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REGENTS BY STATE STANDARD: TOPIC

NY Geometry Regents Exam Questions
from Spring 2014 to January 2020 Sorted by State
Standard: Topic

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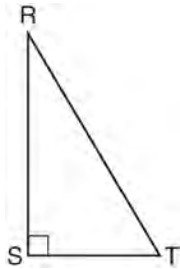
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Geometry Regents Exam Questions by State Standard: Topic

TOOLS OF GEOMETRY
G.GMD.B.4: ROTATIONS OF TWO-DIMENSIONAL OBJECTS

1 Which object is formed when right triangle *RST* shown below is rotated around leg $\overline{RS}$?

1) a pyramid with a square base
2) an isosceles triangle
3) a right triangle
4) a cone

2 If the rectangle below is continuously rotated about side *w*, which solid figure is formed?

1) pyramid
2) rectangular prism
3) cone
4) cylinder

3 A student has a rectangular postcard that he folds in half lengthwise. Next, he rotates it continuously about the folded edge. Which three-dimensional object below is generated by this rotation?

1)

2)

3)

4)
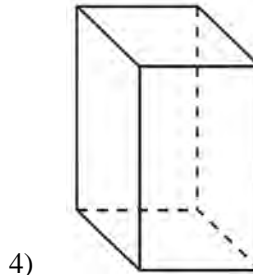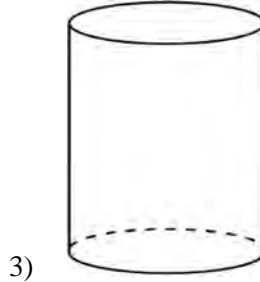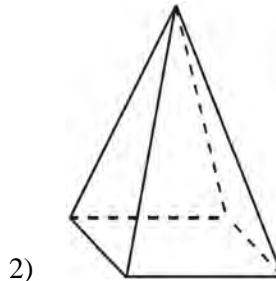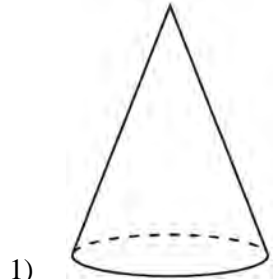
4 In the diagram below, right triangle *ABC* has legs whose lengths are 4 and 6.
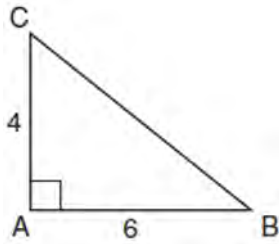
What is the volume of the three-dimensional object formed by continuously rotating the right triangle around $\overline{AB}$?
1) 32π
2) 48π
3) 96π
4) 144π

5 A rectangle whose length and width are 10 and 6, respectively, is shown below. The rectangle is continuously rotated around a straight line to form an object whose volume is 150π.
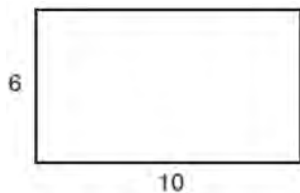
Which line could the rectangle be rotated around?
1) a long side
2) a short side
3) the vertical line of symmetry
4) the horizontal line of symmetry

6 Circle *O* is centered at the origin. In the diagram below, a quarter of circle *O* is graphed.
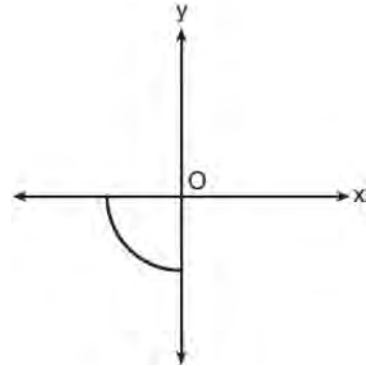
Which three-dimensional figure is generated when the quarter circle is continuously rotated about the *y*-axis?
1) cone
2) sphere
3) cylinder
4) hemisphere

7 Triangle *ABC*, with vertices at $A(0,0)$, $B(3,5)$, and $C(0,5)$, is graphed on the set of axes shown below.
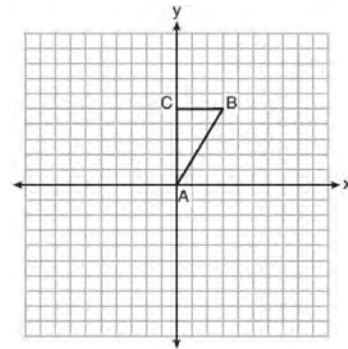
Which figure is formed when $\triangle ABC$ is rotated continuously about $\overline{BC}$?
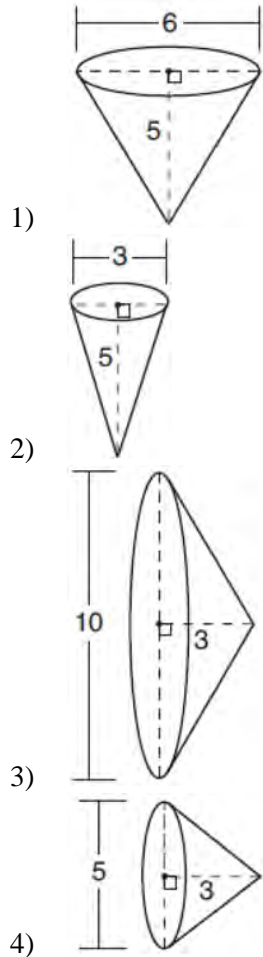
1)

2)

3)

4)

8   If an equilateral triangle is continuously rotated around one of its medians, which 3-dimensional object is generated?
1)   cone
2)   pyramid
3)   prism
4)   sphere

9   If a rectangle is continuously rotated around one of its sides, what is the three-dimensional figure formed?
1)   rectangular prism
2)   cylinder
3)   sphere
4)   cone
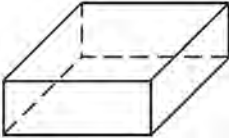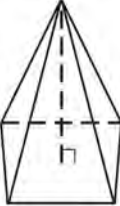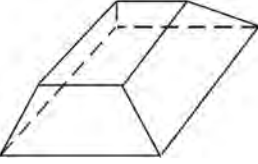
10   An isosceles right triangle whose legs measure 6 is continuously rotated about one of its legs to form a three-dimensional object. The three-dimensional object is a
1)   cylinder with a diameter of 6
2)   cylinder with a diameter of 12
3)   cone with a diameter of 6
4)   cone with a diameter of 12

11   Which three-dimensional figure will result when a rectangle 6 inches long and 5 inches wide is continuously rotated about the longer side?
1)   a rectangular prism with a length of 6 inches, width of 6 inches, and height of 5 inches
2)   a rectangular prism with a length of 6 inches, width of 5 inches, and height of 5 inches
3)   a cylinder with a radius of 5 inches and a height of 6 inches
4)   a cylinder with a radius of 6 inches and a height of 5 inches

12   Square *MATH* has a side length of 7 inches. Which three-dimensional object will be formed by continuously rotating square *MATH* around side $\overline{AT}$?
1)   a right cone with a base diameter of 7 inches
2)   a right cylinder with a diameter of 7 inches
3)   a right cone with a base radius of 7 inches
4)   a right cylinder with a radius of 7 inches

G.GMD.B.4: CROSS-SECTIONS OF THREE-DIMENSIONAL OBJECTS

13 Which figure can have the same cross section as a sphere?

1)

2)

3)

4)

14 A right hexagonal prism is shown below. A two-dimensional cross section that is perpendicular to the base is taken from the prism.
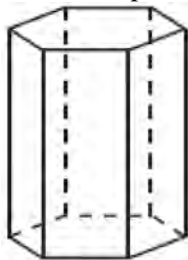
Which figure describes the two-dimensional cross section?
1) triangle
2) rectangle
3) pentagon
4) hexagon

15 William is drawing pictures of cross sections of the right circular cone below.
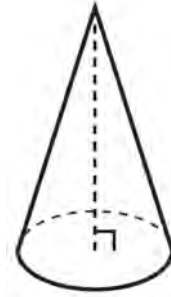
Which drawing can *not* be a cross section of a cone?

1)

2)

3)

4)

16 A two-dimensional cross section is taken of a three-dimensional object. If this cross section is a triangle, what can *not* be the three-dimensional object?
1) cone
2) cylinder
3) pyramid
4) rectangular prism

4

17 The cross section of a regular pyramid contains the altitude of the pyramid. The shape of this cross section is a
1) circle
2) square
3) triangle
4) rectangle

18 A plane intersects a hexagonal prism. The plane is perpendicular to the base of the prism. Which two-dimensional figure is the cross section of the plane intersecting the prism?
1) triangle
2) trapezoid
3) hexagon
4) rectangle

19 A right cylinder is cut perpendicular to its base. The shape of the cross section is a
1) circle
2) cylinder
3) rectangle
4) triangular prism

20 Which figure(s) below can have a triangle as a two-dimensional cross section?
    I.   cone
    II.   cylinder
    III. cube
    IV. square pyramid
1) I, only
2) IV, only
3) I, II, and IV, only
4) I, III, and IV, only

G.CO.D.12: CONSTRUCTIONS

21 Using a compass and straightedge, construct an altitude of triangle ABC below. [Leave all construction marks.]
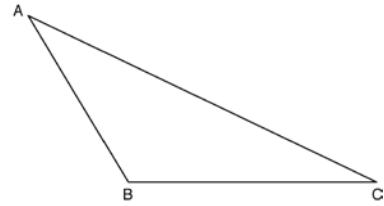
22 Triangle XYZ is shown below. Using a compass and straightedge, on the line below, construct and label $\triangle ABC$, such that $\triangle ABC \cong \triangle XYZ$. [Leave all construction marks.] Based on your construction, state the theorem that justifies why $\triangle ABC$ is congruent to $\triangle XYZ$.

5
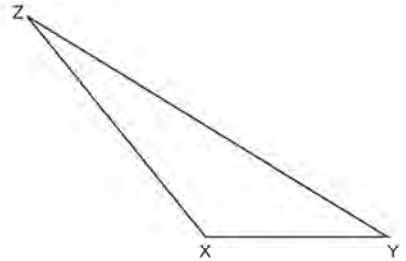
23 In the diagram below, radius $\overline{OA}$ is drawn in circle O. Using a compass and a straightedge, construct a line tangent to circle O at point A. [Leave all construction marks.]
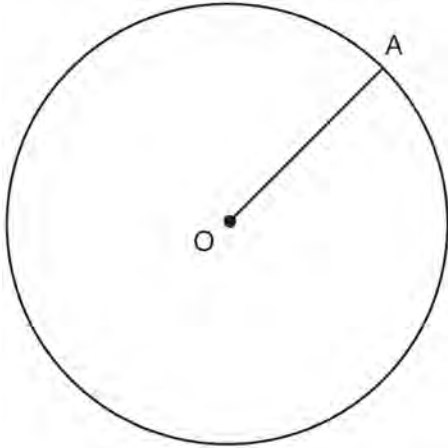
25 Using a compass and straightedge, construct and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation with a scale factor of 2 and centered at B. [Leave all construction marks.] Describe the relationship between the lengths of $\overline{AC}$ and $\overline{A'C'}$.
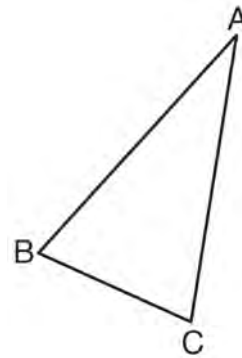
24 In the diagram of $\triangle ABC$ shown below, use a compass and straightedge to construct the median to $\overline{AB}$. [Leave all construction marks.]
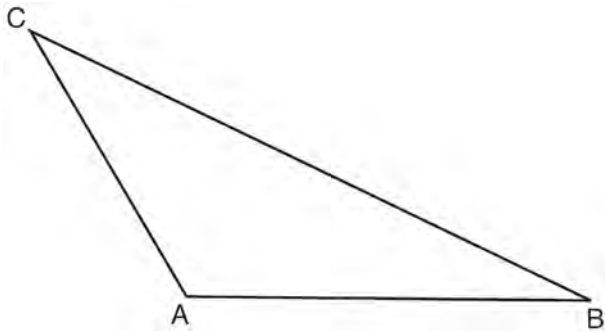
26 Using the construction below, state the degree measure of $\angle CAD$. Explain why.
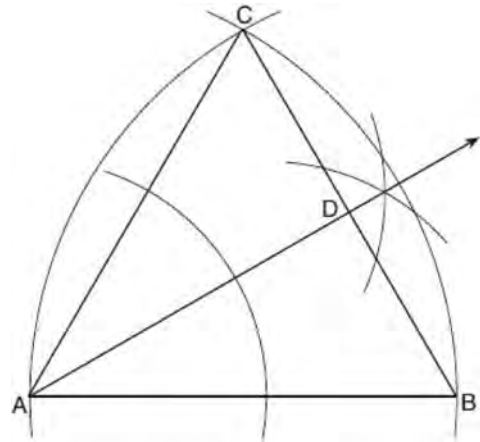
27 Using a compass and straightedge, construct the line of reflection over which triangle *RST* reflects onto triangle *R'S'T'*. [Leave all construction marks.]
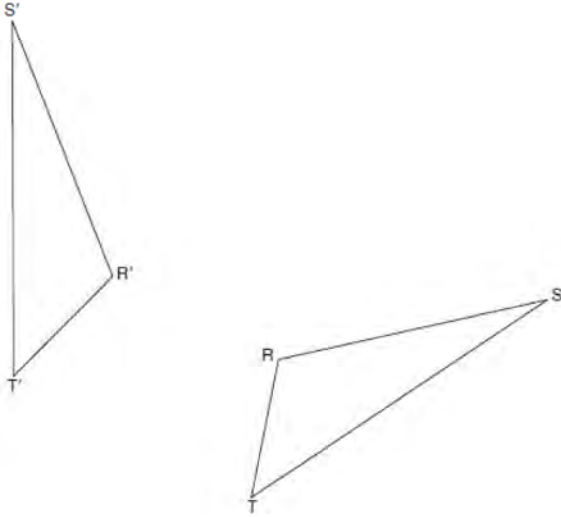
29 Using a compass and straightedge, construct the median to side $\overline{AC}$ in $\triangle ABC$ below. [Leave all construction marks.]
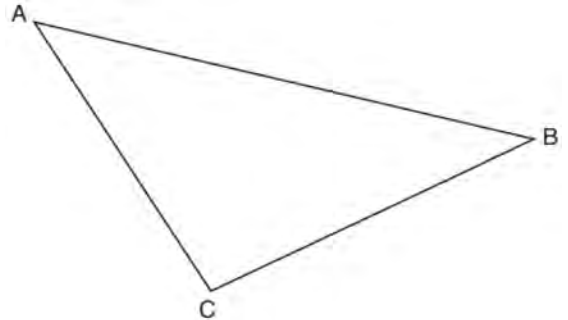
30 In the circle below, $\overline{AB}$ is a chord. Using a compass and straightedge, construct a diameter of the circle. [Leave all construction marks.]
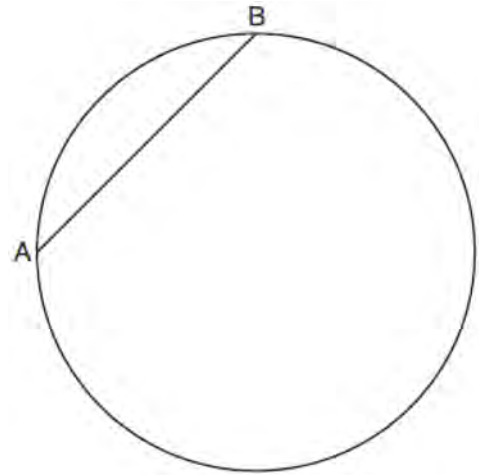
28 Given: Trapezoid *JKLM* with $\overline{JK} \parallel \overline{ML}$
Using a compass and straightedge, construct the altitude from vertex *J* to $\overline{ML}$. [Leave all construction marks.]

7
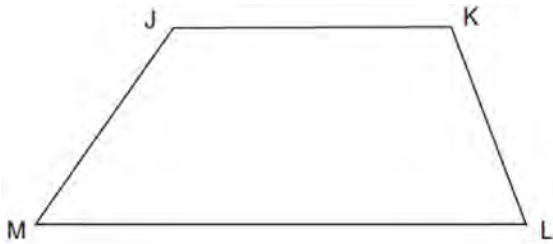
31 Given points *A*, *B*, and *C*, use a compass and straightedge to construct point *D* so that *ABCD* is a parallelogram. [Leave all construction marks.]

• C

• A   • B

32 Triangle *ABC* is shown below. Using a compass and straightedge, construct the dilation of △*ABC* centered at *B* with a scale factor of 2. [Leave all construction marks.]

33 Given $\overline{MT}$ below, use a compass and straightedge to construct a 45° angle whose vertex is at point *M*. [Leave all construction marks.]

M   T

G.CO.D.13: CONSTRUCTIONS

34 Use a compass and straightedge to construct an inscribed square in circle *T* shown below. [Leave all construction marks.]

•T
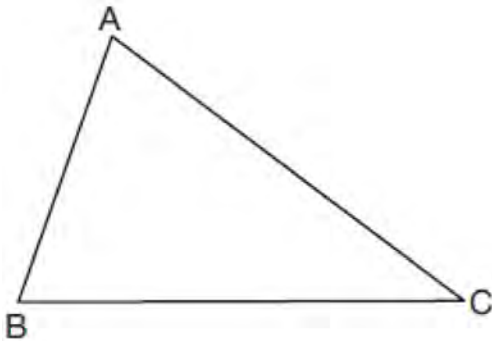
Is the image of △*ABC* similar to the original triangle? Explain why.
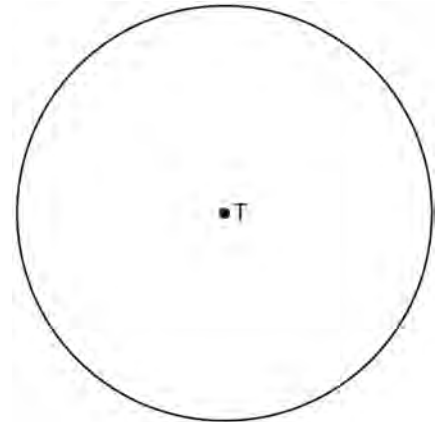
35 Construct an equilateral triangle inscribed in circle T shown below. [Leave all construction marks.]
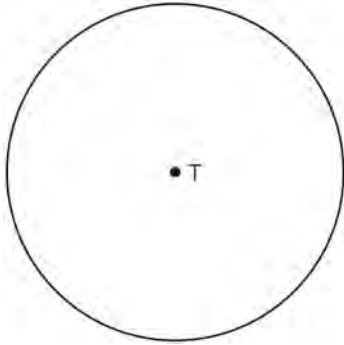
36 Using a compass and straightedge, construct a regular hexagon inscribed in circle O. [Leave all construction marks.]
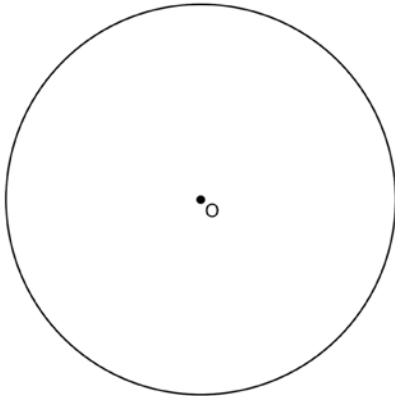
37 The diagram below shows circle O with diameter $\overline{AB}$. Using a compass and straightedge, construct a square that is inscribed in circle O. [Leave all construction marks.]
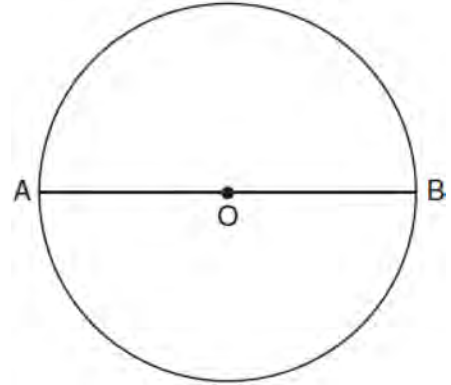
38 Given circle O with radius $\overline{OA}$, use a compass and straightedge to construct an equilateral triangle inscribed in circle O. [Leave all construction marks.]
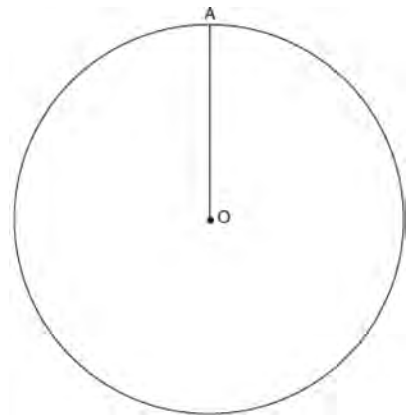
39 Using a straightedge and compass, construct a square inscribed in circle *O* below. [Leave all construction marks.]
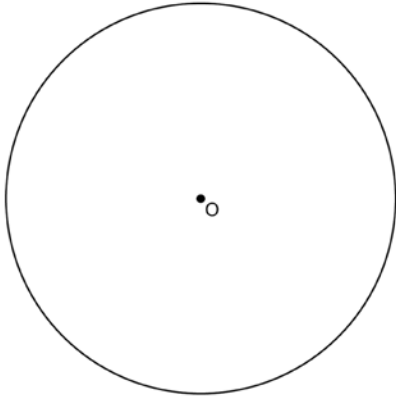
Determine the measure of the arc intercepted by two adjacent sides of the constructed square. Explain your reasoning.

40 Using a compass and straightedge, construct a regular hexagon inscribed in circle *O* below. Label it *ABCDEF*. [Leave all construction marks.]
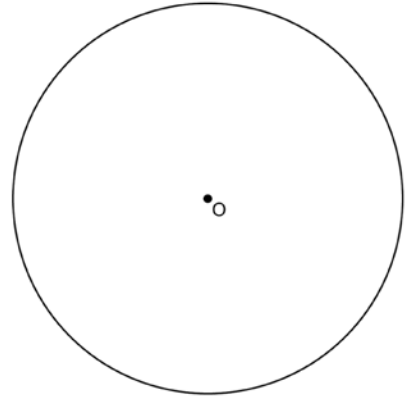
If chords $\overline{FB}$ and $\overline{FC}$ are drawn, which type of triangle, according to its angles, would $\triangle FBC$ be? Explain your answer.

LINES AND ANGLES
G.GPE.B.6: DIRECTED LINE SEGMENTS

41 Point *P* is on the directed line segment from point $X(-6,-2)$ to point $Y(6,7)$ and divides the segment in the ratio $1:5$. What are the coordinates of point *P*?

1) $\left(4, 5\frac{1}{2}\right)$

2) $\left(-\frac{1}{2}, -4\right)$

3) $\left(-4\frac{1}{2}, 0\right)$

4) $\left(-4, -\frac{1}{2}\right)$

42 What are the coordinates of the point on the directed line segment from $K(-5,-4)$ to $L(5,1)$ that partitions the segment into a ratio of 3 to 2?
1) $(-3,-3)$
2) $(-1,-2)$
3) $\left(0,-\frac{3}{2}\right)$
4) $(1,-1)$

43 Point Q is on $\overline{MN}$ such that $MQ:QN = 2:3$. If M has coordinates $(3,5)$ and N has coordinates $(8,-5)$, the coordinates of Q are
1) $(5,1)$
2) $(5,0)$
3) $(6,-1)$
4) $(6,0)$

44 Line segment RW has endpoints $R(-4,5)$ and $W(6,20)$. Point P is on $\overline{RW}$ such that $RP:PW$ is 2:3. What are the coordinates of point P?
1) $(2,9)$
2) $(0,11)$
3) $(2,14)$
4) $(10,2)$

45 The coordinates of the endpoints of $\overline{AB}$ are $A(-8,-2)$ and $B(16,6)$. Point P is on $\overline{AB}$. What are the coordinates of point P, such that $AP:PB$ is 3:5?
1) $(1,1)$
2) $(7,3)$
3) $(9.6,3.6)$
4) $(6.4,2.8)$

46 Directed line segment DE has endpoints $D(-4,-2)$ and $E(1,8)$. Point F divides $\overline{DE}$ such that $DF:FE$ is 2:3. What are the coordinates of F?
1) (-3.0)
2) $(-2,2)$
3) $(-1,4)$
4) $(2,4)$

47 The coordinates of the endpoints of directed line segment ABC are $A(-8,7)$ and $C(7,-13)$. If $AB:BC = 3:2$, the coordinates of B are
1) $(1,-5)$
2) $(-2,-1)$
3) $(-3,0)$
4) $(3,-6)$

48 Point M divides $\overline{AB}$ so that $AM:MB = 1:2$. If A has coordinates $(-1,-3)$ and B has coordinates $(8,9)$, the coordinates of M are
1) $(2,1)$
2) $\left(\frac{5}{3},0\right)$
3) $(5,5)$
4) $\left(\frac{23}{3},8\right)$

49 What are the coordinates of point C on the directed segment from $A(-8,4)$ to $B(10,-2)$ that partitions the segment such that $AC:CB$ is 2:1?
1) $(1,1)$
2) $(-2,2)$
3) $(2,-2)$
4) $(4,0)$

11

50 The coordinates of the endpoints of $\overline{QS}$ are
    $Q(-9,8)$ and $S(9,-4)$. Point R is on $\overline{QS}$ such that
    $QR:RS$ is in the ratio of 1:2. What are the
    coordinates of point R?
    1) $(0,2)$
    2) $(3,0)$
    3) $(-3,4)$
    4) $(-6,6)$

51 The endpoints of directed line segment PQ have
    coordinates of $P(-7,-5)$ and $Q(5,3)$. What are the
    coordinates of point A, on $\overline{PQ}$, that divide $\overline{PQ}$ into
    a ratio of 1:3?
    1) $A(-1,-1)$
    2) $A(2,1)$
    3) $A(3,2)$
    4) $A(-4,-3)$

52 In the diagram below, $\overline{AC}$ has endpoints with
    coordinates $A(-5,2)$ and $C(4,-10)$.
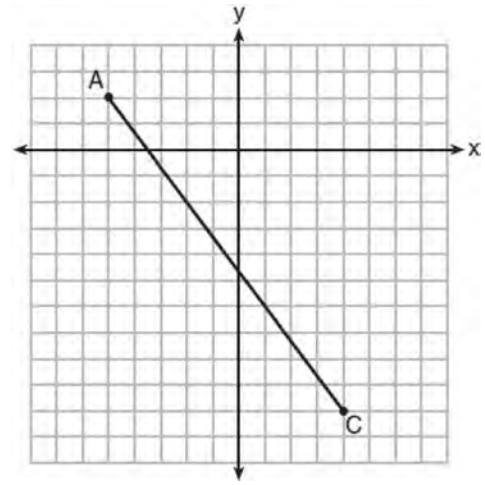
If B is a point on $\overline{AC}$ and $AB:BC = 1:2$, what are
the coordinates of B?
    1) $(-2,-2)$
    2) $\left(-\dfrac{1}{2},-4\right)$
    3) $\left(0,-\dfrac{14}{3}\right)$
    4) $(1,-6)$

53 The coordinates of the endpoints of $\overline{AB}$ are
$A(-6,-5)$ and $B(4,0)$. Point P is on $\overline{AB}$. Determine
and state the coordinates of point P, such that
$AP:PB$ is $2:3$. [The use of the set of axes below is
optional.]
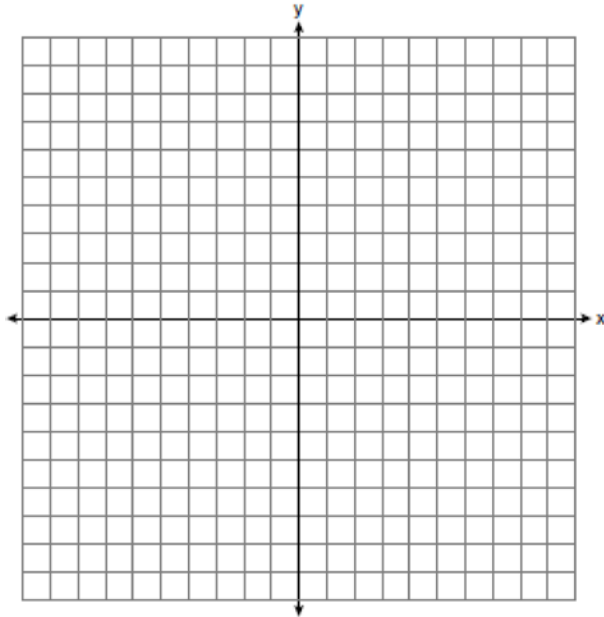
54 Directed line segment PT has endpoints whose
coordinates are $P(-2,1)$ and $T(4,7)$. Determine the
coordinates of point J that divides the segment in
the ratio 2 to 1. [The use of the set of axes below is
optional.]
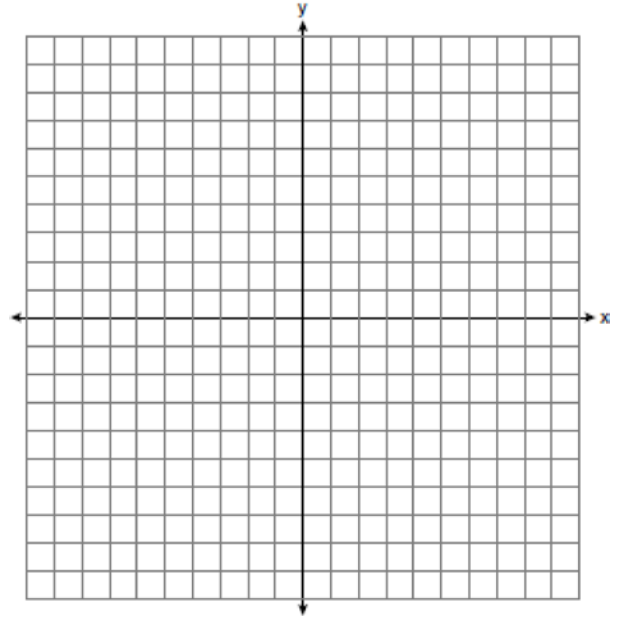
55 Point P is on segment AB such that $AP:PB$ is $4:5$.
If A has coordinates $(4,2)$, and B has coordinates
$(22,2)$, determine and state the coordinates of P.

56 The endpoints of $\overline{DEF}$ are $D(1,4)$ and $F(16,14)$.
Determine and state the coordinates of point E, if
$DE:EF = 2:3$.

G.CO.C.9: LINES & ANGLES

57 Steve drew line segments *ABCD*, *EFG*, *BF*, and *CF* as shown in the diagram below. Scalene △*BFC* is formed.
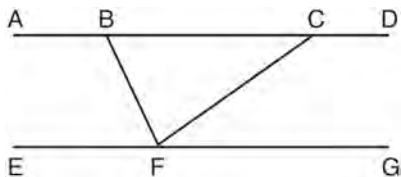
Which statement will allow Steve to prove $\overline{ABCD} \parallel \overline{EFG}$?

1) $\angle CFG \cong \angle FCB$
2) $\angle ABF \cong \angle BFC$
3) $\angle EFB \cong \angle CFB$
4) $\angle CBF \cong \angle GFC$

58 In the diagram below, $\overleftrightarrow{FE}$ bisects $\overline{AC}$ at *B*, and $\overleftrightarrow{GE}$ bisects $\overline{BD}$ at *C*.
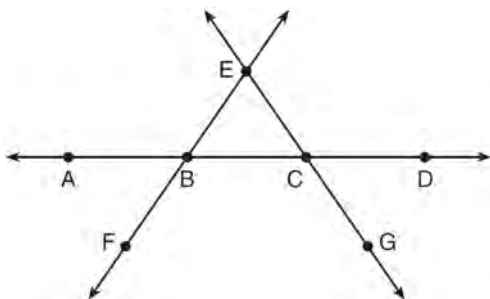
Which statement is always true?

1) $\overline{AB} \cong \overline{DC}$
2) $\overline{FB} \cong \overline{EB}$
3) $\overleftrightarrow{BD}$ bisects $\overline{GE}$ at *C*.
4) $\overleftrightarrow{AC}$ bisects $\overline{FE}$ at *B*.

59 In the diagram below, lines ℓ, *m*, *n*, and *p* intersect line *r*.
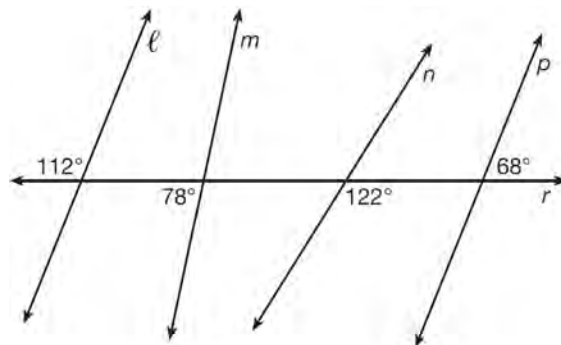
Which statement is true?

1) $\ell \parallel n$
2) $\ell \parallel p$
3) $m \parallel p$
4) $m \parallel n$

60 In the diagram below, $\overline{AB} \parallel \overrightarrow{DEF}$, $\overline{AE}$ and $\overline{BD}$ intersect at *C*, m∠*B* = 43°, and m∠*CEF* = 152°.
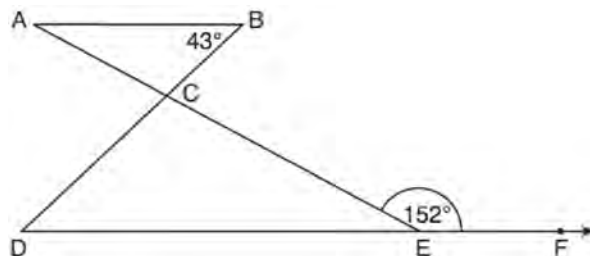
Which statement is true?

1) m∠*D* = 28°
2) m∠*A* = 43°
3) m∠*ACD* = 71°
4) m∠*BCE* = 109°

14

61 In the diagram below, $\overline{DB}$ and $\overline{AF}$ intersect at point C, and $\overline{AD}$ and $\overline{FBE}$ are drawn.
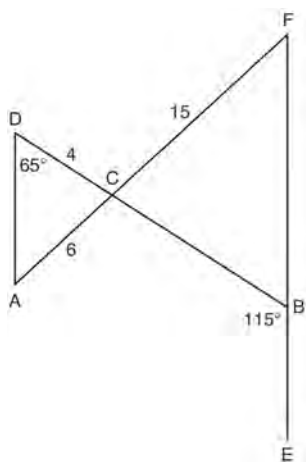
If $AC = 6$, $DC = 4$, $FC = 15$, m$\angle D = 65°$, and m$\angle CBE = 115°$, what is the length of $\overline{CB}$?
1) 10
2) 12
3) 17
4) 22.5

62 As shown in the diagram below, $\overleftrightarrow{ABC} \parallel \overleftrightarrow{EFG}$ and $\overline{BF} \cong \overline{EF}$.
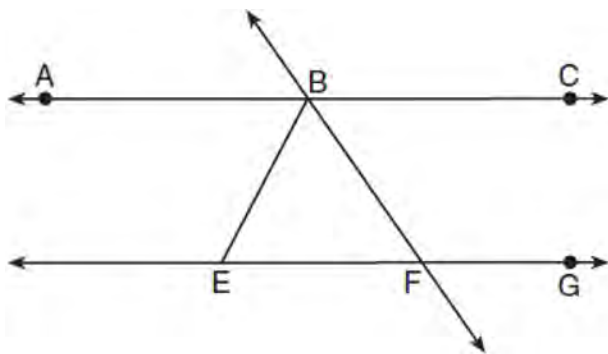
If m$\angle CBF = 42.5°$, then m$\angle EBF$ is
1) 42.5°
2) 68.75°
3) 95°
4) 137.5°

63 In the diagram below, $\overline{AEFB} \parallel \overline{CGD}$, and $\overline{GE}$ and $\overline{GF}$ are drawn.
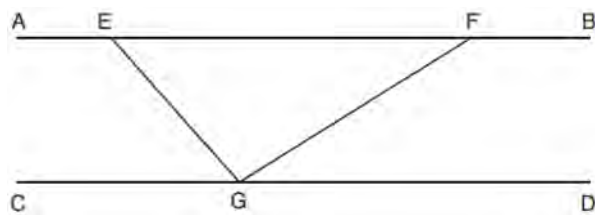
If m$\angle EFG = 32°$ and m$\angle AEG = 137°$, what is m$\angle EGF$?
1) 11°
2) 43°
3) 75°
4) 105°

64 In the diagram below, $\overline{FAD} \parallel \overline{EHC}$, and $\overline{ABH}$ and $\overline{BC}$ are drawn.
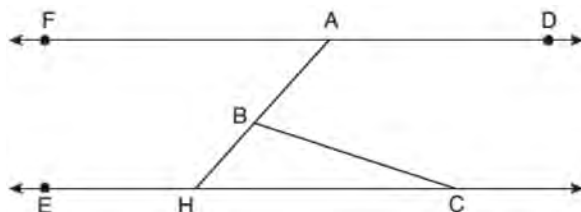
If m$\angle FAB = 48°$ and m$\angle ECB = 18°$, what is m$\angle ABC$?
1) 18°
2) 48°
3) 66°
4) 114°

15

65 Segment *CD* is the perpendicular bisector of $\overline{AB}$ at *E*. Which pair of segments does *not* have to be congruent?
1) $\overline{AD}, \overline{BD}$
2) $\overline{AC}, \overline{BC}$
3) $\overline{AE}, \overline{BE}$
4) $\overline{DE}, \overline{CE}$

66 In the diagram below, $\overline{EF}$ intersects $\overline{AB}$ and $\overline{CD}$ at *G* and *H*, respectively, and $\overline{GI}$ is drawn such that $\overline{GH} \cong \overline{IH}$.
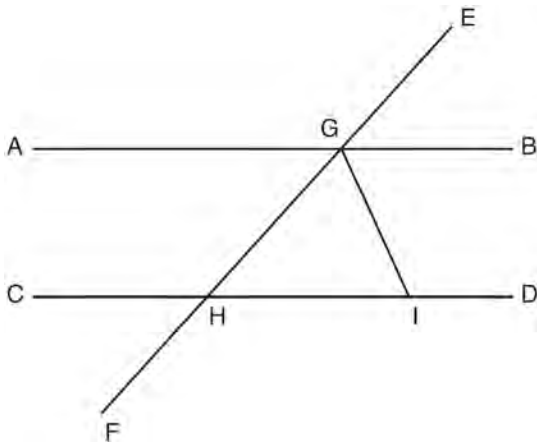
If m∠*EGB* = 50° and m∠*DIG* = 115°, explain why $\overline{AB} \parallel \overline{CD}$.

G.GPE.B.5: PARALLEL AND PERPENDICULAR LINES

67 Given $\overline{MN}$ shown below, with $M(-6,1)$ and $N(3,-5)$, what is an equation of the line that passes through point $P(6,1)$ and is parallel to $\overline{MN}$?
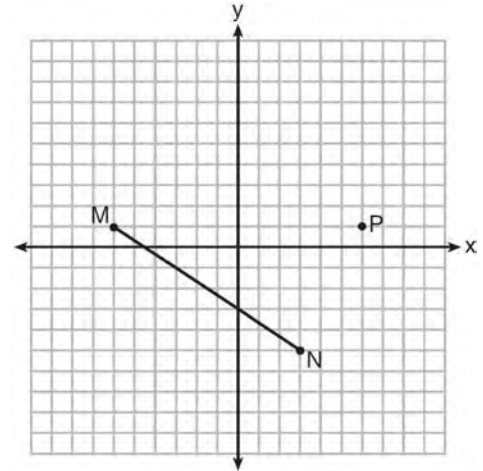
1) $y = -\frac{2}{3}x + 5$
2) $y = -\frac{2}{3}x - 3$
3) $y = \frac{3}{2}x + 7$
4) $y = \frac{3}{2}x - 8$

68 What is an equation of the perpendicular bisector of the line segment shown in the diagram below?
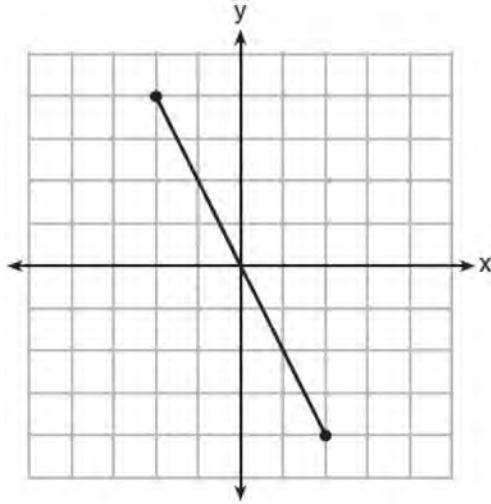
1) $y + 2x = 0$
2) $y - 2x = 0$
3) $2y + x = 0$
4) $2y - x = 0$

69 Which equation represents a line that is perpendicular to the line represented by $2x - y = 7$?

1) $y = -\dfrac{1}{2}x + 6$

2) $y = \dfrac{1}{2}x + 6$

3) $y = -2x + 6$
4) $y = 2x + 6$

70 What is an equation of a line that is perpendicular to the line whose equation is $2y + 3x = 1$?

1) $y = \dfrac{2}{3}x + \dfrac{5}{2}$

2) $y = \dfrac{3}{2}x + 2$

3) $y = -\dfrac{2}{3}x + 1$

4) $y = -\dfrac{3}{2}x + \dfrac{1}{2}$

71 Which equation represents a line that is perpendicular to the line represented by $y = \dfrac{2}{3}x + 1$?

1) $3x + 2y = 12$
2) $3x - 2y = 12$

3) $y = \dfrac{3}{2}x + 2$

4) $y = -\dfrac{2}{3}x + 4$

72 An equation of a line perpendicular to the line represented by the equation $y = -\dfrac{1}{2}x - 5$ and passing through $(6, -4)$ is

1) $y = -\dfrac{1}{2}x + 4$

2) $y = -\dfrac{1}{2}x - 1$

3) $y = 2x + 14$
4) $y = 2x - 16$

17

73 Line segment *NY* has endpoints $N(-11,5)$ and $Y(5,-7)$. What is the equation of the perpendicular bisector of $\overline{NY}$?

1) $y + 1 = \dfrac{4}{3}(x + 3)$

2) $y + 1 = -\dfrac{3}{4}(x + 3)$

3) $y - 6 = \dfrac{4}{3}(x - 8)$

4) $y - 6 = -\dfrac{3}{4}(x - 8)$

74 Which equation represents the line that passes through the point $(-2,2)$ and is parallel to $y = \dfrac{1}{2}x + 8$?

1) $y = \dfrac{1}{2}x$

2) $y = -2x - 3$

3) $y = \dfrac{1}{2}x + 3$

4) $y = -2x + 3$

75 What is an equation of a line that is perpendicular to the line whose equation is $2y = 3x - 10$ and passes through $(-6,1)$?

1) $y = -\dfrac{2}{3}x - 5$

2) $y = -\dfrac{2}{3}x - 3$

3) $y = \dfrac{2}{3}x + 1$

4) $y = \dfrac{2}{3}x + 10$

76 What is an equation of a line which passes through $(6,9)$ and is perpendicular to the line whose equation is $4x - 6y = 15$?

1) $y - 9 = -\dfrac{3}{2}(x - 6)$

2) $y - 9 = \dfrac{2}{3}(x - 6)$

3) $y + 9 = -\dfrac{3}{2}(x + 6)$

4) $y + 9 = \dfrac{2}{3}(x + 6)$

77 What is an equation of the line that passes through the point $(6,8)$ and is perpendicular to a line with equation $y = \dfrac{3}{2}x + 5$?

1) $y - 8 = \dfrac{3}{2}(x - 6)$

2) $y - 8 = -\dfrac{2}{3}(x - 6)$

3) $y + 8 = \dfrac{3}{2}(x + 6)$

4) $y + 8 = -\dfrac{2}{3}(x + 6)$

78 Which equation represents a line parallel to the line whose equation is $-2x + 3y = -4$ and passes through the point $(1,3)$?

1) $y - 3 = -\dfrac{3}{2}(x - 1)$

2) $y - 3 = \dfrac{2}{3}(x - 1)$

3) $y + 3 = -\dfrac{3}{2}(x + 1)$

4) $y + 3 = \dfrac{2}{3}(x + 1)$

79 Write an equation of the line that is parallel to the line whose equation is $3y + 7 = 2x$ and passes through the point $(2,6)$.

80 Determine and state an equation of the line perpendicular to the line $5x - 4y = 10$ and passing through the point $(5,12)$.

TRIANGLES
G.SRT.C.8: 30-60-90 TRIANGLES

81 The diagram shows rectangle $ABCD$, with diagonal $\overline{BD}$.
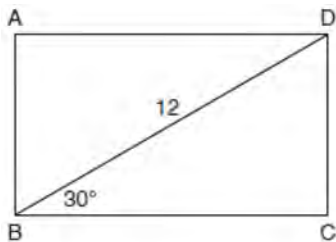
What is the perimeter of rectangle $ABCD$, to the *nearest tenth*?
1) 28.4
2) 32.8
3) 48.0
4) 62.4

82 An equilateral triangle has sides of length 20. To the *nearest tenth*, what is the height of the equilateral triangle?
1) 10.0
2) 11.5
3) 17.3
4) 23.1

G.SRT.B.5: SIDE SPLITTER THEOREM

83 In the diagram below, $\triangle ABC \sim \triangle ADE$.
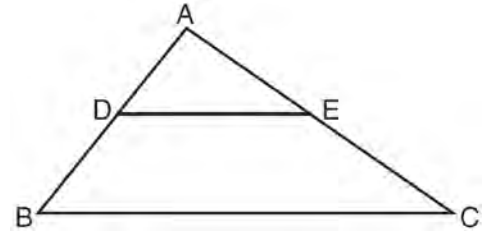
Which measurements are justified by this similarity?
1) $AD = 3$, $AB = 6$, $AE = 4$, and $AC = 12$
2) $AD = 5$, $AB = 8$, $AE = 7$, and $AC = 10$
3) $AD = 3$, $AB = 9$, $AE = 5$, and $AC = 10$
4) $AD = 2$, $AB = 6$, $AE = 5$, and $AC = 15$

84 In the diagram of $\triangle ADC$ below, $\overline{EB} \parallel \overline{DC}$, $AE = 9$, $ED = 5$, and $AB = 9.2$.
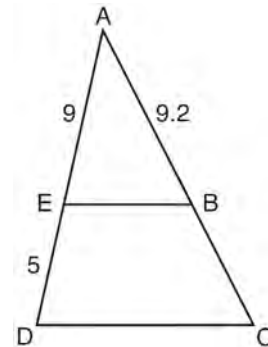
What is the length of $\overline{AC}$, to the *nearest tenth*?
1) 5.1
2) 5.2
3) 14.3
4) 14.4

19

85 In the diagram of $\triangle ABC$, points D and E are on $\overline{AB}$ and $\overline{CB}$, respectively, such that $\overline{AC} \parallel \overline{DE}$.
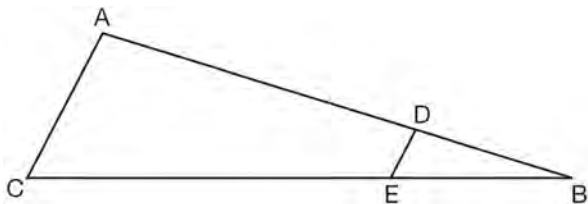
If $AD = 24$, $DB = 12$, and $DE = 4$, what is the length of $\overline{AC}$?
1) 8
2) 12
3) 16
4) 72

86 Given $\triangle MRO$ shown below, with trapezoid $PTRO$, $MR = 9$, $MP = 2$, and $PO = 4$.
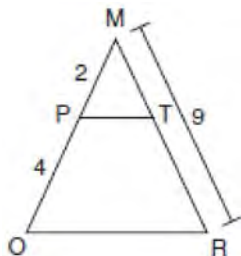
What is the length of $\overline{TR}$?
1) 4.5
2) 5
3) 3
4) 6

87 In the diagram below, triangle ACD has points B and E on sides $\overline{AC}$ and $\overline{AD}$, respectively, such that $\overline{BE} \parallel \overline{CD}$, $AB = 1$, $BC = 3.5$, and $AD = 18$.
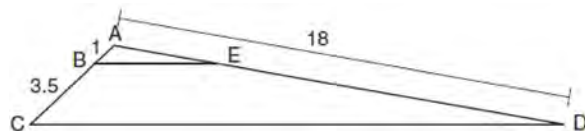
What is the length of $\overline{AE}$, to the *nearest tenth*?
1) 14.0
2) 5.1
3) 3.3
4) 4.0

88 In the diagram of $\triangle ABC$ below, $\overline{DE}$ is parallel to $\overline{AB}$, $CD = 15$, $AD = 9$, and $AB = 40$.
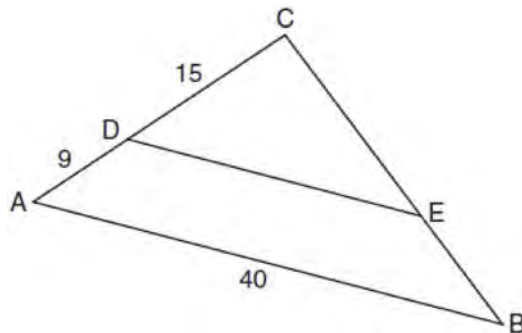
The length of $\overline{DE}$ is
1) 15
2) 24
3) 25
4) 30

89 In the diagram below of $\triangle PQR$, $\overline{ST}$ is drawn parallel to $\overline{PR}$, $PS = 2$, $SQ = 5$, and $TR = 5$.
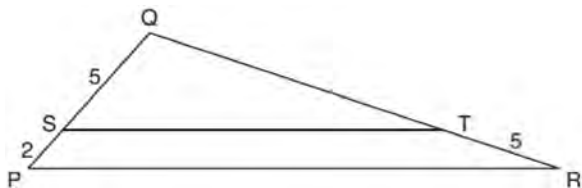
What is the length of $\overline{QR}$?
1) 7
2) 2
3) $12\frac{1}{2}$
4) $17\frac{1}{2}$

90 In the diagram of $\triangle ABC$ below, points D and E are on sides $\overline{AB}$ and $\overline{CB}$ respectively, such that $\overline{DE} \parallel \overline{AC}$.
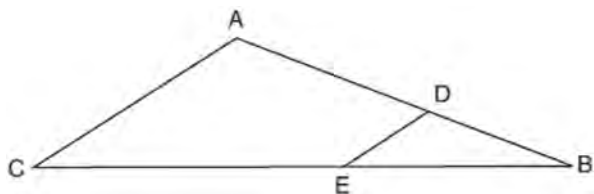
If EB is 3 more than DB, $AB = 14$, and $CB = 21$, what is the length of $\overline{AD}$?
1) 6
2) 8
3) 9
4) 12

91 In triangle ABC, points D and E are on sides $\overline{AB}$ and $\overline{BC}$, respectively, such that $\overline{DE} \parallel \overline{AC}$, and $AD:DB = 3:5$.
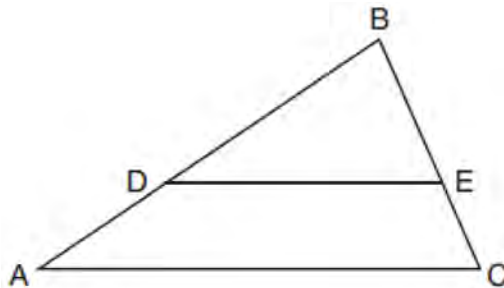
If $DB = 6.3$ and $AC = 9.4$, what is the length of DE, to the nearest tenth?
1) 3.8
2) 5.6
3) 5.9
4) 15.7

92 In right triangle ABC shown below, point D is on $\overline{AB}$ and point E is on $\overline{CB}$ such that $\overline{AC} \parallel \overline{DE}$.
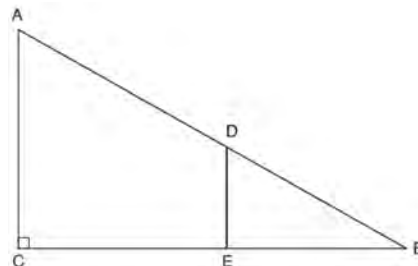
If $AB = 15$, $BC = 12$, and $EC = 7$, what is the length of $\overline{BD}$?
1) 8.75
2) 6.25
3) 5
4) 4

93 In the diagram below of $\triangle ABC$, D is a point on $\overline{BA}$, E is a point on $\overline{BC}$, and $\overline{DE}$ is drawn.
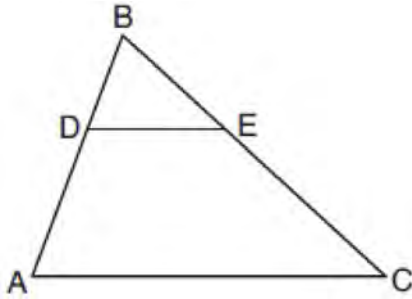
If $BD = 5$, $DA = 12$, and $BE = 7$, what is the length of $\overline{BC}$ so that $\overline{AC} \parallel \overline{DE}$?
1) 23.8
2) 16.8
3) 15.6
4) 8.6

94 In the diagram below of $\triangle RST$, L is a point on $\overline{RS}$, and M is a point on $\overline{RT}$, such that $\overline{LM} \parallel \overline{ST}$.
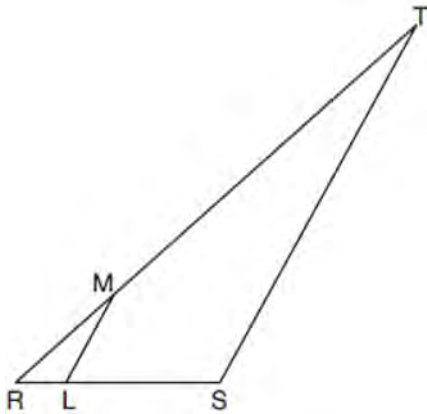
If $RL = 2$, $LS = 6$, $LM = 4$, and $ST = x + 2$, what is the length of $\overline{ST}$?
1) 10
2) 12
3) 14
4) 16

95 In $\triangle CED$ as shown below, points A and B are located on sides $\overline{CE}$ and $\overline{ED}$, respectively. Line segment AB is drawn such that $AE = 3.75$, $AC = 5$, $EB = 4.5$, and $BD = 6$.
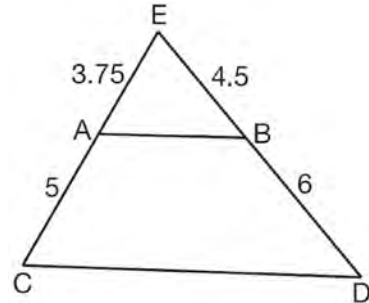
Explain why $\overline{AB}$ is parallel to $\overline{CD}$.

G.CO.C.10: INTERIOR AND EXTERIOR ANGLES OF TRIANGLES

96 In the diagram below, m∠$BDC = 100°$, m∠$A = 50°$, and m∠$DBC = 30°$.
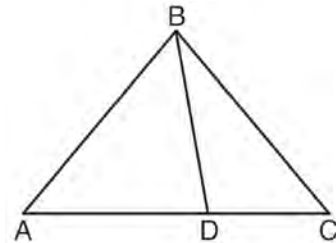
Which statement is true?
1) $\triangle ABD$ is obtuse.
2) $\triangle ABC$ is isosceles.
3) m∠$ABD = 80°$
4) $\triangle ABD$ is scalene.

22

97 In the diagram below, $\overline{DE}$ divides $\overline{AB}$ and $\overline{AC}$ proportionally, $m\angle C = 26°$, $m\angle A = 82°$, and $\overline{DF}$ bisects $\angle BDE$.
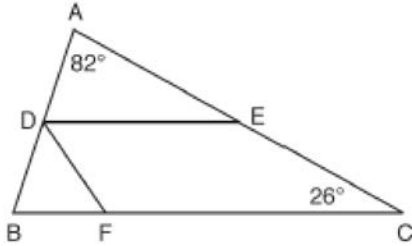
The measure of angle *DFB* is
1) 36°
2) 54°
3) 72°
4) 82°

98 In the diagram below of triangle *MNO*, $\angle M$ and $\angle O$ are bisected by $\overline{MS}$ and $\overline{OR}$, respectively. Segments *MS* and *OR* intersect at *T*, and $m\angle N = 40°$.
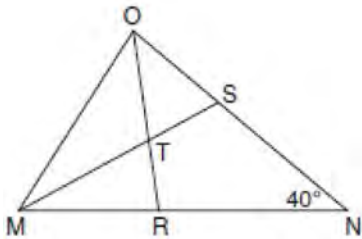
If $m\angle TMR = 28°$, the measure of angle *OTS* is
1) 40°
2) 50°
3) 60°
4) 70°

G.CO.C.10: EXTERIOR ANGLE THEOREM

99 In the diagram below of triangle *ABC*, $\overline{AC}$ is extended through point *C* to point *D*, and $\overline{BE}$ is drawn to $\overline{AC}$.
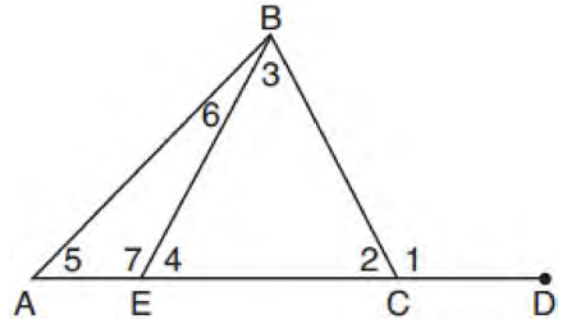
Which equation is always true?
1) $m\angle 1 = m\angle 3 + m\angle 2$
2) $m\angle 5 = m\angle 3 - m\angle 2$
3) $m\angle 6 = m\angle 3 - m\angle 2$
4) $m\angle 7 = m\angle 3 + m\angle 2$

100 Given $\triangle ABC$ with $m\angle B = 62°$ and side $\overline{AC}$ extended to *D*, as shown below.
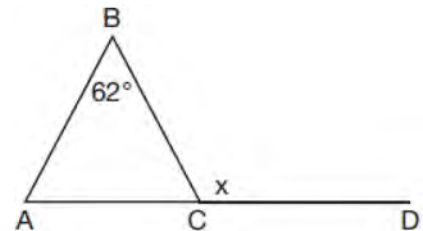
Which value of *x* makes $\overline{AB} \cong \overline{CB}$?
1) 59°
2) 62°
3) 118°
4) 121°

23

101 In $\triangle ABC$ shown below, side $\overline{AC}$ is extended to point D with m$\angle DAB = (180 - 3x)°$, m$\angle B = (6x - 40)°$, and m$\angle C = (x + 20)°$.
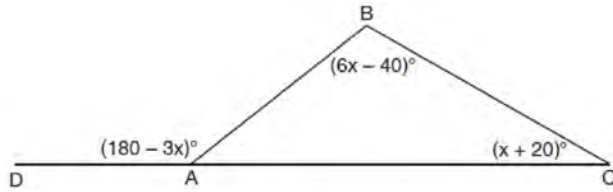
What is m$\angle BAC$?
1) 20°
2) 40°
3) 60°
4) 80°

102 In the diagram below of $\triangle ACD$, $\overline{DB}$ is a median to $\overline{AC}$, and $\overline{AB} \cong \overline{DB}$.
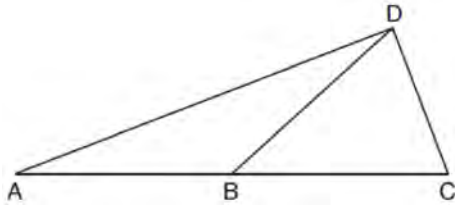
If m$\angle DAB = 32°$, what is m$\angle BDC$?
1) 32°
2) 52°
3) 58°
4) 64°

G.CO.C.10: ANGLE SIDE RELATIONSHIP

103 In the diagram of quadrilateral $NAVY$ below, m$\angle YNA = 30°$, m$\angle YAN = 38°$, m$\angle AVY = 94°$, and m$\angle VAY = 46°$.
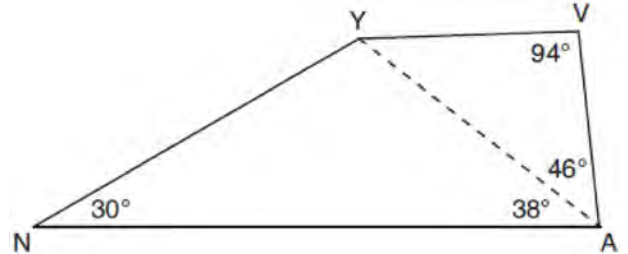
Which segment has the shortest length?
1) $\overline{AY}$
2) $\overline{NY}$
3) $\overline{VA}$
4) $\overline{VY}$

G.CO.C.10: MEDIANS, ALTITUDES AND BISECTORS

104 In triangle MAH below, $\overline{MT}$ is the perpendicular bisector of $\overline{AH}$.
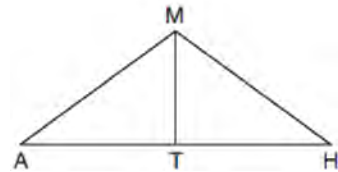
Which statement is *not* always true?
1) $\triangle MAH$ is isosceles.
2) $\triangle MAT$ is isosceles.
3) $\overline{MT}$ bisects $\angle AMH$.
4) $\angle A$ and $\angle TMH$ are complementary.

105 In $\triangle ABC$, $\overline{BD}$ is the perpendicular bisector of $\overline{ADC}$. Based upon this information, which statements below can be proven?

I. $\overline{BD}$ is a median.
II. $\overline{BD}$ bisects $\angle ABC$.
III. $\triangle ABC$ is isosceles.

1) I and II, only
2) I and III, only
3) II and III, only
4) I, II, and III

106 In isosceles $\triangle MNP$, line segment NO bisects vertex $\angle MNP$, as shown below. If $MP = 16$, find the length of $\overline{MO}$ and explain your answer.

G.CO.C.10: MIDSEGMENTS

107 In the diagram below, $\overline{DE}$, $\overline{DF}$, and $\overline{EF}$ are midsegments of $\triangle ABC$.
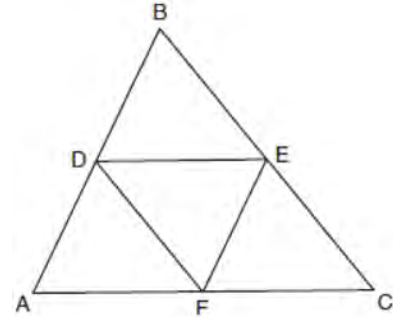
The perimeter of quadrilateral $ADEF$ is equivalent to

1) $AB + BC + AC$
2) $\frac{1}{2}AB + \frac{1}{2}AC$
3) $2AB + 2AC$
4) $AB + AC$

108 In the diagram below of $\triangle ABC$, D, E, and F are the midpoints of $\overline{AB}$, $\overline{BC}$, and $\overline{CA}$, respectively.
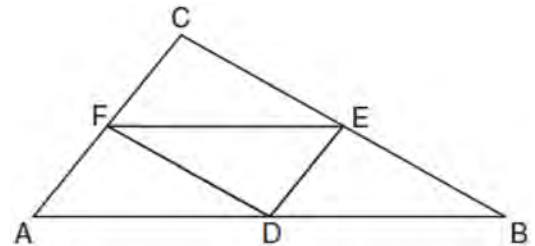
What is the ratio of the area of $\triangle CFE$ to the area of $\triangle CAB$?

1) 1:1
2) 1:2
3) 1:3
4) 1:4

25

109 In the diagram of equilateral triangle ABC shown below, E and F are the midpoints of $\overline{AC}$ and $\overline{BC}$, respectively.
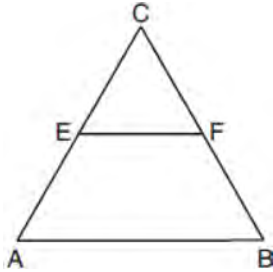
If $EF = 2x + 8$ and $AB = 7x - 2$, what is the perimeter of trapezoid $ABFE$?
1) 36
2) 60
3) 100
4) 120

110 In quadrilateral $ABCD$ below, $\overline{AB} \parallel \overline{CD}$, and E, H, and F are the midpoints of $\overline{AD}$, $\overline{AC}$, and $\overline{BC}$, respectively.
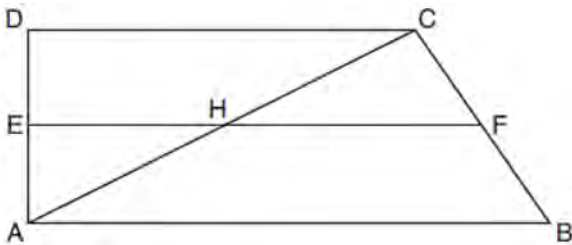
If $AB = 24$, $CD = 18$, and $AH = 10$, then FH is
1) 9
2) 10
3) 12
4) 21

G.CO.C.10: CENTROID, ORTHOCENTER, INCENTER & CIRCUMCENTER

111 If the altitudes of a triangle meet at one of the triangle's vertices, then the triangle is
1) a right triangle
2) an acute triangle
3) an obtuse triangle
4) an equilateral triangle

112 In triangle SRK below, medians $\overline{SC}$, $\overline{KE}$, and $\overline{RL}$ intersect at M.
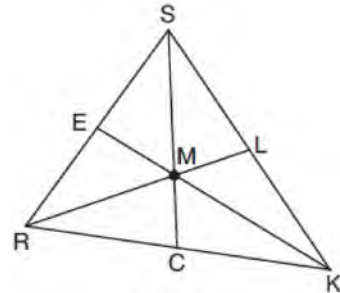
Which statement must always be true?
1) $3(MC) = SC$
2) $MC = \dfrac{1}{3}(SM)$
3) $RM = 2MC$
4) $SM = KM$

26

113 In the diagram below of isosceles triangle ABC, $\overline{AB} \cong \overline{CB}$ and angle bisectors $\overline{AD}$, $\overline{BF}$, and $\overline{CE}$ are drawn and intersect at X.
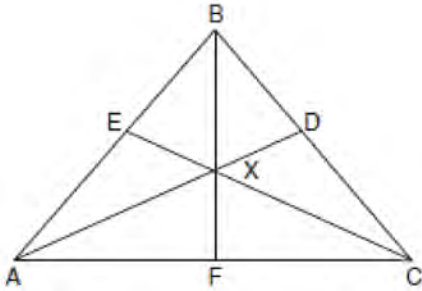
If m$\angle BAC = 50°$, find m$\angle AXC$.

114 In $\triangle XYZ$, shown below, medians $\overline{XE}$, $\overline{YF}$, and $\overline{ZD}$ intersect at C.
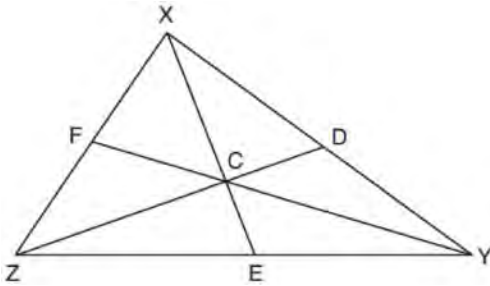
If $CE = 5$, $YF = 21$, and $XZ = 15$, determine and state the perimeter of triangle CFX.

G.GPE.B.4: TRIANGLES IN THE COORDINATE PLANE

115 In the diagram below, $\triangle ABC$ has vertices $A(4,5)$, $B(2,1)$, and $C(7,3)$.
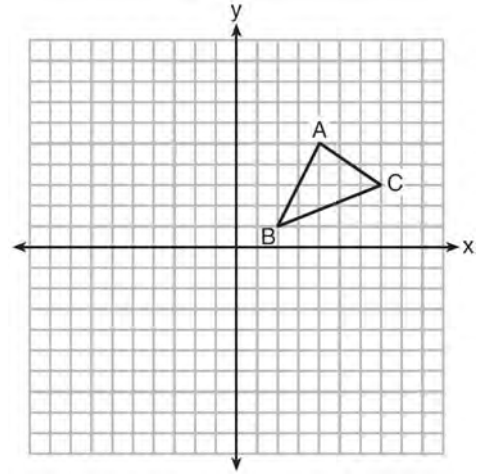
What is the slope of the altitude drawn from A to $\overline{BC}$?

1) $\dfrac{2}{5}$

2) $\dfrac{3}{2}$

3) $-\dfrac{1}{2}$

4) $-\dfrac{5}{2}$

27

116 On the set of axes below, $\triangle ABC$, altitude $\overline{CG}$, and median $\overline{CM}$ are drawn.
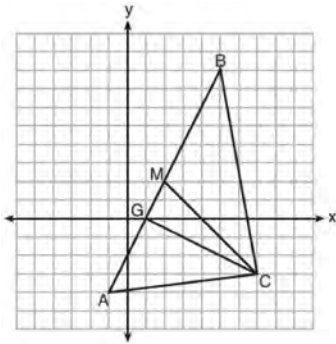
Which expression represents the area of $\triangle ABC$?
1) $\dfrac{(BC)(AC)}{2}$

2) $\dfrac{(GC)(BC)}{2}$

3) $\dfrac{(CM)(AB)}{2}$

4) $\dfrac{(GC)(AB)}{2}$

118 Triangle ABC has vertices with $A(x,3)$, $B(-3,-1)$, and $C(-1,-4)$. Determine and state a value of x that would make triangle ABC a right triangle. Justify why $\triangle ABC$ is a right triangle. [The use of the set of axes below is optional.]

117 The coordinates of the vertices of $\triangle RST$ are $R(-2,-3)$, $S(8,2)$, and $T(4,5)$. Which type of triangle is $\triangle RST$?
1) right
2) acute
3) obtuse
4) equiangular

28
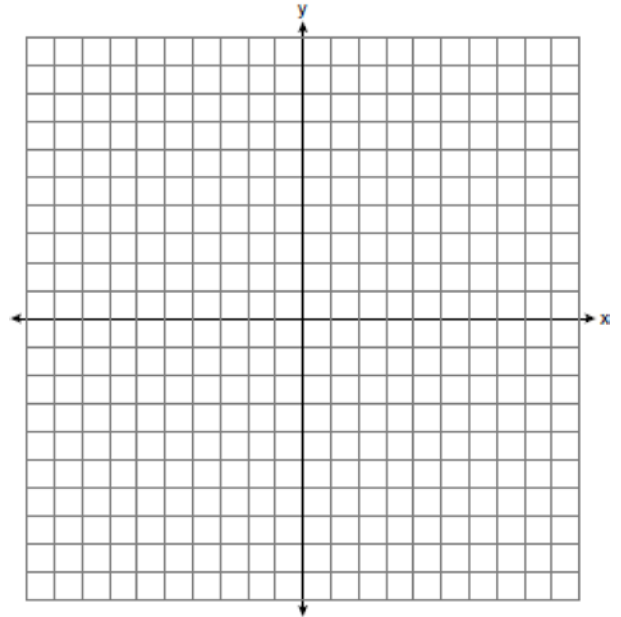
119 Triangle *ABC* has vertices with coordinates *A*(−1,−1), *B*(4,0), and *C*(0,4). Prove that △*ABC* is an isosceles triangle but *not* an equilateral triangle. [The use of the set of axes below is optional.]
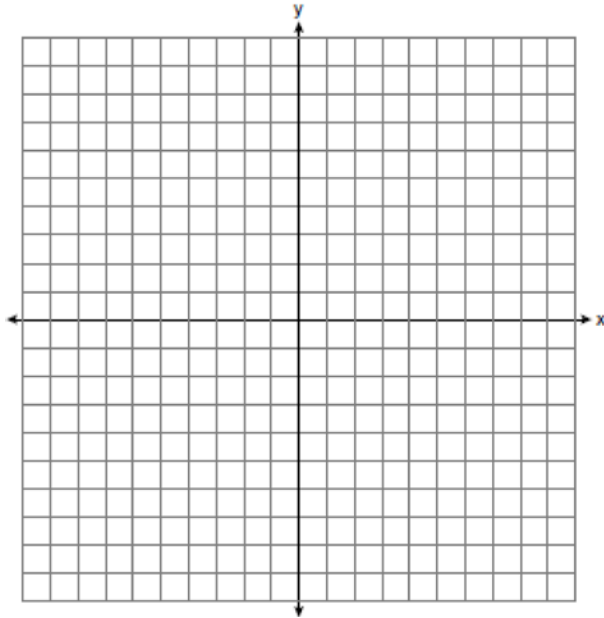
120 Triangle *PQR* has vertices *P*(−3,−1), *Q*(−1,7), and *R*(3,3), and points *A* and *B* are midpoints of $\overline{PQ}$ and $\overline{RQ}$, respectively. Use coordinate geometry to prove that $\overline{AB}$ is parallel to $\overline{PR}$ and is half the length of $\overline{PR}$. [The use of the set of axes below is optional.]
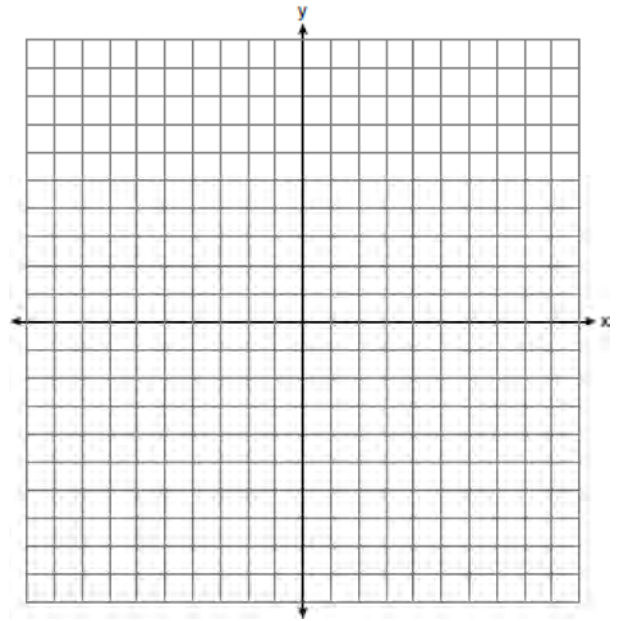
121 On the set of axes below, $\triangle DEF$ has vertices at the coordinates $D(1,-1)$, $E(3,4)$, and $F(4,2)$, and point G has coordinates $(3,1)$. Owen claims the median from point E must pass through point G. Is Owen correct? Explain why.

POLYGONS
G.CO.C.11: INTERIOR AND EXTERIOR ANGLES OF POLYGONS

123 In the diagram of parallelogram $FRED$ shown below, $\overline{ED}$ is extended to A, and $\overline{AF}$ is drawn such that $\overline{AF} \cong \overline{DF}$.
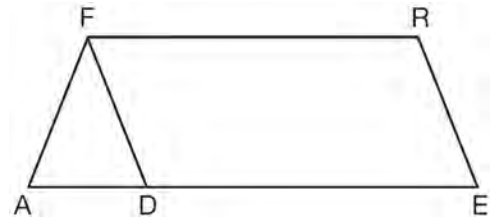
If $m\angle R = 124°$, what is $m\angle AFD$?
1) 124°
2) 112°
3) 68°
4) 56°

122 A triangle has vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$. Prove that $\triangle ABC$ is an isosceles right triangle. [The use of the set of axes below is optional.]

124 In parallelogram $QRST$ shown below, diagonal $\overline{TR}$ is drawn, U and V are points on $\overline{TS}$ and $\overline{QR}$, respectively, and $\overline{UV}$ intersects $\overline{TR}$ at W.
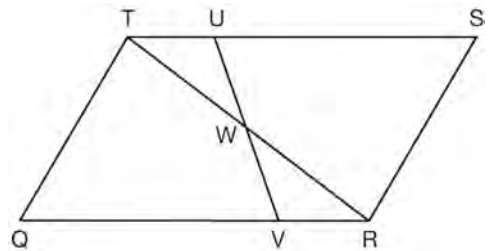
If $m\angle S = 60°$, $m\angle SRT = 83°$, and $m\angle TWU = 35°$, what is $m\angle WVQ$?
1) 37º
2) 60º
3) 72º
4) 83º

125 In the diagram below, *ABCD* is a parallelogram, $\overline{AB}$ is extended through *B* to *E*, and $\overline{CE}$ is drawn.
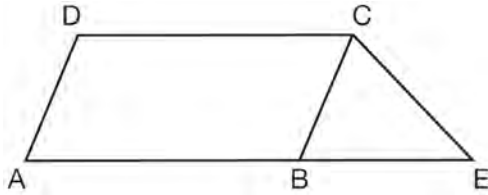
If $\overline{CE} \cong \overline{BE}$ and m∠*D* = 112°, what is m∠*E*?
1) 44°
2) 56°
3) 68°
4) 112°

126 In the diagram below of parallelogram *ROCK*, m∠*C* is 70° and m∠*ROS* is 65°.
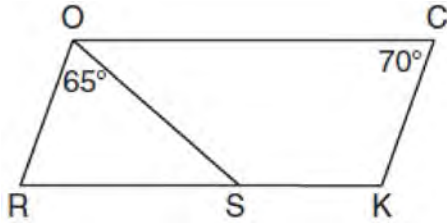
What is m∠*KSO*?
1) 45°
2) 110°
3) 115°
4) 135°

127 In parallelogram *PQRS*, $\overline{QP}$ is extended to point *T* and $\overline{ST}$ is drawn.
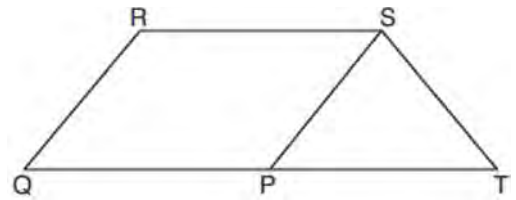
If $\overline{ST} \cong \overline{SP}$ and m∠*R* = 130°, what is m∠*PST*?
1) 130°
2) 80°
3) 65°
4) 50°

128 In the diagram below of parallelogram *ABCD*, $\overline{AFGB}$, $\overline{CF}$ bisects ∠*DCB*, $\overline{DG}$ bisects ∠*ADC*, and $\overline{CF}$ and $\overline{DG}$ intersect at *E*.
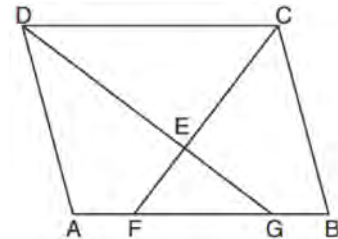
If m∠*B* = 75°, then the measure of ∠*EFA* is
1) 142.5°
2) 127.5°
3) 52.5°
4) 37.5°

129 The diagram below shows parallelogram *LMNO* with diagonal $\overline{LN}$, m∠*M* = 118°, and m∠*LNO* = 22°.
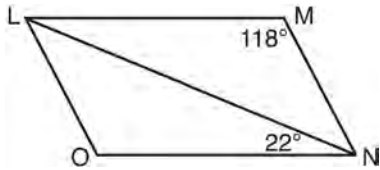
Explain why m∠*NLO* is 40 degrees.

130 Parallelogram *ABCD* is adjacent to rhombus *DEFG*, as shown below, and $\overline{FC}$ intersects $\overline{AGD}$ at *H*.
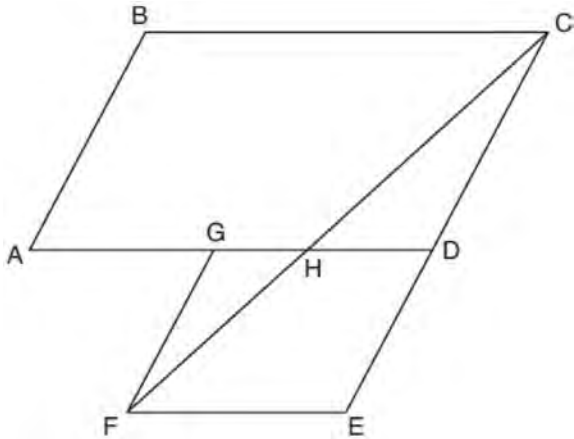
If m∠*B* = 118° and m∠*AHC* = 138°, determine and state m∠*GFH*.

131 In parallelogram *ABCD* shown below, m∠*DAC* = 98° and m∠*ACD* = 36°.
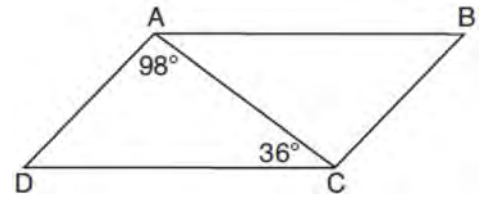
What is the measure of angle *B*? Explain why.

G.CO.C.11: PARALLELOGRAMS

132 Parallelogram *HAND* is drawn below with diagonals $\overline{HN}$ and $\overline{AD}$ intersecting at *S*.
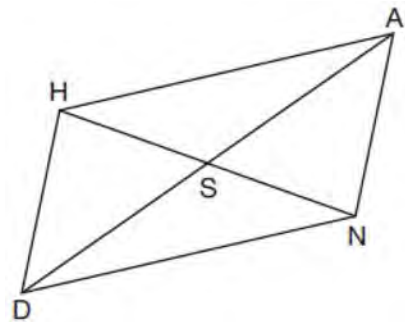
Which statement is always true?

1) $AN = \dfrac{1}{2} AD$

2) $AS = \dfrac{1}{2} AD$

3) ∠*AHS* ≅ ∠*ANS*

4) ∠*HDS* ≅ ∠*NDS*

133 Quadrilateral *ABCD* with diagonals $\overline{AC}$ and $\overline{BD}$ is shown in the diagram below.
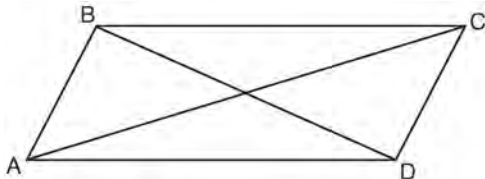
Which information is *not* enough to prove *ABCD* is a parallelogram?
1) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{DC}$
2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{DA}$
3) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$
4) $\overline{AB} \parallel \overline{DC}$ and $\overline{BC} \parallel \overline{AD}$

134 In quadrilateral *BLUE* shown below, $\overline{BE} \cong \overline{UL}$.
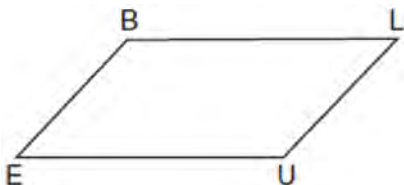
Which information would be sufficient to prove quadrilateral *BLUE* is a parallelogram?
1) $\overline{BL} \parallel \overline{EU}$
2) $\overline{LU} \parallel \overline{BE}$
3) $\overline{BE} \cong \overline{BL}$
4) $\overline{LU} \cong \overline{EU}$

135 Quadrilateral *ABCD* has diagonals $\overline{AC}$ and $\overline{BD}$. Which information is *not* sufficient to prove *ABCD* is a parallelogram?
1) $\overline{AC}$ and $\overline{BD}$ bisect each other.
2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{AD}$
3) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{CD}$
4) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$

136 Quadrilateral *MATH* has both pairs of opposite sides congruent and parallel. Which statement about quadrilateral *MATH* is always true?
1) $\overline{MT} \cong \overline{AH}$
2) $\overline{MT} \perp \overline{AH}$
3) $\angle MHT \cong \angle ATH$
4) $\angle MAT \cong \angle MHT$

137 Which statement about parallelograms is always true?
1) The diagonals are congruent.
2) The diagonals bisect each other.
3) The diagonals are perpendicular.
4) The diagonals bisect their respective angles.

138 A quadrilateral must be a parallelogram if
1) one pair of sides is parallel and one pair of angles is congruent
2) one pair of sides is congruent and one pair of angles is congruent
3) one pair of sides is both parallel and congruent
4) the diagonals are congruent

139 In parallelogram *ABCD* shown below, the bisectors of $\angle ABC$ and $\angle DCB$ meet at *E*, a point on $\overline{AD}$.
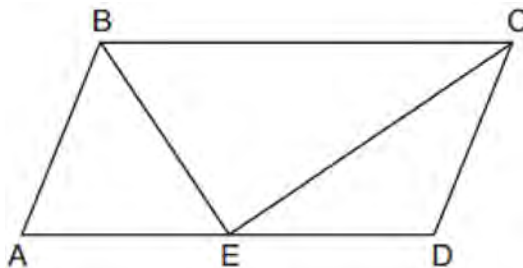
If $m\angle A = 68°$, determine and state $m\angle BEC$.

33

G.CO.C.11: TRAPEZOIDS

140 In trapezoid $ABCD$ below, $\overline{AB} \parallel \overline{CD}$.
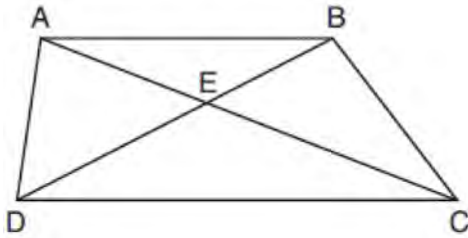
If $AE = 5.2$, $AC = 11.7$, and $CD = 10.5$, what is the length of $\overline{AB}$, to the *nearest tenth*?
1) 4.7
2) 6.5
3) 8.4
4) 13.1

G.CO.C.11: SPECIAL QUADRILATERALS

141 In the diagram below, if $\triangle ABE \cong \triangle CDF$ and $\overline{AEFC}$ is drawn, then it could be proven that quadrilateral $ABCD$ is a
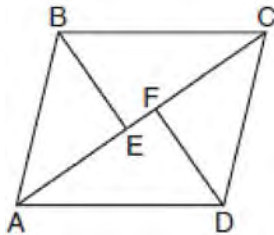
1) square
2) rhombus
3) rectangle
4) parallelogram

142 The diagram below shows parallelogram $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at E.
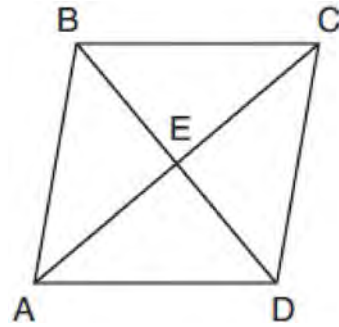
What additional information is sufficient to prove that parallelogram $ABCD$ is also a rhombus?
1) $\overline{BD}$ bisects $\overline{AC}$.
2) $\overline{AB}$ is parallel to $\overline{CD}$.
3) $\overline{AC}$ is congruent to $\overline{BD}$.
4) $\overline{AC}$ is perpendicular to $\overline{BD}$.

143 In rhombus $TIGE$, diagonals $\overline{TG}$ and $\overline{IE}$ intersect at R. The perimeter of $TIGE$ is 68, and $TG = 16$.
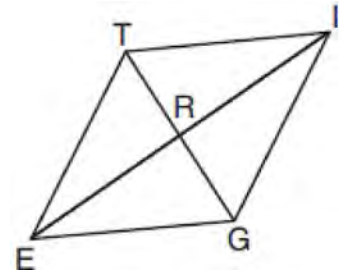
What is the length of diagonal $\overline{IE}$?
1) 15
2) 30
3) 34
4) 52

144 A parallelogram must be a rectangle when its
  1) diagonals are perpendicular
  2) diagonals are congruent
  3) opposite sides are parallel
  4) opposite sides are congruent

145 In parallelogram *ABCD*, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at *E*. Which statement does *not* prove parallelogram *ABCD* is a rhombus?
  1) $\overline{AC} \cong \overline{DB}$
  2) $\overline{AB} \cong \overline{BC}$
  3) $\overline{AC} \perp \overline{DB}$
  4) $\overline{AC}$ bisects $\angle DCB$

146 A parallelogram is always a rectangle if
  1) the diagonals are congruent
  2) the diagonals bisect each other
  3) the diagonals intersect at right angles
  4) the opposite angles are congruent

147 If *ABCD* is a parallelogram, which statement would prove that *ABCD* is a rhombus?
  1) $\angle ABC \cong \angle CDA$
  2) $\overline{AC} \cong \overline{BD}$
  3) $\overline{AC} \perp \overline{BD}$
  4) $\overline{AB} \perp \overline{CD}$

148 A parallelogram must be a rhombus if its diagonals
  1) are congruent
  2) bisect each other
  3) do not bisect its angles
  4) are perpendicular to each other

149 Which information is *not* sufficient to prove that a parallelogram is a square?
  1) The diagonals are both congruent and perpendicular.
  2) The diagonals are congruent and one pair of adjacent sides are congruent.
  3) The diagonals are perpendicular and one pair of adjacent sides are congruent.
  4) The diagonals are perpendicular and one pair of adjacent sides are perpendicular.

150 In quadrilateral *QRST*, diagonals $\overline{QS}$ and $\overline{RT}$ intersect at *M*. Which statement would always prove quadrilateral *QRST* is a parallelogram?
  1) $\angle TQR$ and $\angle QRS$ are supplementary.
  2) $\overline{QM} \cong \overline{SM}$ and $\overline{QT} \cong \overline{RS}$
  3) $\overline{QR} \cong \overline{TS}$ and $\overline{QT} \cong \overline{RS}$
  4) $\overline{QR} \cong \overline{TS}$ and $\overline{QT} \parallel \overline{RS}$

151 In parallelogram *ABCD*, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at *E*. Which statement proves *ABCD* is a rectangle?
  1) $\overline{AC} \cong \overline{BD}$
  2) $\overline{AB} \perp \overline{BD}$
  3) $\overline{AC} \perp \overline{BD}$
  4) $\overline{AC}$ bisects $\angle BCD$

152 Which set of statements would describe a parallelogram that can always be classified as a rhombus?

    I.   Diagonals are perpendicular bisectors of each other.

    II. Diagonals bisect the angles from which they are drawn.

    III. Diagonals form four congruent isosceles right triangles.

1)   I and II
2)   I and III
3)   II and III
4)   I, II, and III

153 In rhombus *VENU*, diagonals $\overline{VN}$ and $\overline{EU}$ intersect at *S*. If $VN = 12$ and $EU = 16$, what is the perimeter of the rhombus?

1)   80
2)   40
3)   20
4)   10

154 In the diagram of rhombus *PQRS* below, the diagonals $\overline{PR}$ and $\overline{QS}$ intersect at point *T*, $PR = 16$, and $QS = 30$. Determine and state the perimeter of *PQRS*.
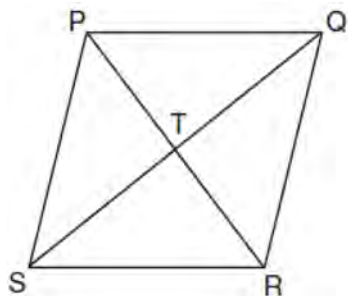
G.GPE.B.4: QUADRILATERALS IN THE COORDINATE PLANE

155 Parallelogram *ABCD* has coordinates $A(0,7)$ and $C(2,1)$. Which statement would prove that *ABCD* is a rhombus?

1)   The midpoint of $\overline{AC}$ is $(1,4)$.
2)   The length of $\overline{BD}$ is $\sqrt{40}$.
3)   The slope of $\overline{BD}$ is $\dfrac{1}{3}$.
4)   The slope of $\overline{AB}$ is $\dfrac{1}{3}$.

156 A quadrilateral has vertices with coordinates $(-3,1)$, $(0,3)$, $(5,2)$, and $(-1,-2)$. Which type of quadrilateral is this?

1)   rhombus
2)   rectangle
3)   square
4)   trapezoid

157 The diagonals of rhombus *TEAM* intersect at $P(2,1)$. If the equation of the line that contains diagonal $\overline{TA}$ is $y = -x + 3$, what is the equation of a line that contains diagonal *EM*?

1) $y = x - 1$
2) $y = x - 3$
3) $y = -x - 1$
4) $y = -x - 3$

158 The coordinates of the vertices of parallelogram *CDEH* are $C(-5,5)$, $D(2,5)$, $E(-1,-1)$, and $H(-8,-1)$. What are the coordinates of *P*, the point of intersection of diagonals $\overline{CE}$ and $\overline{DH}$?

1) $(-2,3)$
2) $(-2,2)$
3) $(-3,2)$
4) $(-3,-2)$

159 In rhombus *MATH*, the coordinates of the endpoints of the diagonal $\overline{MT}$ are $M(0,-1)$ and $T(4,6)$. Write an equation of the line that contains diagonal $\overline{AH}$. [Use of the set of axes below is optional.] Using the given information, explain how you know that your line contains diagonal $\overline{AH}$.
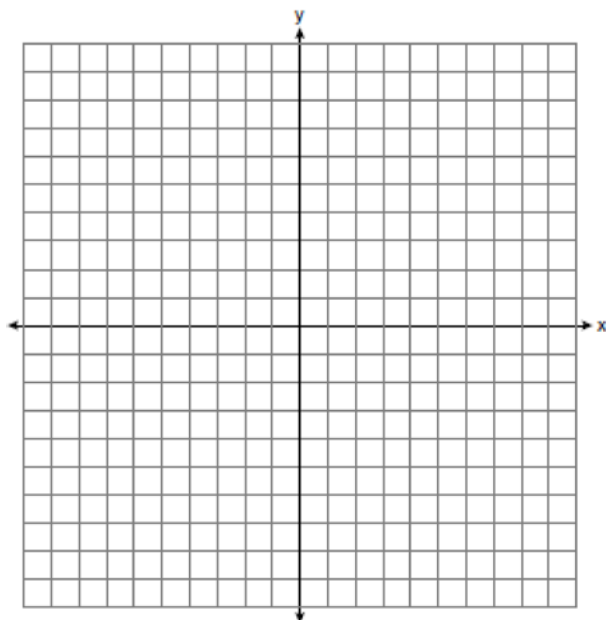
160 In the coordinate plane, the vertices of $\triangle RST$ are $R(6,-1)$, $S(1,-4)$, and $T(-5,6)$. Prove that $\triangle RST$ is a right triangle. State the coordinates of point P such that quadrilateral $RSTP$ is a rectangle. Prove that your quadrilateral $RSTP$ is a rectangle. [The use of the set of axes below is optional.]
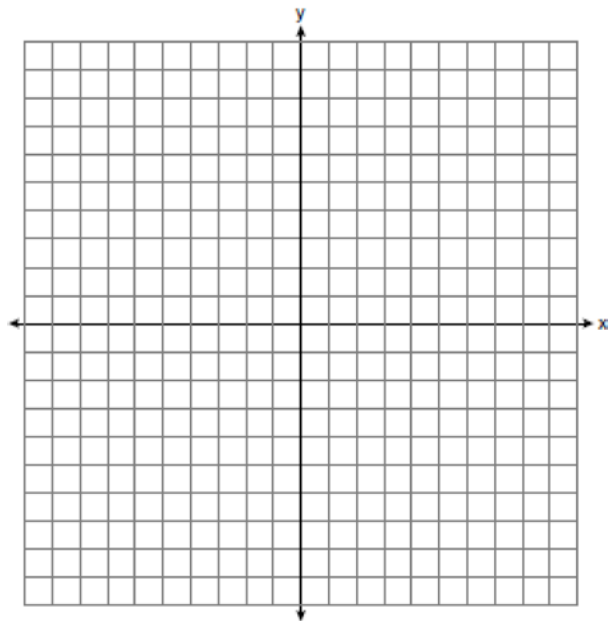
161 In square *GEOM*, the coordinates of *G* are $(2,-2)$ and the coordinates of *O* are $(-4,2)$. Determine and state the coordinates of vertices *E* and *M*. [The use of the set of axes below is optional.]
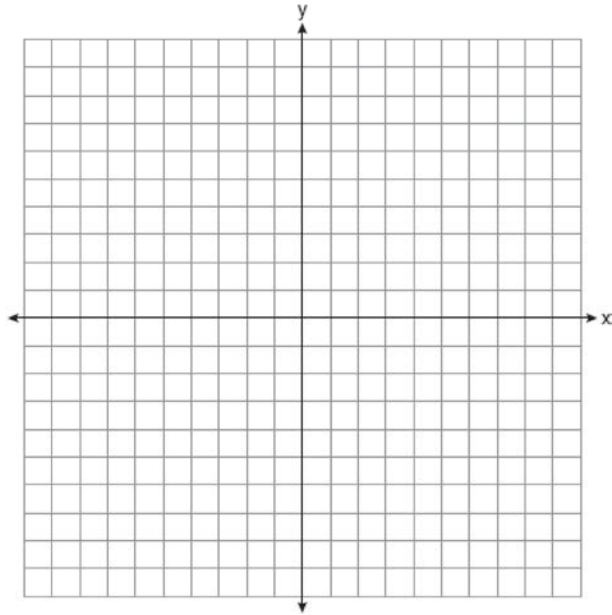
162 Quadrilateral *PQRS* has vertices $P(-2,3)$, $Q(3,8)$, $R(4,1)$, and $S(-1,-4)$. Prove that *PQRS* is a rhombus. Prove that *PQRS* is *not* a square. [The use of the set of axes below is optional.]
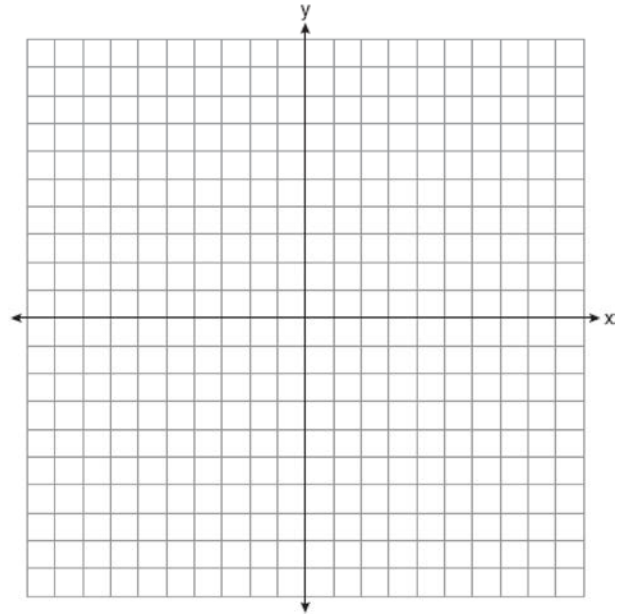
163 In the coordinate plane, the vertices of triangle *PAT* are $P(-1,-6)$, $A(-4,5)$, and $T(5,-2)$. Prove that $\triangle PAT$ is an isosceles triangle. State the coordinates of *R* so that quadrilateral *PART* is a parallelogram. Prove that quadrilateral *PART* is a parallelogram. [The use of the set of axes below is optional.]
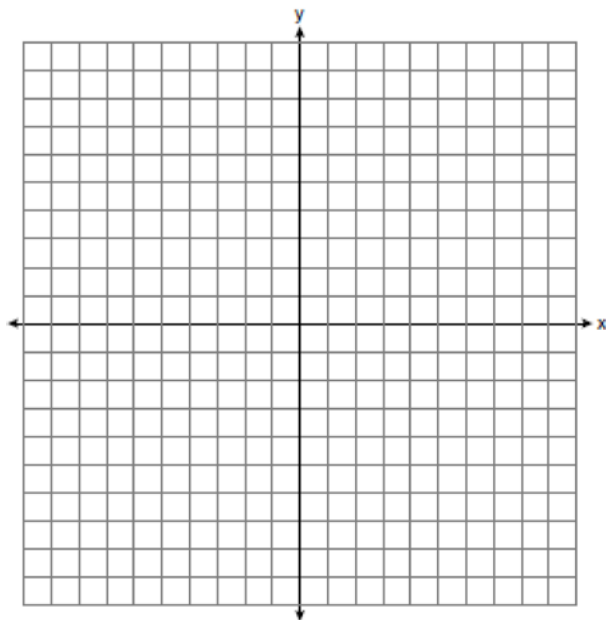
164 The vertices of quadrilateral *MATH* have coordinates $M(-4,2)$, $A(-1,-3)$, $T(9,3)$, and $H(6,8)$. Prove that quadrilateral *MATH* is a parallelogram. Prove that quadrilateral *MATH* is a rectangle. [The use of the set of axes below is optional.]
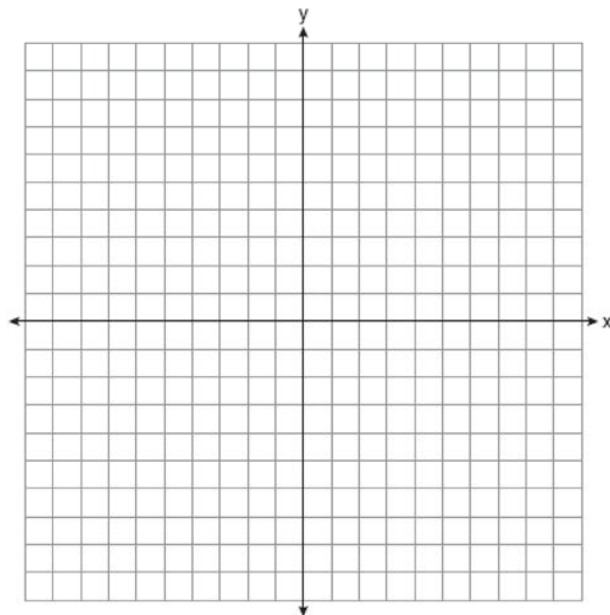
165 Riley plotted $A(-1,6)$, $B(3,8)$, $C(6,-1)$, and $D(1,0)$ to form a quadrilateral. Prove that Riley's quadrilateral $ABCD$ is a trapezoid. [The use of the set of axes on the next page is optional.] Riley defines an isosceles trapezoid as a trapezoid with congruent diagonals. Use Riley's definition to prove that $ABCD$ is *not* an isosceles trapezoid.
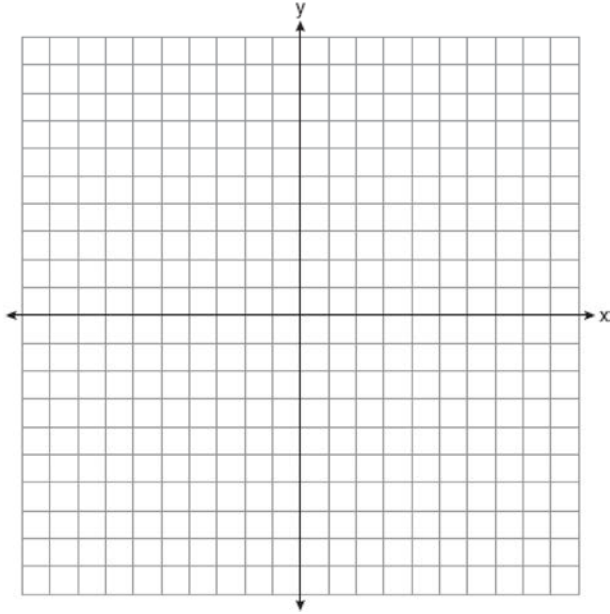
166 The coordinates of the vertices of $\triangle ABC$ are $A(1,2)$, $B(-5,3)$, and $C(-6,-3)$. Prove that $\triangle ABC$ is isosceles. State the coordinates of point D such that quadrilateral $ABCD$ is a square. Prove that your quadrilateral $ABCD$ is a square. [The use of the set of axes below is optional.]
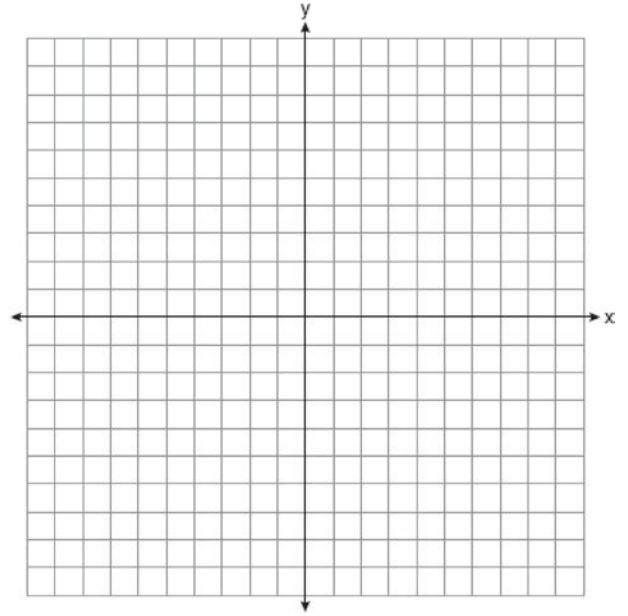
167 Quadrilateral *NATS* has coordinates $N(-4,-3)$, $A(1,2)$, $T(8,1)$, and $S(3,-4)$. Prove quadrilateral *NATS* is a rhombus. [The use of the set of axes below is optional.]
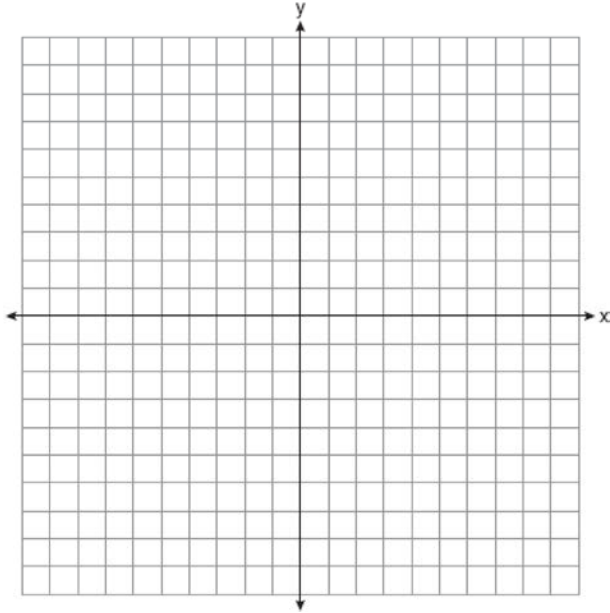
G.GPE.B.7: POLYGONS IN THE COORDINATE PLANE

168 Triangle *RST* is graphed on the set of axes below.
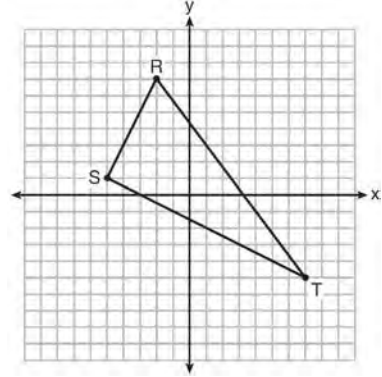
How many square units are in the area of $\triangle RST$?
1) $9\sqrt{3} + 15$
2) $9\sqrt{5} + 15$
3) 45
4) 90

169 On the set of axes below, the vertices of $\triangle PQR$ have coordinates $P(-6,7)$, $Q(2,1)$, and $R(-1,-3)$.
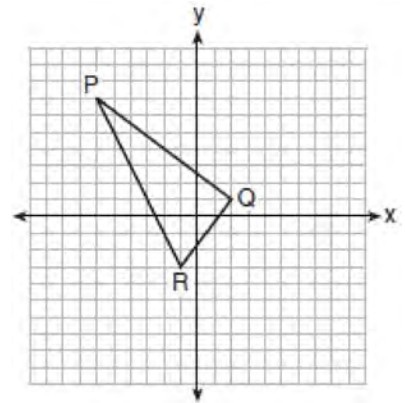
What is the area of $\triangle PQR$?
1) 10
2) 20
3) 25
4) 50

41

170 Triangle *DAN* is graphed on the set of axes below. The vertices of $\triangle DAN$ have coordinates $D(-6,-1)$, $A(6,3)$, and $N(-3,10)$.
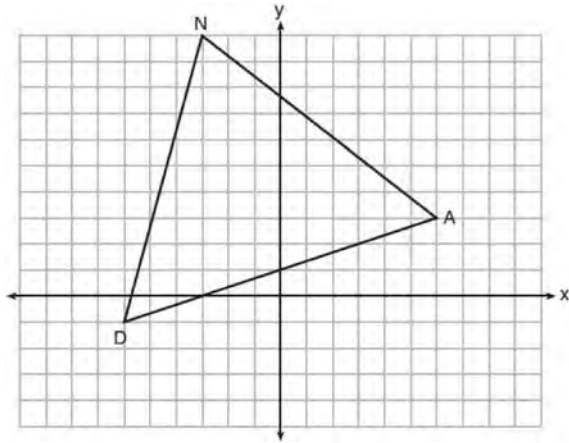
What is the area of $\triangle DAN$?
1) 60
2) 120
3) $20\sqrt{13}$
4) $40\sqrt{13}$

171 On the set of axes below, rhombus *ABCD* has vertices whose coordinates are $A(1,2)$, $B(4,6)$, $C(7,2)$, and $D(4,-2)$.
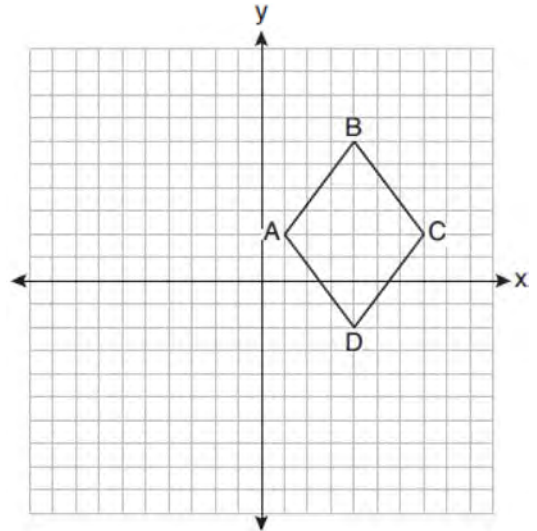
What is the area of rhombus *ABCD*?
1) 20
2) 24
3) 25
4) 48

172 The coordinates of vertices *A* and *B* of $\triangle ABC$ are $A(3,4)$ and $B(3,12)$. If the area of $\triangle ABC$ is 24 square units, what could be the coordinates of point *C*?
1) $(3,6)$
2) $(8,-3)$
3) $(-3,8)$
4) $(6,3)$

42

173 The endpoints of one side of a regular pentagon are $(-1,4)$ and $(2,3)$. What is the perimeter of the pentagon?
1) $\sqrt{10}$
2) $5\sqrt{10}$
3) $5\sqrt{2}$
4) $25\sqrt{2}$

174 The vertices of square $RSTV$ have coordinates $R(-1,5)$, $S(-3,1)$, $T(-7,3)$, and $V(-5,7)$. What is the perimeter of $RSTV$?
1) $\sqrt{20}$
2) $\sqrt{40}$
3) $4\sqrt{20}$
4) $4\sqrt{40}$

175 Rhombus $STAR$ has vertices $S(-1,2)$, $T(2,3)$, $A(3,0)$, and $R(0,-1)$. What is the perimeter of rhombus $STAR$?
1) $\sqrt{34}$
2) $4\sqrt{34}$
3) $\sqrt{10}$
4) $4\sqrt{10}$

176 Determine and state the area of triangle PQR, whose vertices have coordinates $P(-2,-5)$, $Q(3,5)$, and $R(6,1)$. [The use of the set of axes below is optional.]
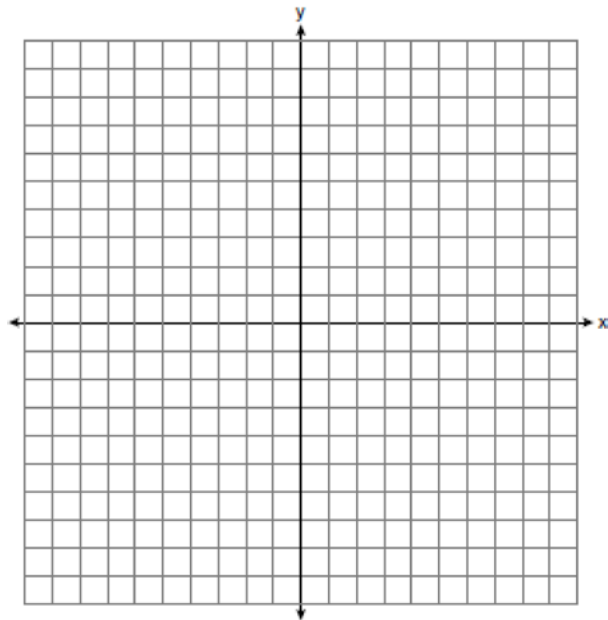
177 The vertices of $\triangle ABC$ have coordinates $A(-2,-1)$, $B(10,-1)$, and $C(4,4)$. Determine and state the area of $\triangle ABC$. [The use of the set of axes below is optional.]
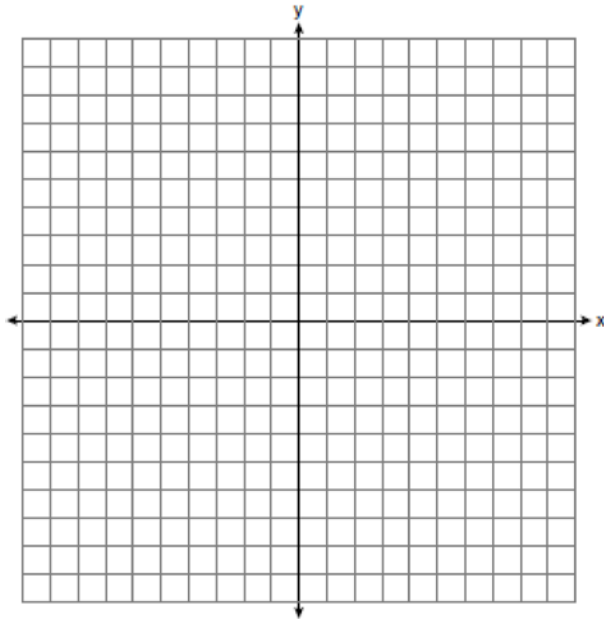
CONICS
G.C.A.2: CHORDS, SECANTS AND TANGENTS

178 In the diagram of circle A shown below, chords $\overline{CD}$ and $\overline{EF}$ intersect at G, and chords $\overline{CE}$ and $\overline{FD}$ are drawn.
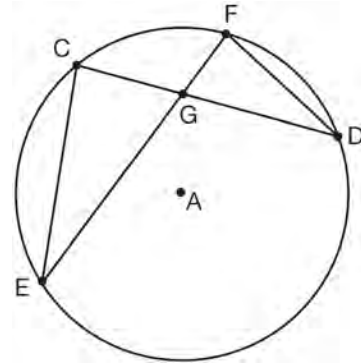
Which statement is *not* always true?
1) $\overline{CG} \cong \overline{FG}$
2) $\angle CEG \cong \angle FDG$
3) $\dfrac{CE}{EG} = \dfrac{FD}{DG}$
4) $\triangle CEG \sim \triangle FDG$

179 In circle O shown below, diameter $\overline{AC}$ is perpendicular to $\overline{CD}$ at point C, and chords $\overline{AB}$, $\overline{BC}$, $\overline{AE}$, and $\overline{CE}$ are drawn.
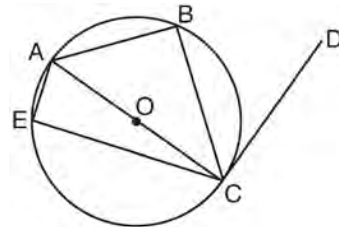
Which statement is *not* always true?
1) $\angle ACB \cong \angle BCD$
2) $\angle ABC \cong \angle ACD$
3) $\angle BAC \cong \angle DCB$
4) $\angle CBA \cong \angle AEC$

180 In the diagram below of circle O, $\overline{OB}$ and $\overline{OC}$ are radii, and chords $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$ are drawn.
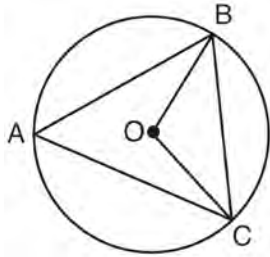
Which statement must always be true?
1) $\angle BAC \cong \angle BOC$
2) $m\angle BAC = \dfrac{1}{2}m\angle BOC$
3) $\triangle BAC$ and $\triangle BOC$ are isosceles.
4) The area of $\triangle BAC$ is twice the area of $\triangle BOC$.

181 In the diagram below, $\overline{BC}$ is the diameter of circle A.
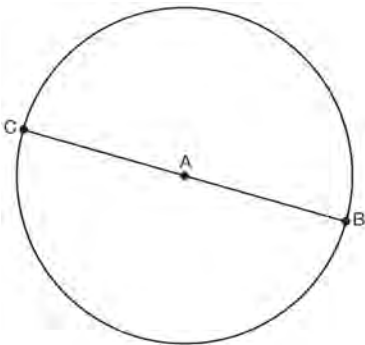
Point D, which is unique from points B and C, is plotted on circle A. Which statement must always be true?
1) $\triangle BCD$ is a right triangle.
2) $\triangle BCD$ is an isosceles triangle.
3) $\triangle BAD$ and $\triangle CBD$ are similar triangles.
4) $\triangle BAD$ and $\triangle CAD$ are congruent triangles.

182 In circle M below, diameter $\overline{AC}$, chords $\overline{AB}$ and $\overline{BC}$, and radius $\overline{MB}$ are drawn.
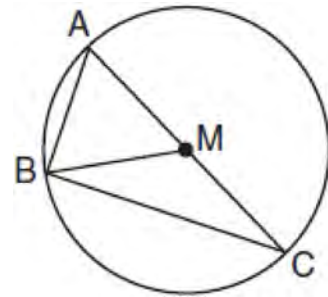
Which statement is *not* true?
1) $\triangle ABC$ is a right triangle.
2) $\triangle ABM$ is isosceles.
3) $m\overset{\frown}{BC} = m\angle BMC$
4) $m\overset{\frown}{AB} = \dfrac{1}{2}m\angle ACB$

183 In the diagram below of circle O, points K, A, T, I, and E are on the circle, $\triangle KAE$ and $\triangle ITE$ are drawn, $\overset{\frown}{KE} \cong \overset{\frown}{EI}$, and $\angle EKA \cong \angle EIT$.
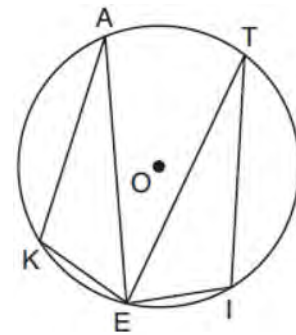
Which statement about $\triangle KAE$ and $\triangle ITE$ is always true?
1) They are neither congruent nor similar.
2) They are similar but not congruent.
3) They are right triangles.
4) They are congruent.

45

184 In the diagram below of circle O, chords $\overline{JT}$ and $\overline{ER}$ intersect at M.
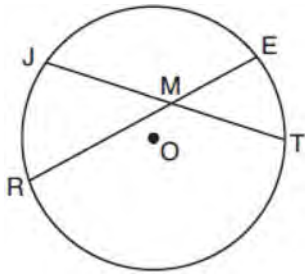
If $EM = 8$ and $RM = 15$, the lengths of $\overline{JM}$ and $\overline{TM}$ could be
1) 12 and 9.5
2) 14 and 8.5
3) 16 and 7.5
4) 18 and 6.5

185 In the diagram below, chords $\overline{PQ}$ and $\overline{RS}$ of circle O intersect at T.
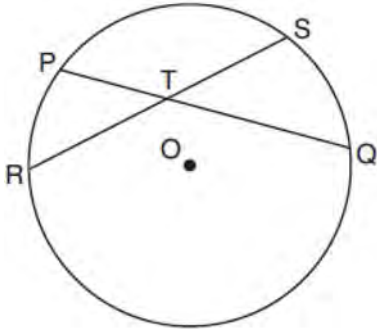
Which relationship must always be true?
1) $RT = TQ$
2) $RT = TS$
3) $RT + TS = PT + TQ$
4) $RT \times TS = PT \times TQ$

186 In the diagram shown below, $\overline{AC}$ is tangent to circle O at A and to circle P at C, $\overline{OP}$ intersects $\overline{AC}$ at B, $OA = 4$, $AB = 5$, and $PC = 10$.
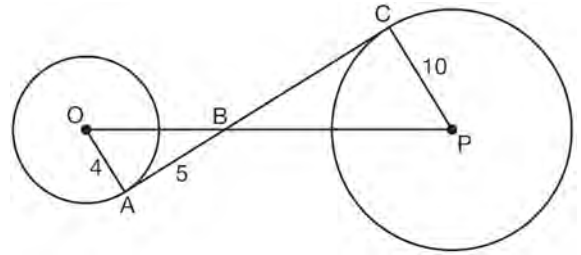
What is the length of $\overline{BC}$?
1) 6.4
2) 8
3) 12.5
4) 16

187 In the diagram below, $\overline{DC}$, $\overline{AC}$, $\overline{DOB}$, $\overline{CB}$, and $\overline{AB}$ are chords of circle O, $\overleftrightarrow{FDE}$ is tangent at point D, and radius $\overline{AO}$ is drawn. Sam decides to apply this theorem to the diagram: "An angle inscribed in a semi-circle is a right angle."
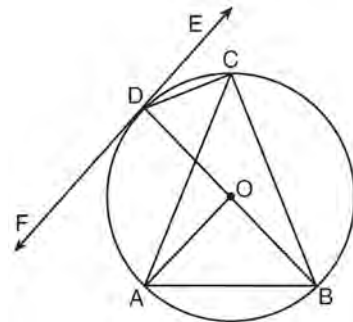
Which angle is Sam referring to?
1) $\angle AOB$
2) $\angle BAC$
3) $\angle DCB$
4) $\angle FDB$

188   In the diagram below, $m\overset{\frown}{ABC} = 268°$.
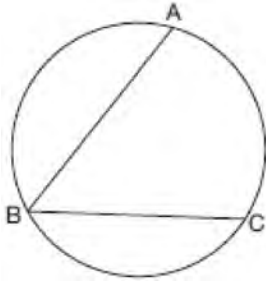
What is the number of degrees in the measure of ∠ABC?
1)   134°
2)   92°
3)   68°
4)   46°

189   In the diagram below of circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E.
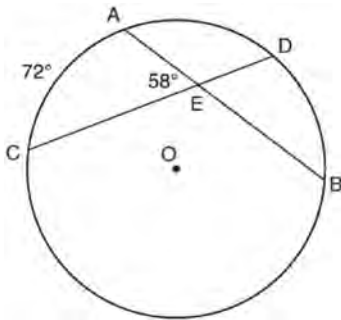
If $m\overset{\frown}{AC} = 72°$ and m∠AEC = 58°, how many degrees are in $m\overset{\frown}{DB}$?
1)   108°
2)   65°
3)   44°
4)   14°

190   In the diagram below of circle O, chord $\overline{DF}$ bisects chord $\overline{BC}$ at E.
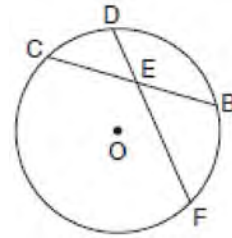
If $BC = 12$ and FE is 5 more than DE, then FE is
1)   13
2)   9
3)   6
4)   4

191   In the diagram below of circle O, chord $\overline{CD}$ is parallel to diameter $\overline{AOB}$ and $m\overset{\frown}{CD} = 130$.
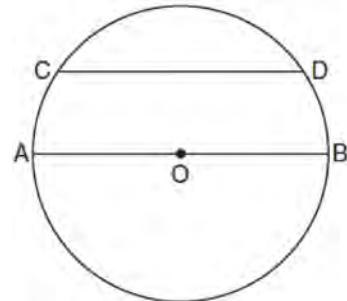
What is $m\overset{\frown}{AC}$?
1)   25
2)   50
3)   65
4)   115

47

192 In the diagram shown below, $\overline{PA}$ is tangent to circle T at A, and secant $\overline{PBC}$ is drawn where point B is on circle T.
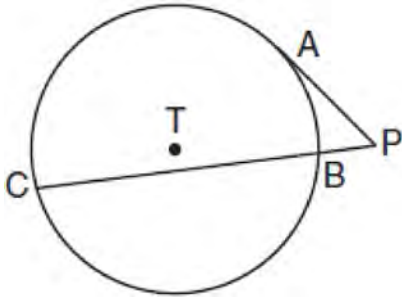
If $PB = 3$ and $BC = 15$, what is the length of $\overline{PA}$?

1) $3\sqrt{5}$
2) $3\sqrt{6}$
3) 3
4) 9

193 In the figure shown below, quadrilateral $TAEO$ is circumscribed around circle D. The midpoint of $\overline{TA}$ is R, and $\overline{HO} \cong \overline{PE}$.
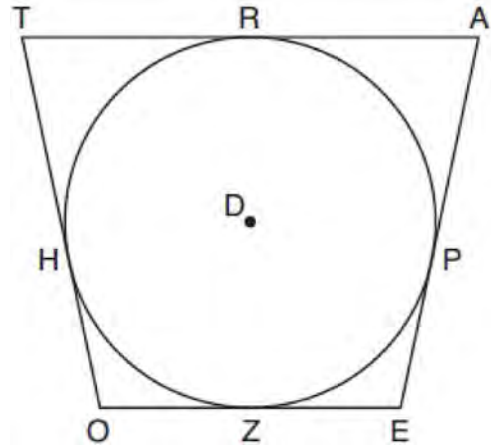
If $AP = 10$ and $EO = 12$, what is the perimeter of quadrilateral $TAEO$?

1) 56
2) 64
3) 72
4) 76

194 In circle O, secants $\overline{ADB}$ and $\overline{AEC}$ are drawn from external point A such that points D, B, E, and C are on circle O. If $AD = 8$, $AE = 6$, and EC is 12 more than BD, the length of $\overline{BD}$ is

1) 6
2) 22
3) 36
4) 48

195 In circle O two secants, $\overline{ABP}$ and $\overline{CDP}$, are drawn to external point P. If $m\overset{\frown}{AC} = 72°$, and $m\overset{\frown}{BD} = 34°$, what is the measure of $\angle P$?

1) 19°
2) 38°
3) 53°
4) 106°

196 In the diagram below of circle O with diameter $\overline{BC}$ and radius $\overline{OA}$, chord $\overline{DC}$ is parallel to chord $\overline{BA}$.
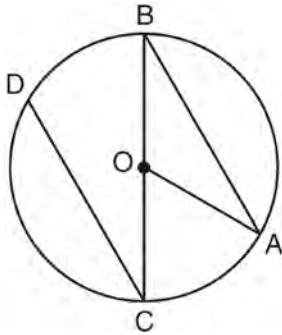
If m∠BCD = 30°, determine and state m∠AOB.

197 Lines AE and BD are tangent to circles O and P at A, E, B, and D, as shown in the diagram below. If $AC:CE = 5:3$, and $BD = 56$, determine and state the length of $\overline{CD}$.
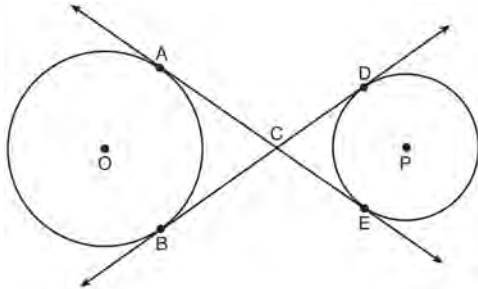
198 In the diagram below, tangent $\overline{DA}$ and secant $\overline{DBC}$ are drawn to circle O from external point D, such that $\overset{\frown}{AC} \cong \overset{\frown}{BC}$.
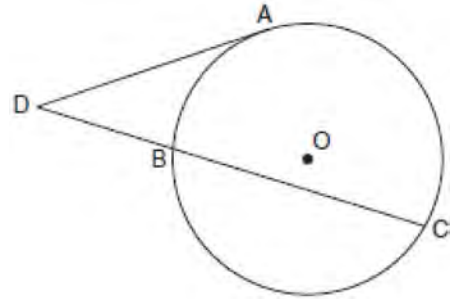
If m$\overset{\frown}{BC}$ = 152°, determine and state m∠D.

199 In the diagram below, secants $\overline{RST}$ and $\overline{RQP}$, drawn from point R, intersect circle O at S, T, Q, and P.
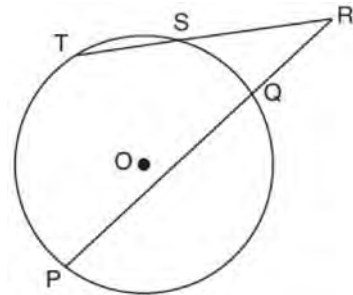
If $RS = 6$, $ST = 4$, and $RP = 15$, what is the length of $\overline{RQ}$?

200 In circle *A* below, chord $\overline{BC}$ and diameter $\overline{DAE}$ intersect at *F*.
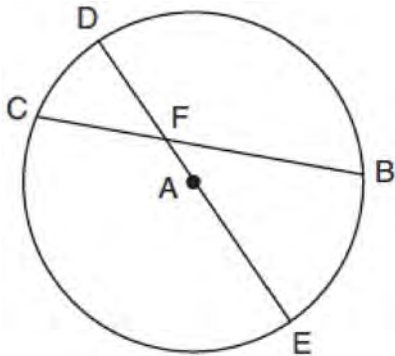
If m$\overarc{CD}$ = 46° and m$\overarc{DB}$ = 102°, what is m∠*CFE*?

201 As shown in the diagram below, secants $\overrightarrow{PWR}$ and $\overrightarrow{PTS}$ are drawn to circle *O* from external point *P*.
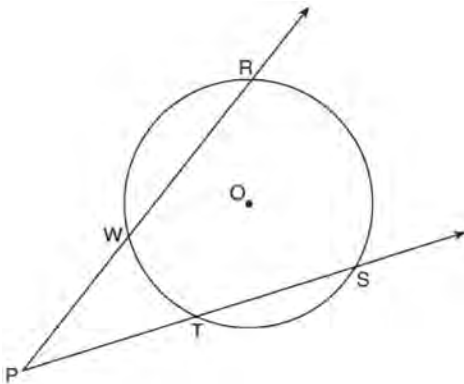
If m∠*RPS* = 35° and m$\overarc{RS}$ = 121°, determine and state m$\overarc{WT}$.

202 In the diagram below of circle *K*, secant $\overline{PLKE}$ and tangent $\overline{PZ}$ are drawn from external point *P*.
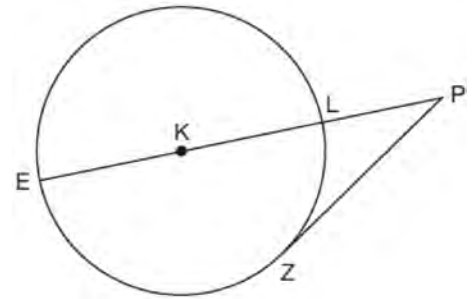
If m$\overarc{LZ}$ = 56°, determine and state the degree measure of angle *P*.

203 In the diagram below of circle *O*, secant $\overline{ABC}$ and tangent $\overline{AD}$ are drawn.
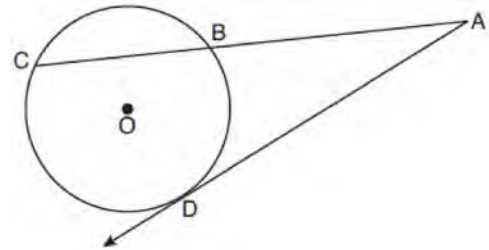
If *CA* = 12.5 and *CB* = 4.5, determine and state the length of $\overline{DA}$.

50

G.C.A.3: INSCRIBED QUADRILATERALS

204 Quadrilateral *ABCD* is inscribed in circle *O*, as shown below.
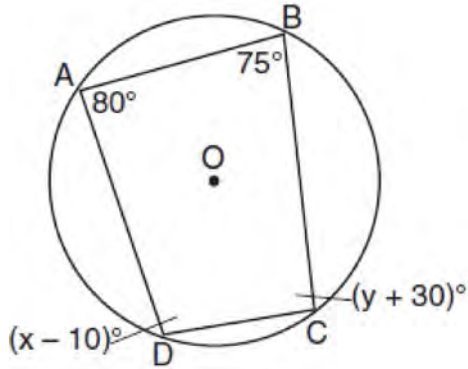
If m∠*A* = 80°, m∠*B* = 75°, m∠*C* = $(y + 30)°$, and m∠*D* = $(x - 10)°$, which statement is true?
1) $x = 85$ and $y = 50$
2) $x = 90$ and $y = 45$
3) $x = 110$ and $y = 75$
4) $x = 115$ and $y = 70$

205 In the diagram below, quadrilateral *ABCD* is inscribed in circle *P*.
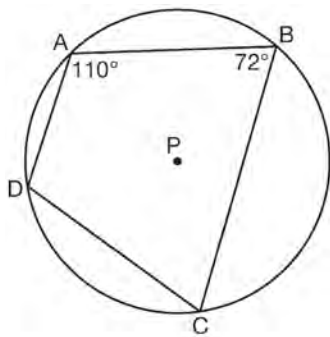
What is m∠*ADC*?
1) 70°
2) 72°
3) 108°
4) 110°

206 Linda is designing a circular piece of stained glass with a diameter of 7 inches. She is going to sketch a square inside the circular region. To the *nearest tenth of an inch*, the largest possible length of a side of the square is
1) 3.5
2) 4.9
3) 5.0
4) 6.9

G.GPE.A.1: EQUATIONS OF CIRCLES

207 The graph below shows $\overline{AB}$, which is a chord of circle *O*. The coordinates of the endpoints of $\overline{AB}$ are $A(3,3)$ and $B(3,-7)$. The distance from the midpoint of $\overline{AB}$ to the center of circle *O* is 2 units.
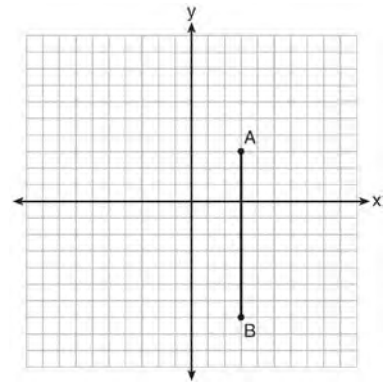
What could be a correct equation for circle *O*?
1) $(x - 1)^2 + (y + 2)^2 = 29$
2) $(x + 5)^2 + (y - 2)^2 = 29$
3) $(x - 1)^2 + (y - 2)^2 = 25$
4) $(x - 5)^2 + (y + 2)^2 = 25$

208 What is an equation of circle O shown in the graph below?
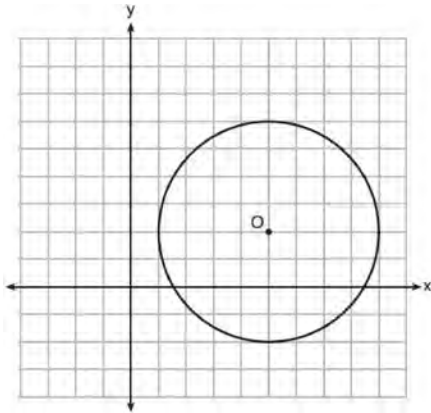
1) $x^2 + 10x + y^2 + 4y = -13$
2) $x^2 - 10x + y^2 - 4y = -13$
3) $x^2 + 10x + y^2 + 4y = -25$
4) $x^2 - 10x + y^2 - 4y = -25$

209 If $x^2 + 4x + y^2 - 6y - 12 = 0$ is the equation of a circle, the length of the radius is
1) 25
2) 16
3) 5
4) 4

210 An equation of circle O is $x^2 + y^2 + 4x - 8y = -16$. The statement that best describes circle O is the
1) center is $(2,-4)$ and is tangent to the x-axis
2) center is $(2,-4)$ and is tangent to the y-axis
3) center is $(-2,4)$ and is tangent to the x-axis
4) center is $(-2,4)$ and is tangent to the y-axis

211 The equation of a circle is $x^2 + y^2 + 6y = 7$. What are the coordinates of the center and the length of the radius of the circle?
1) center $(0,3)$ and radius 4
2) center $(0,-3)$ and radius 4
3) center $(0,3)$ and radius 16
4) center $(0,-3)$ and radius 16

212 What are the coordinates of the center and length of the radius of the circle whose equation is $x^2 + 6x + y^2 - 4y = 23$?
1) $(3,-2)$ and 36
2) $(3,-2)$ and 6
3) $(-3,2)$ and 36
4) $(-3,2)$ and 6

213 What are the coordinates of the center and the length of the radius of the circle represented by the equation $x^2 + y^2 - 4x + 8y + 11 = 0$?
1) center $(2,-4)$ and radius 3
2) center $(-2,4)$ and radius 3
3) center $(2,-4)$ and radius 9
4) center $(-2,4)$ and radius 9

214 The equation of a circle is $x^2 + y^2 - 6y + 1 = 0$. What are the coordinates of the center and the length of the radius of this circle?
1) center $(0,3)$ and radius $= 2\sqrt{2}$
2) center $(0,-3)$ and radius $= 2\sqrt{2}$
3) center $(0,6)$ and radius $= \sqrt{35}$
4) center $(0,-6)$ and radius $= \sqrt{35}$

215 The equation of a circle is $x^2 + y^2 - 12y + 20 = 0$. What are the coordinates of the center and the length of the radius of the circle?
1) center $(0,6)$ and radius 4
2) center $(0,-6)$ and radius 4
3) center $(0,6)$ and radius 16
4) center $(0,-6)$ and radius 16

216 The equation of a circle is $x^2 + y^2 - 6x + 2y = 6$. What are the coordinates of the center and the length of the radius of the circle?
1) center $(-3,1)$ and radius 4
2) center $(3,-1)$ and radius 4
3) center $(-3,1)$ and radius 16
4) center $(3,-1)$ and radius 16

217 What is an equation of a circle whose center is $(1,4)$ and diameter is 10?
1) $x^2 - 2x + y^2 - 8y = 8$
2) $x^2 + 2x + y^2 + 8y = 8$
3) $x^2 - 2x + y^2 - 8y = 83$
4) $x^2 + 2x + y^2 + 8y = 83$

218 The equation of a circle is $x^2 + 8x + y^2 - 12y = 144$. What are the coordinates of the center and the length of the radius of the circle?
1) center $(4,-6)$ and radius 12
2) center $(-4,6)$ and radius 12
3) center $(4,-6)$ and radius 14
4) center $(-4,6)$ and radius 14

219 What are the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 = 8x - 6y + 39$?
1) center $(-4,3)$ and radius 64
2) center $(4,-3)$ and radius 64
3) center $(-4,3)$ and radius 8
4) center $(4,-3)$ and radius 8

220 What is an equation of a circle whose center is at $(2,-4)$ and is tangent to the line $x = -2$?
1) $(x-2)^2 + (y+4)^2 = 4$
2) $(x-2)^2 + (y+4)^2 = 16$
3) $(x+2)^2 + (y-4)^2 = 4$
4) $(x+2)^2 + (y-4)^2 = 16$

221 Kevin's work for deriving the equation of a circle is shown below.
$$x^2 + 4x = -(y^2 - 20)$$
STEP 1 $x^2 + 4x = -y^2 + 20$
STEP 2 $x^2 + 4x + 4 = -y^2 + 20 - 4$
STEP 3 $(x+2)^2 = -y^2 + 20 - 4$
STEP 4 $(x+2)^2 + y^2 = 16$
In which step did he make an error in his work?
1) Step 1
2) Step 2
3) Step 3
4) Step 4

222 Determine and state the coordinates of the center and the length of the radius of a circle whose equation is $x^2 + y^2 - 6x = 56 - 8y$.

G.GPE.B.4: CIRCLES IN THE COORDINATE PLANE

223 A circle whose center is the origin passes through the point $(-5,12)$. Which point also lies on this circle?
1) $(10,3)$
2) $(-12,13)$
3) $(11,2\sqrt{12})$
4) $(-8,5\sqrt{21})$

224 The center of circle Q has coordinates $(3,-2)$. If circle Q passes through $R(7,1)$, what is the length of its diameter?
1) 50
2) 25
3) 10
4) 5

225 A circle has a center at $(1,-2)$ and radius of 4. Does the point $(3.4,1.2)$ lie on the circle? Justify your answer.

MEASURING IN THE PLANE AND SPACE
G.MG.A.3: AREA OF POLYGONS, SURFACE AREA AND LATERAL AREA

226 A farmer has 64 feet of fence to enclose a rectangular vegetable garden. Which dimensions would result in the biggest area for this garden?
1) the length and the width are equal
2) the length is 2 more than the width
3) the length is 4 more than the width
4) the length is 6 more than the width

227 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.
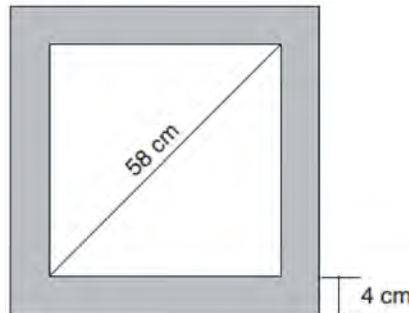
Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter*.

228 A gallon of paint will cover approximately 450 square feet. An artist wants to paint all the outside surfaces of a cube measuring 12 feet on each edge. What is the *least* number of gallons of paint he must buy to paint the cube?
1) 1
2) 2
3) 3
4) 4

G.GMD.A.1: CIRCUMFERENCE

229 A circle with a radius of 5 was divided into 24 congruent sectors. The sectors were then rearranged, as shown in the diagram below.
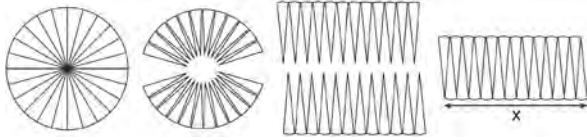
To the *nearest integer*, the value of *x* is
1) 31
2) 16
3) 12
4) 10

230 A designer needs to create perfectly circular necklaces. The necklaces each need to have a radius of 10 cm. What is the largest number of necklaces that can be made from 1000 cm of wire?
1) 15
2) 16
3) 31
4) 32

G.MG.A.3: COMPOSITIONS OF POLYGONS AND CIRCLES

231 A countertop for a kitchen is modeled with the dimensions shown below. An 18-inch by 21-inch rectangle will be removed for the installation of the sink.
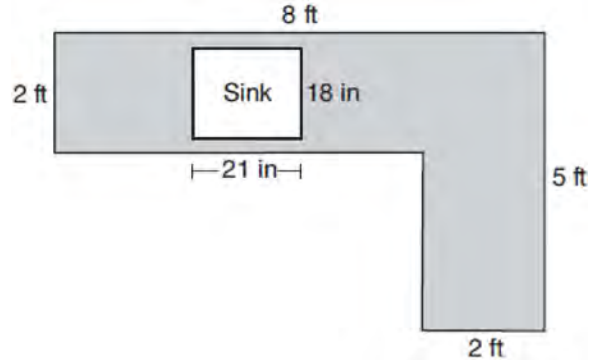
What is the area of the top of the installed countertop, to the *nearest square foot*?
1) 26
2) 23
3) 22
4) 19

232 Francisco needs the three pieces of glass shown below to complete a stained glass window. The shapes, two triangles and a trapezoid, are measured in inches.
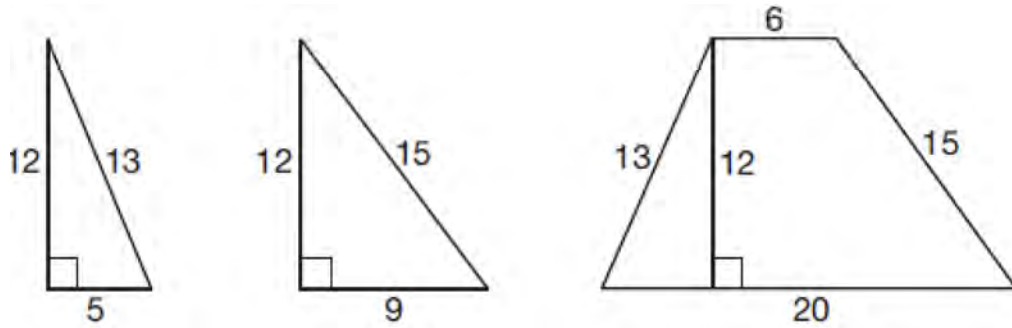
Glass can be purchased in rectangular sheets that are 12 inches wide. What is the minimum length of a sheet of glass, in inches, that Francisco must purchase in order to have enough to complete the window?
1)   20   3)   29
2)   25   4)   34

233 A walking path at a local park is modeled on the grid below, where the length of each grid square is 10 feet. The town needs to submit paperwork to pave the walking path. Determine and state, to the *nearest square foot*, the area of the walking path.
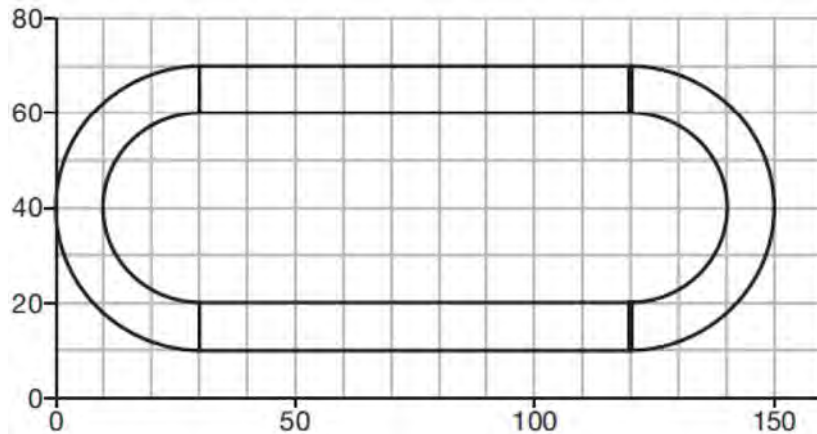
G.C.B.5: ARC LENGTH

234 In the diagram below, the circle shown has radius 10. Angle B intercepts an arc with a length of 2π.
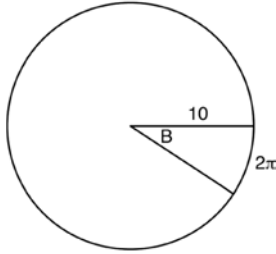
What is the measure of angle B, in radians?
1) $10 + 2\pi$
2) 20π
3) $\dfrac{\pi}{5}$
4) $\dfrac{5}{\pi}$

235 The diagram below shows circle O with radii $\overline{OA}$ and $\overline{OB}$. The measure of angle AOB is $120°$, and the length of a radius is 6 inches.
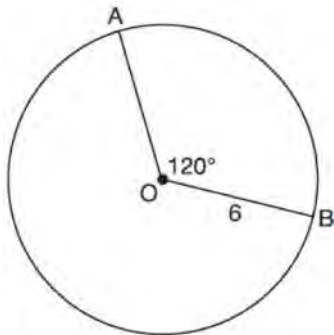
Which expression represents the length of arc AB, in inches?
1) $\dfrac{120}{360}(6\pi)$
2) $120(6)$
3) $\dfrac{1}{3}(36\pi)$
4) $\dfrac{1}{3}(12\pi)$

236 In the diagram below, two concentric circles with center O, and radii $\overline{OC}$, $\overline{OD}$, $\overline{OGE}$, and $\overline{ODF}$ are drawn.
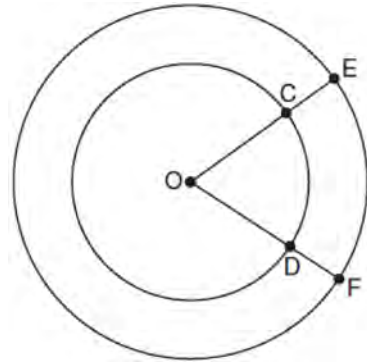
If $OC = 4$ and $OE = 6$, which relationship between the length of arc EF and the length of arc CD is always true?
1) The length of arc EF is 2 units longer than the length of arc CD.
2) The length of arc EF is 4 units longer than the length of arc CD.
3) The length of arc EF is 1.5 times the length of arc CD.
4) The length of arc EF is 2.0 times the length of arc CD.

237 In the diagram below, Circle 1 has radius 4, while Circle 2 has radius 6.5. Angle A intercepts an arc of length π, and angle B intercepts an arc of length $\dfrac{13\pi}{8}$.
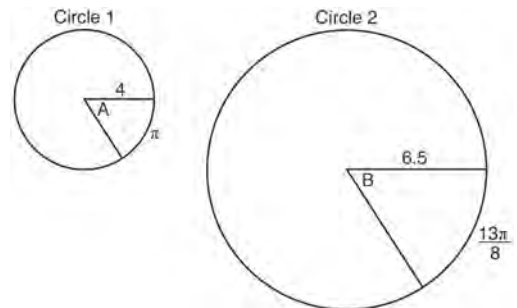
Dominic thinks that angles A and B have the same radian measure. State whether Dominic is correct or not. Explain why.

Geometry Regents Exam Questions by State Standard: Topic

G.C.B.5: SECTORS

238 Triangle FGH is inscribed in circle O, the length of radius $\overline{OH}$ is 6, and $\overline{FH} \cong \overline{OG}$.
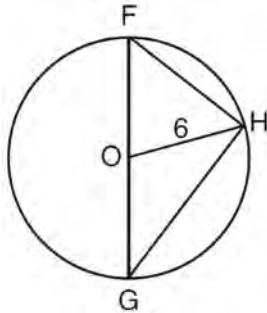
What is the area of the sector formed by angle *FOH*?
1) 2π
2) $\frac{3}{2}\pi$
3) 6π
4) 24π

239 In the diagram below of circle O, the area of the shaded sector *LOM* is 2π cm^2.
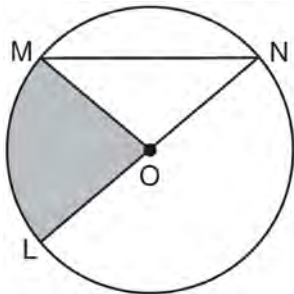
If the length of $\overline{NL}$ is 6 cm, what is m$\angle N$?
1) $10°$
2) $20°$
3) $40°$
4) $80°$

240 In the diagram below of circle O, $GO = 8$ and m$\angle GOJ = 60°$.
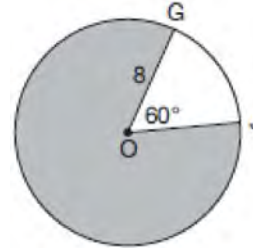
What is the area, in terms of π, of the shaded region?
1) $\frac{4\pi}{3}$
2) $\frac{20\pi}{3}$
3) $\frac{32\pi}{3}$
4) $\frac{160\pi}{3}$

241 A circle with a diameter of 10 cm and a central angle of 30° is drawn below.
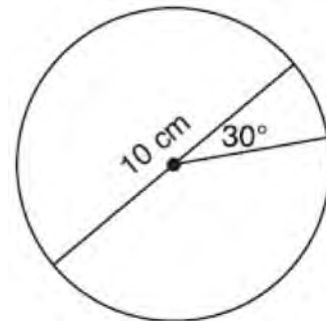
What is the area, to the *nearest tenth of a square centimeter*, of the sector formed by the 30° angle?
1) 5.2
2) 6.5
3) 13.1
4) 26.2

242 Circle O with a radius of 9 is drawn below. The measure of central angle AOC is 120°.
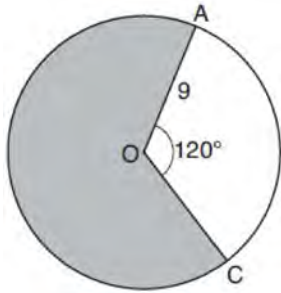
What is the area of the shaded sector of circle O?
1) 6π
2) 12π
3) 27π
4) 54π

243 In circle B below, diameter $\overline{RT}$, radius $\overline{BE}$, and chord $\overline{RE}$ are drawn.
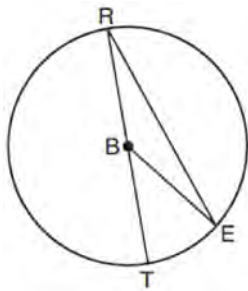
If m$\angle TRE = 15°$ and $BE = 9$, then the area of sector EBR is
1) 3.375π
2) 6.75π
3) 33.75π
4) 37.125π

244 In circle O, diameter $\overline{AB}$, chord $\overline{BC}$, and radius $\overline{OC}$ are drawn, and the measure of arc BC is 108°.
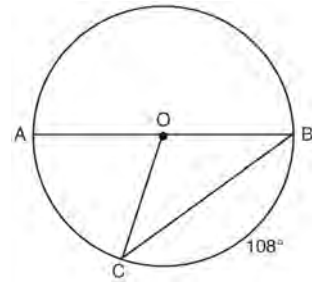
Some students wrote these formulas to find the area of sector COB:

Amy $\quad \dfrac{3}{10} \cdot \pi \cdot (BC)^2$

Beth $\quad \dfrac{108}{360} \cdot \pi \cdot (OC)^2$

Carl $\quad \dfrac{3}{10} \cdot \pi \cdot (\dfrac{1}{2} AB)^2$

Dex $\quad \dfrac{108}{360} \cdot \pi \cdot \dfrac{1}{2} (AB)^2$

Which students wrote correct formulas?
1) Amy and Dex
2) Beth and Carl
3) Carl and Amy
4) Dex and Beth

245 What is the area of a sector of a circle with a radius of 8 inches and formed by a central angle that measures 60°?
1) $\dfrac{8\pi}{3}$
2) $\dfrac{16\pi}{3}$
3) $\dfrac{32\pi}{3}$
4) $\dfrac{64\pi}{3}$

246 In a circle with a diameter of 32, the area of a
sector is $\frac{512\pi}{3}$. The measure of the angle of the
sector, in radians, is

1) $\frac{\pi}{3}$

2) $\frac{4\pi}{3}$

3) $\frac{16\pi}{3}$

4) $\frac{64\pi}{3}$

247 The area of a sector of a circle with a radius
measuring 15 cm is 75π cm^2. What is the measure
of the central angle that forms the sector?
1) 72°
2) 120°
3) 144°
4) 180°

248 In the diagram below of circle O, diameter $\overline{AB}$ and
radii $\overline{OC}$ and $\overline{OD}$ are drawn. The length of $\overline{AB}$ is
12 and the measure of $\angle COD$ is 20 degrees.
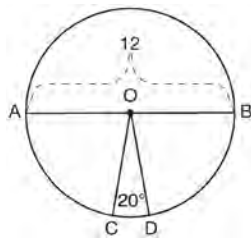
If $\overset{\frown}{AC} \cong \overset{\frown}{BD}$, find the area of sector BOD in terms
of π.

249 In the diagram below of circle O, the area of the
shaded sector AOC is 12π in^2 and the length of $\overline{OA}$
is 6 inches. Determine and state m$\angle AOC$.
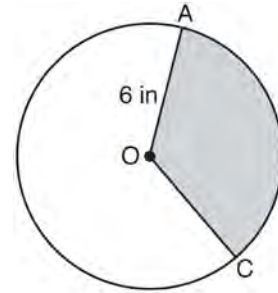
250 Determine and state, in terms of π, the area of a
sector that intercepts a 40° arc of a circle with a
radius of 4.5.

251 In the diagram below, the circle has a radius of 25
inches. The area of the *unshaded* sector is
500π in^2.
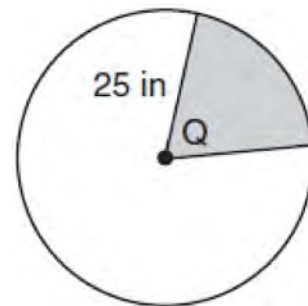
Determine and state the degree measure of angle Q,
the central angle of the shaded sector.

252 In the diagram below, circle O has a radius of 10.
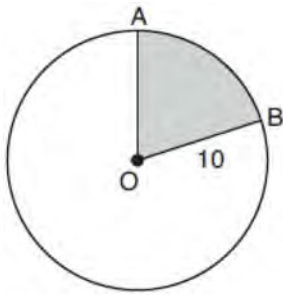
If $m\overset{\frown}{AB} = 72°$, find the area of shaded sector AOB, in terms of π.

G.GMD.1: CAVALERI'S PRINCIPLE

253 The diagram below shows two figures. Figure A is a right triangular prism and figure B is an oblique triangular prism. The base of figure A has a height of 5 and a length of 8 and the height of prism A is 14. The base of figure B has a height of 8 and a length of 5 and the height of prism B is 14.
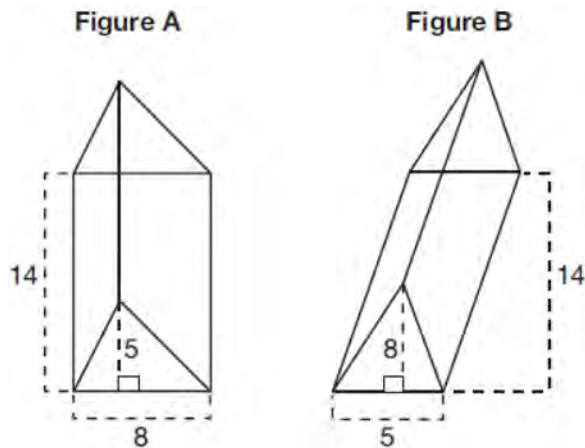
Use Cavalieri's Principle to explain why the volumes of these two triangular prisms are equal.

254 Two stacks of 23 quarters each are shown below. One stack forms a cylinder but the other stack does not form a cylinder.

Use Cavelieri's principle to explain why the volumes of these two stacks of quarters are equal.

255 Sue believes that the two cylinders shown in the diagram below have equal volumes.
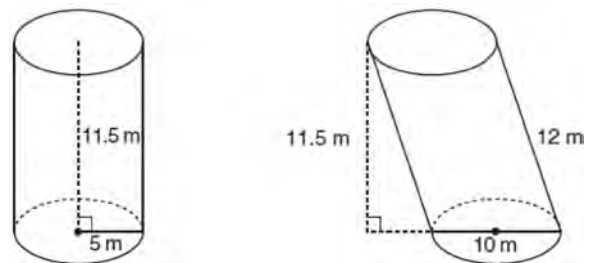
Is Sue correct? Explain why.

G.GMD.A.3: VOLUME

256 As shown in the diagram below, a regular pyramid has a square base whose side measures 6 inches.

6 in
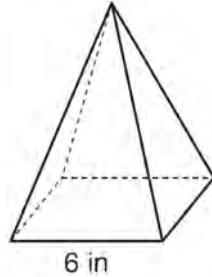
If the altitude of the pyramid measures 12 inches, its volume, in cubic inches, is
1) 72
2) 144
3) 288
4) 432

257 A solid metal prism has a rectangular base with sides of 4 inches and 6 inches, and a height of 4 inches. A hole in the shape of a cylinder, with a radius of 1 inch, is drilled through the entire length of the rectangular prism.

1 in.
4 in
4 in
6 in
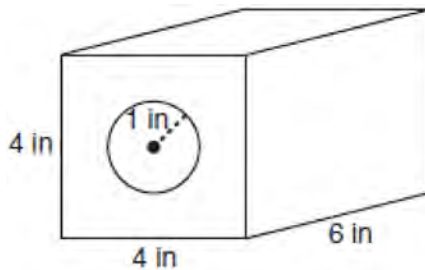
What is the approximate volume of the remaining solid, in cubic inches?
1) 19
2) 77
3) 93
4) 96

258 The pyramid shown below has a square base, a height of 7, and a volume of 84.

7
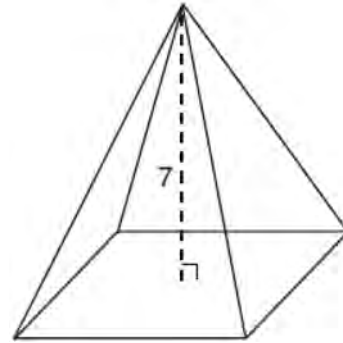
What is the length of the side of the base?
1) 6
2) 12
3) 18
4) 36

259 As shown in the diagram below, the radius of a cone is 2.5 cm and its slant height is 6.5 cm.

6.5

2.5
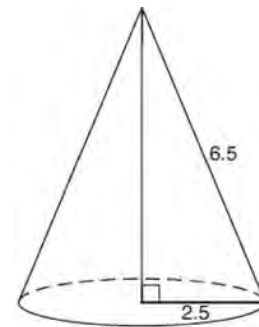
How many cubic centimeters are in the volume of the cone?
1) 12.5π
2) 13.5π
3) 30.0π
4) 37.5π

260 A fabricator is hired to make a 27-foot-long solid metal railing for the stairs at the local library. The railing is modeled by the diagram below. The railing is 2.5 inches high and 2.5 inches wide and is comprised of a rectangular prism and a half-cylinder.
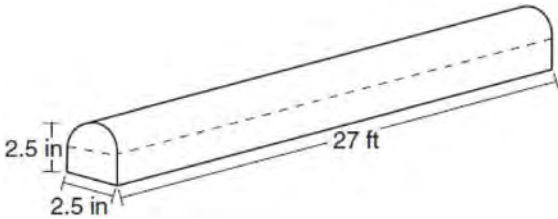
How much metal, to the *nearest cubic inch*, will the railing contain?
1)   151
2)   795
3)   1808
4)   2025

261 The greenhouse pictured below can be modeled as a rectangular prism with a half-cylinder on top. The rectangular prism is 20 feet wide, 12 feet high, and 45 feet long. The half-cylinder has a diameter of 20 feet.
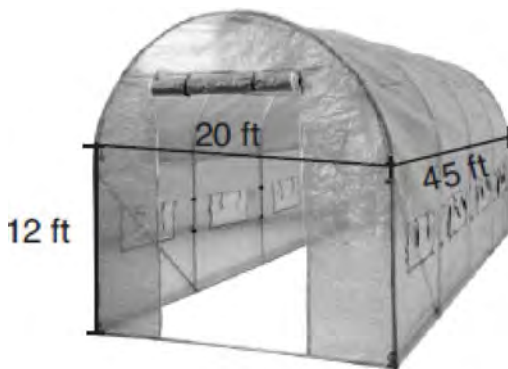
To the *nearest cubic foot*, what is the volume of the greenhouse?
1)   17,869
2)   24,937
3)   39,074
4)   67,349

262 A vendor is using an 8-ft by 8-ft tent for a craft fair. The legs of the tent are 9 ft tall and the top forms a square pyramid with a height of 3 ft.
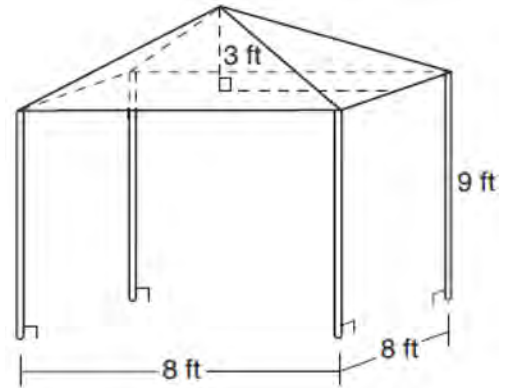
What is the volume, in cubic feet, of space the tent occupies?
1)   256
2)   640
3)   672
4)   768

263 The Great Pyramid of Giza was constructed as a regular pyramid with a square base. It was built with an approximate volume of 2,592,276 cubic meters and a height of 146.5 meters. What was the length of one side of its base, to the *nearest meter*?
1)   73
2)   77
3)   133
4)   230

264 A fish tank in the shape of a rectangular prism has dimensions of 14 inches, 16 inches, and 10 inches. The tank contains 1680 cubic inches of water. What percent of the fish tank is empty?
1)   10
2)   25
3)   50
4)   75

265 The diameter of a basketball is approximately 9.5 inches and the diameter of a tennis ball is approximately 2.5 inches. The volume of the basketball is about how many times greater than the volume of the tennis ball?
1) 3591
2) 65
3) 55
4) 4

266 A company is creating an object from a wooden cube with an edge length of 8.5 cm. A right circular cone with a diameter of 8 cm and an altitude of 8 cm will be cut out of the cube. Which expression represents the volume of the remaining wood?
1) $(8.5)^3 - \pi(8)^2(8)$
2) $(8.5)^3 - \pi(4)^2(8)$
3) $(8.5)^3 - \frac{1}{3}\pi(8)^2(8)$
4) $(8.5)^3 - \frac{1}{3}\pi(4)^2(8)$

267 Tennis balls are sold in cylindrical cans with the balls stacked one on top of the other. A tennis ball has a diameter of 6.7 cm. To the *nearest cubic centimeter*, what is the minimum volume of the can that holds a stack of 4 tennis balls?
1) 236
2) 282
3) 564
4) 945

268 A cone has a volume of 108π and a base diameter of 12. What is the height of the cone?
1) 27
2) 9
3) 3
4) 4

269 The base of a pyramid is a rectangle with a width of 4.6 cm and a length of 9 cm. What is the height, in centimeters, of the pyramid if its volume is 82.8 cm³?
1) 6
2) 2
3) 9
4) 18

270 A water cup in the shape of a cone has a height of 4 inches and a maximum diameter of 3 inches. What is the volume of the water in the cup, to the *nearest tenth of a cubic inch*, when the cup is filled to half its height?
1) 1.2
2) 3.5
3) 4.7
4) 14.1

271 An ice cream waffle cone can be modeled by a right circular cone with a base diameter of 6.6 centimeters and a volume of 54.45π cubic centimeters. What is the number of centimeters in the height of the waffle cone?
1) $3\frac{3}{4}$
2) 5
3) 15
4) $24\frac{3}{4}$

272 A regular pyramid has a square base. The perimeter of the base is 36 inches and the height of the pyramid is 15 inches. What is the volume of the pyramid in cubic inches?
1) 180
2) 405
3) 540
4) 1215

64

273 A child's tent can be modeled as a pyramid with a square base whose sides measure 60 inches and whose height measures 84 inches. What is the volume of the tent, to the *nearest cubic foot*?
1) 35
2) 58
3) 82
4) 175

274 A tent is in the shape of a right pyramid with a square floor. The square floor has side lengths of 8 feet. If the height of the tent at its center is 6 feet, what is the volume of the tent, in cubic feet?
1) 48
2) 128
3) 192
4) 384

275 What is the volume of a hemisphere that has a diameter of 12.6 cm, to the *nearest tenth of a cubic centimeter*?
1) 523.7
2) 1047.4
3) 4189.6
4) 8379.2

276 What is the volume, in cubic centimeters, of a right square pyramid with base edges that are 64 cm long and a slant height of 40 cm?
1) 8192.0
2) $13,653.\overline{3}$
3) 32,768.0
4) $54,613.\overline{3}$

277 Jaden is comparing two cones. The radius of the base of cone *A* is twice as large as the radius of the base of cone *B*. The height of cone *B* is twice the height of cone *A*. The volume of cone *A* is
1) twice the volume of cone *B*
2) four times the volume of cone *B*
3) equal to the volume of cone *B*
4) equal to half the volume of cone *B*

278 A water glass can be modeled by a truncated right cone (a cone which is cut parallel to its base) as shown below.
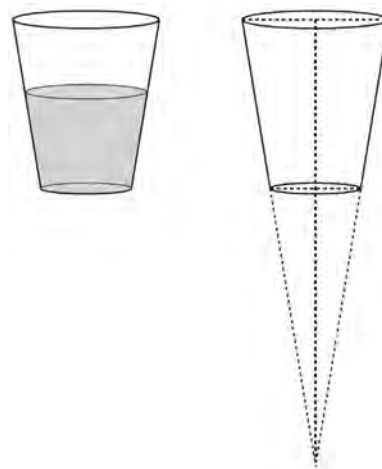
The diameter of the top of the glass is 3 inches, the diameter at the bottom of the glass is 2 inches, and the height of the glass is 5 inches. The base with a diameter of 2 inches must be parallel to the base with a diameter of 3 inches in order to find the height of the cone. Explain why. Determine and state, in inches, the height of the larger cone. Determine and state, to the *nearest tenth of a cubic inch*, the volume of the water glass.

65

279 A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.
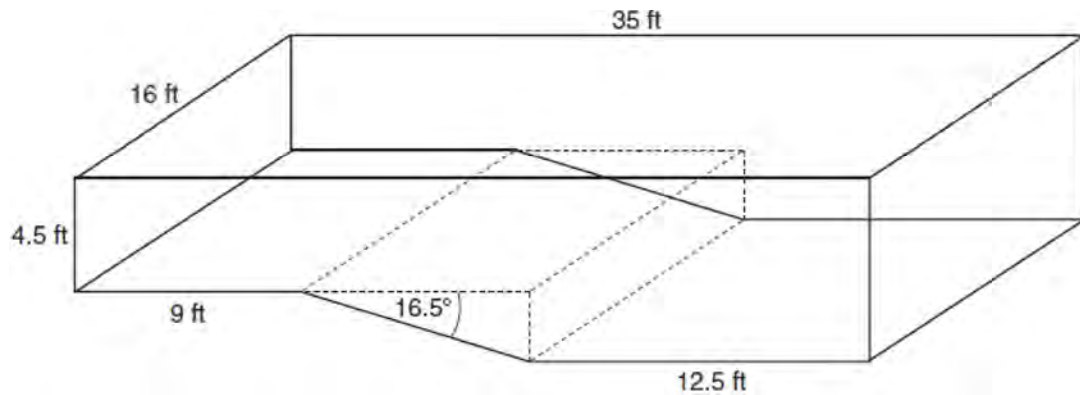
If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*? Find the volume of the inside of the pool to the *nearest cubic foot*. A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10 .5 gallons per minute. How much time, to the *nearest hour*, will it take to fill the pool 6 inches from the top? [1 ft³=7.48 gallons]

280 A candle maker uses a mold to make candles like the one shown below.

The height of the candle is 13 cm and the circumference of the candle at its widest measure is 31.416 cm. Use modeling to approximate how much wax, to the *nearest cubic centimeter*, is needed to make this candle. Justify your answer.

281 A gas station has a cylindrical fueling tank that holds the gasoline for its pumps, as modeled below. The tank holds a maximum of 20,000 gallons of gasoline and has a length of 34.5 feet.
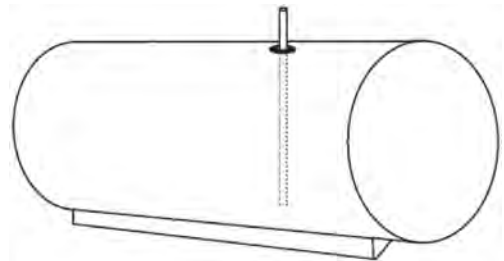
A metal pole is used to measure how much gas is in the tank. To the *nearest tenth of a foot*, how long does the pole need to be in order to reach the bottom of the tank and still extend one foot outside the tank? Justify your answer. [1 ft³=7.48 gallons]

66

282 A storage tank is in the shape of a cylinder with a hemisphere on the top. The highest point on the inside of the storage tank is 13 meters above the floor of the storage tank, and the diameter inside the cylinder is 8 meters. Determine and state, to the *nearest cubic meter*, the total volume inside the storage tank.

13 m

8 m
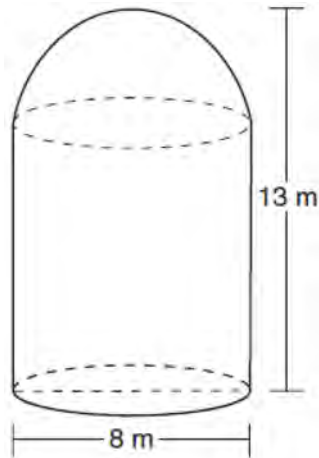
283 Ian needs to replace two concrete sections in his sidewalk, as modeled below. Each section is 36 inches by 36 inches and 4 inches deep. He can mix his own concrete for $3.25 per cubic foot.

36 in

36 in

4 in
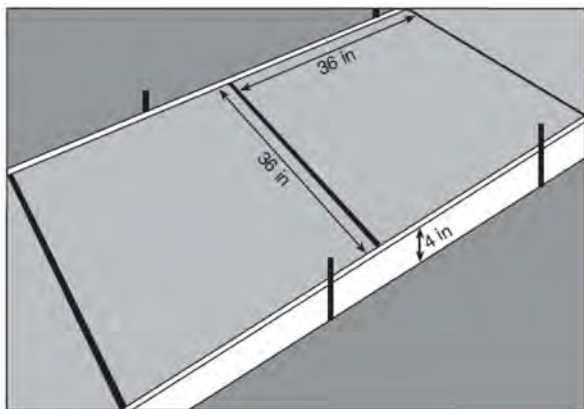
How much money will it cost Ian to replace the two concrete sections?

284 A cargo trailer, pictured below, can be modeled by a rectangular prism and a triangular prism. Inside the trailer, the rectangular prism measures 6 feet wide and 10 feet long. The walls that form the triangular prism each measure 4 feet wide inside the trailer. The diagram below is of the floor, showing the inside measurements of the trailer.

Cargo Trailer

Cargo Trailer Floor

10 ft

4 ft

6 ft

4 ft

10 ft
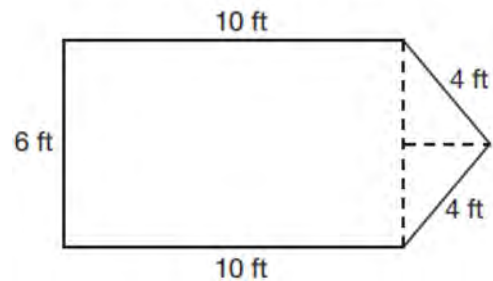
If the inside height of the trailer is 6.5 feet, what is the total volume of the inside of the trailer, to the *nearest cubic foot*?

285 A manufacturer is designing a new container for their chocolate-covered almonds. Their original container was a cylinder with a height of 18 cm and a diameter of 14 cm. The new container can be modeled by a rectangular prism with a square base and will contain the same amount of chocolate-covered almonds.
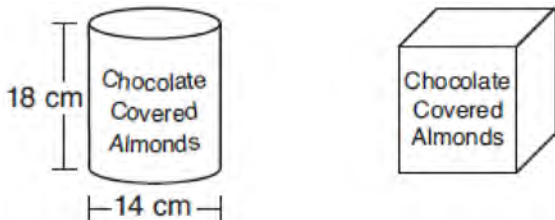
If the new container's height is 16 cm, determine and state, to the *nearest tenth of a centimeter*, the side length of the new container if both containers contain the same amount of almonds. A store owner who sells the chocolate-covered almonds displays them on a shelf whose dimensions are 80 cm long and 60 cm wide. The shelf can only hold one layer of new containers when each new container sits on its square base. Determine and state the maximum number of new containers the store owner can fit on the shelf.

286 Randy's basketball is in the shape of a sphere with a maximum circumference of 29.5 inches. Determine and state the volume of the basketball, to the *nearest cubic inch*.

287 When volleyballs are purchased, they are not fully inflated. A partially inflated volleyball can be modeled by a sphere whose volume is approximately 180 in³. After being fully inflated, its volume is approximately 294 in³. To the *nearest tenth of an inch*, how much does the radius increase when the volleyball is fully inflated?

288 Theresa has a rectangular pool 30 ft long, 15 ft wide, and 4 ft deep. Theresa fills her pool using city water at a rate of $3.95 per 100 gallons of water. Nancy has a circular pool with a diameter of 24 ft and a depth of 4 ft. Nancy fills her pool with a water delivery service at a rate of $200 per 6000 gallons. If Theresa and Nancy both fill their pools 6 inches from the top of the pool, determine and state who paid more to fill her pool.
[1ft³ water = 7.48 gallons]

289 A child-sized swimming pool can be modeled by a cylinder. The pool has a diameter of $6\frac{1}{2}$ feet and a height of 12 inches. The pool is filled with water to $\frac{2}{3}$ of its height. Determine and state the volume of the water in the pool, to the *nearest cubic foot*. One cubic foot equals 7.48 gallons of water. Determine and state, to the *nearest gallon*, the number of gallons of water in the pool.

290 A large water basin is in the shape of a right cylinder. The inside of the basin has a diameter of $8\frac{1}{4}$ feet and a height of 3 feet. Determine and state, to the *nearest cubic foot*, the number of cubic feet of water that it will take to fill the basin to a level of $\frac{1}{2}$ foot from the top.

291 A barrel of fuel oil is a right circular cylinder where the inside measurements of the barrel are a diameter of 22.5 inches and a height of 33.5 inches. There are 231 cubic inches in a liquid gallon. Determine and state, to the *nearest tenth*, the gallons of fuel that are in a barrel of fuel oil.

G.MG.A.2: DENSITY

292 A shipping container is in the shape of a right rectangular prism with a length of 12 feet, a width of 8.5 feet, and a height of 4 feet. The container is completely filled with contents that weigh, on average, 0.25 pound per cubic foot. What is the weight, in pounds, of the contents in the container?
1) 1,632
2) 408
3) 102
4) 92

293 A hemispherical tank is filled with water and has a diameter of 10 feet. If water weighs 62.4 pounds per cubic foot, what is the total weight of the water in a full tank, to the *nearest pound*?
1) 16,336
2) 32,673
3) 130,690
4) 261,381

294 Molly wishes to make a lawn ornament in the form of a solid sphere. The clay being used to make the sphere weighs .075 pound per cubic inch. If the sphere's radius is 4 inches, what is the weight of the sphere, to the *nearest pound*?
1) 34
2) 20
3) 15
4) 4

295 Seawater contains approximately 1.2 ounces of salt per liter on average. How many gallons of seawater, to the *nearest tenth of a gallon*, would contain 1 pound of salt?
1) 3.3
2) 3.5
3) 4.7
4) 13.3

296 A hemispherical water tank has an inside diameter of 10 feet. If water has a density of 62.4 pounds per cubic foot, what is the weight of the water in a full tank, to the *nearest pound*?
1) 16,336
2) 32,673
3) 130,690
4) 261,381

297 The density of the American white oak tree is 752 kilograms per cubic meter. If the trunk of an American white oak tree has a circumference of 4.5 meters and the height of the trunk is 8 meters, what is the approximate number of kilograms of the trunk?
1) 13
2) 9694
3) 13,536
4) 30,456

298 A standard-size golf ball has a diameter of 1.680 inches. The material used to make the golf ball weighs 0.6523 ounce per cubic inch. What is the weight, to the *nearest hundredth of an ounce*, of one golf ball?
1) 1.10
2) 1.62
3) 2.48
4) 3.81

299 Lou has a solid clay brick in the shape of a rectangular prism with a length of 8 inches, a width of 3.5 inches, and a height of 2.25 inches. If the clay weighs 1.055 oz/in³, how much does Lou's brick weigh, to the *nearest ounce*?
1) 66
2) 64
3) 63
4) 60

300 The 2010 U.S. Census populations and population densities are shown in the table below.

State	Population Density $\left(\dfrac{\text{people}}{\text{mi}^2}\right)$	Population in 2010
Florida	350.6	18,801,310
Illinois	231.1	12,830,632
New York	411.2	19,378,102
Pennsylvania	283.9	12,702,379

Based on the table above, which list has the states' areas, in square miles, in order from largest to smallest?
1) Illinois, Florida, New York, Pennsylvania
2) New York, Florida, Illinois, Pennsylvania
3) New York, Florida, Pennsylvania, Illinois
4) Pennsylvania, New York, Florida, Illinois

301 The table below shows the population and land area, in square miles, of four counties in New York State at the turn of the century.

County	2000 Census Population	2000 Land Area $\left(\text{mi}^2\right)$
Broome	200,536	706.82
Dutchess	280,150	801.59
Niagara	219,846	522.95
Saratoga	200,635	811.84

Which county had the greatest population density?
1) Broome
2) Dutchess
3) Niagara
4) Saratoga

302 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*. State which type of wood the cube is made of, using the density table below.

Type of Wood	Density (g/cm³)
Pine	0.373
Hemlock	0.431
Elm	0.554
Birch	0.601
Ash	0.638
Maple	0.676
Oak	0.711

303 The water tower in the picture below is modeled by the two-dimensional figure beside it. The water tower is composed of a hemisphere, a cylinder, and a cone. Let *C* be the center of the hemisphere and let *D* be the center of the base of the cone.

Source: http://en.wikipedia.org
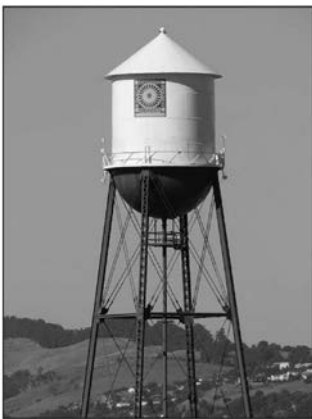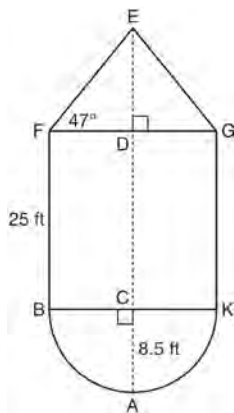
If *AC* = 8.5 feet, *BF* = 25 feet, and m∠*EFD* = 47°, determine and state, to the *nearest cubic foot*, the volume of the water tower. The water tower was constructed to hold a maximum of 400,000 pounds of water. If water weighs 62.4 pounds per cubic foot, can the water tower be filled to 85% of its volume and *not* exceed the weight limit? Justify your answer.

304 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

Walter goes to a hobby store to buy the wax for his candles. The wax costs $0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles? If Walter spent a total of $37.83 for the molds and charges $1.95 for each candle, what is Walter's profit after selling 100 candles?

305 During an experiment, the same type of bacteria is grown in two petri dishes. Petri dish *A* has a diameter of 51 mm and has approximately 40,000 bacteria after 1 hour. Petri dish *B* has a diameter of 75 mm and has approximately 72,000 bacteria after 1 hour.
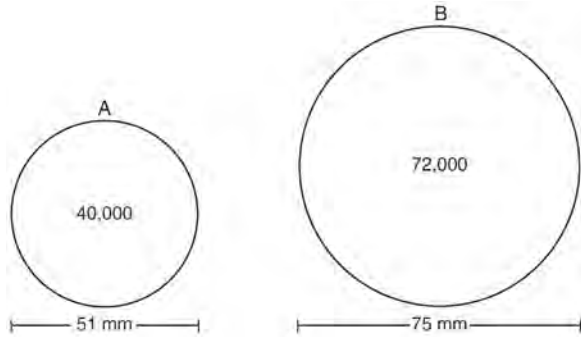
Determine and state which petri dish has the greater population density of bacteria at the end of the first hour.

306 A snow cone consists of a paper cone completely filled with shaved ice and topped with a hemisphere of shaved ice, as shown in the diagram below. The inside diameter of both the cone and the hemisphere is 8.3 centimeters. The height of the cone is 10.2 centimeters.
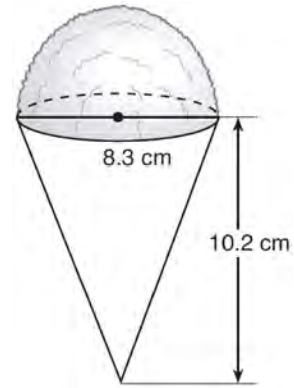
The desired density of the shaved ice is 0.697 g/cm^3, and the cost, per kilogram, of ice is $3.83. Determine and state the cost of the ice needed to make 50 snow cones.

307 Shae has recently begun kickboxing and purchased training equipment as modeled in the diagram below. The total weight of the bag, pole, and unfilled base is 270 pounds. The cylindrical base is 18 inches tall with a diameter of 20 inches. The dry sand used to fill the base weighs 95.46 lbs per cubic foot.
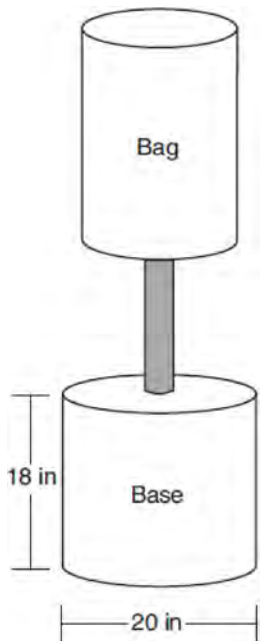
To the *nearest pound*, determine and state the total weight of the training equipment if the base is filled to 85% of its capacity.

308 Trees that are cut down and stripped of their branches for timber are approximately cylindrical. A timber company specializes in a certain type of tree that has a typical diameter of 50 cm and a typical height of about 10 meters. The density of the wood is 380 kilograms per cubic meter, and the wood can be sold by mass at a rate of $4.75 per kilogram. Determine and state the minimum number of whole trees that must be sold to raise at least $50,000.

309 A contractor needs to purchase 500 bricks. The dimensions of each brick are 5.1 cm by 10.2 cm by 20.3 cm, and the density of each brick is 1920 kg / m³. The maximum capacity of the contractor's trailer is 900 kg. Can the trailer hold the weight of 500 bricks? Justify your answer.

310 New streetlights will be installed along a section of the highway. The posts for the streetlights will be 7.5 m tall and made of aluminum. The city can choose to buy the posts shaped like cylinders or the posts shaped like rectangular prisms. The cylindrical posts have a hollow core, with aluminum 2.5 cm thick, and an outer diameter of 53.4 cm. The rectangular-prism posts have a hollow core, with aluminum 2.5 cm thick, and a square base that measures 40 cm on each side. The density of aluminum is 2.7 g/cm3, and the cost of aluminum is $0.38 per kilogram. If all posts must be the same shape, which post design will cost the town less? How much money will be saved per streetlight post with the less expensive design?

311 A machinist creates a solid steel part for a wind turbine engine. The part has a volume of 1015 cubic centimeters. Steel can be purchased for $0.29 per kilogram, and has a density of 7.95 g/cm³. If the machinist makes 500 of these parts, what is the cost of the steel, to the *nearest dollar*?

312 A bakery sells hollow chocolate spheres. The larger diameter of each sphere is 4 cm. The thickness of the chocolate of each sphere is 0.5 cm. Determine and state, to the *nearest tenth of a cubic centimeter*, the amount of chocolate in each hollow sphere. The bakery packages 8 of them into a box. If the density of the chocolate is 1.308 g/cm³, determine and state, to the *nearest gram*, the total mass of the chocolate in the box.

313 A rectangular tabletop will be made of maple wood that weighs 43 pounds per cubic foot. The tabletop will have a length of eight feet, a width of three feet, and a thickness of one inch. Determine and state the weight of the tabletop, in pounds.

TRANSFORMATIONS

G.SRT.A.1: LINE DILATIONS

314 In the diagram below, $\overline{CD}$ is the image of $\overline{AB}$ after a dilation of scale factor k with center E.
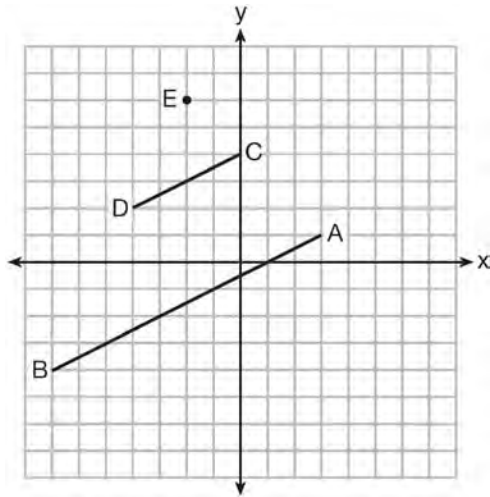
Which ratio is equal to the scale factor k of the dilation?

1) $\dfrac{EC}{EA}$

2) $\dfrac{BA}{EA}$

3) $\dfrac{EA}{BA}$

4) $\dfrac{EA}{EC}$

315 After a dilation with center $(0,0)$, the image of $\overline{DB}$ is $\overline{D'B'}$. If $DB = 4.5$ and $D'B' = 18$, the scale factor of this dilation is

1) $\dfrac{1}{5}$

2) 5

3) $\dfrac{1}{4}$

4) 4

316 After a dilation centered at the origin, the image of $\overline{CD}$ is $\overline{C'D'}$. If the coordinates of the endpoints of these segments are $C(6,-4)$, $D(2,-8)$, $C'(9,-6)$, and $D'(3,-12)$, the scale factor of the dilation is

1) $\dfrac{3}{2}$

2) $\dfrac{2}{3}$

3) 3

4) $\dfrac{1}{3}$

317 The line represented by $2y = x + 8$ is dilated by a scale factor of k centered at the origin, such that the image of the line has an equation of $y - \dfrac{1}{2}x = 2$. What is the scale factor?

1) $k = \dfrac{1}{2}$

2) $k = 2$

3) $k = \dfrac{1}{4}$

4) $k = 4$

318 On the set of axes below, $\overline{AB}$ is dilated by a scale factor of $\frac{5}{2}$ centered at point P.
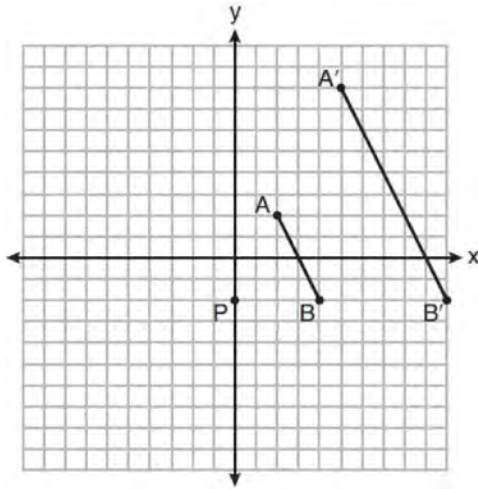
Which statement is always true?
1) $\overline{PA} \cong \overline{AA'}$
2) $\overline{AB} \parallel \overline{A'B'}$
3) $AB = A'B'$
4) $\frac{5}{2}(A'B') = AB$

319 On the graph below, point $A(3,4)$ and $\overline{BC}$ with coordinates $B(4,3)$ and $C(2,1)$ are graphed.
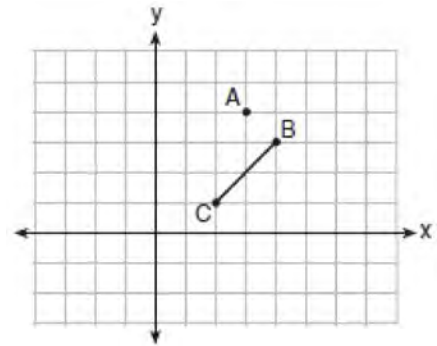
What are the coordinates of B' and C' after $\overline{BC}$ undergoes a dilation centered at point A with a scale factor of 2?
1) $B'(5,2)$ and $C'(1,-2)$
2) $B'(6,1)$ and $C'(0,-1)$
3) $B'(5,0)$ and $C'(1,-2)$
4) $B'(5,2)$ and $C'(3,0)$

320 A line that passes through the points whose coordinates are $(1,1)$ and $(5,7)$ is dilated by a scale factor of 3 and centered at the origin. The image of the line
1) is perpendicular to the original line
2) is parallel to the original line
3) passes through the origin
4) is the original line

321 A line segment is dilated by a scale factor of 2 centered at a point not on the line segment. Which statement regarding the relationship between the given line segment and its image is true?
1) The line segments are perpendicular, and the image is one-half of the length of the given line segment.
2) The line segments are perpendicular, and the image is twice the length of the given line segment.
3) The line segments are parallel, and the image is twice the length of the given line segment.
4) The line segments are parallel, and the image is one-half of the length of the given line segment.

322 The line whose equation is $3x - 5y = 4$ is dilated by a scale factor of $\frac{5}{3}$ centered at the origin. Which statement is correct?
1) The image of the line has the same slope as the pre-image but a different y-intercept.
2) The image of the line has the same y-intercept as the pre-image but a different slope.
3) The image of the line has the same slope and the same y-intercept as the pre-image.
4) The image of the line has a different slope and a different y-intercept from the pre-image.

323 If the line represented by $y = -\frac{1}{4}x - 2$ is dilated by a scale factor of 4 centered at the origin, which statement about the image is true?
1) The slope is $-\frac{1}{4}$ and the y-intercept is -8.
2) The slope is $-\frac{1}{4}$ and the y-intercept is -2.
3) The slope is -1 and the y-intercept is -8.
4) The slope is -1 and the y-intercept is -2.

324 The line $3y = -2x + 8$ is transformed by a dilation centered at the origin. Which linear equation could be its image?
1) $2x + 3y = 5$
2) $2x - 3y = 5$
3) $3x + 2y = 5$
4) $3x - 2y = 5$

325 The line represented by the equation $4y = 3x + 7$ is transformed by a dilation centered at the origin. Which linear equation could represent its image?
1) $3x - 4y = 9$
2) $3x + 4y = 9$
3) $4x - 3y = 9$
4) $4x + 3y = 9$

326 The line $-3x + 4y = 8$ is transformed by a dilation centered at the origin. Which linear equation could represent its image?
1) $y = \frac{4}{3}x + 8$
2) $y = \frac{3}{4}x + 8$
3) $y = -\frac{3}{4}x - 8$
4) $y = -\frac{4}{3}x - 8$

327 The equation of line h is $2x + y = 1$. Line m is the image of line h after a dilation of scale factor 4 with respect to the origin. What is the equation of the line m?
1) $y = -2x + 1$
2) $y = -2x + 4$
3) $y = 2x + 4$
4) $y = 2x + 1$

76

328 The line $y = 2x - 4$ is dilated by a scale factor of $\frac{3}{2}$ and centered at the origin. Which equation represents the image of the line after the dilation?
1) $y = 2x - 4$
2) $y = 2x - 6$
3) $y = 3x - 4$
4) $y = 3x - 6$

329 Line $y = 3x - 1$ is transformed by a dilation with a scale factor of 2 and centered at $(3, 8)$. The line's image is
1) $y = 3x - 8$
2) $y = 3x - 4$
3) $y = 3x - 2$
4) $y = 3x - 1$

330 Line MN is dilated by a scale factor of 2 centered at the point $(0, 6)$. If $\overleftrightarrow{MN}$ is represented by $y = -3x + 6$, which equation can represent $\overleftrightarrow{M'N'}$, the image of $\overleftrightarrow{MN}$?
1) $y = -3x + 12$
2) $y = -3x + 6$
3) $y = -6x + 12$
4) $y = -6x + 6$

331 What is an equation of the image of the line $y = \frac{3}{2}x - 4$ after a dilation of a scale factor of $\frac{3}{4}$ centered at the origin?
1) $y = \frac{9}{8}x - 4$
2) $y = \frac{9}{8}x - 3$
3) $y = \frac{3}{2}x - 4$
4) $y = \frac{3}{2}x - 3$

332 A three-inch line segment is dilated by a scale factor of 6 and centered at its midpoint. What is the length of its image?
1) 9 inches
2) 2 inches
3) 15 inches
4) 18 inches

333 Line segment $A'B'$, whose endpoints are $(4, -2)$ and $(16, 14)$, is the image of $\overline{AB}$ after a dilation of $\frac{1}{2}$ centered at the origin. What is the length of $\overline{AB}$?
1) 5
2) 10
3) 20
4) 40

77

334 Line *n* is represented by the equation $3x + 4y = 20$. Determine and state the equation of line *p*, the image of line *n*, after a dilation of scale factor $\frac{1}{3}$ centered at the point $(4,2)$. [The use of the set of axes below is optional.] Explain your answer.
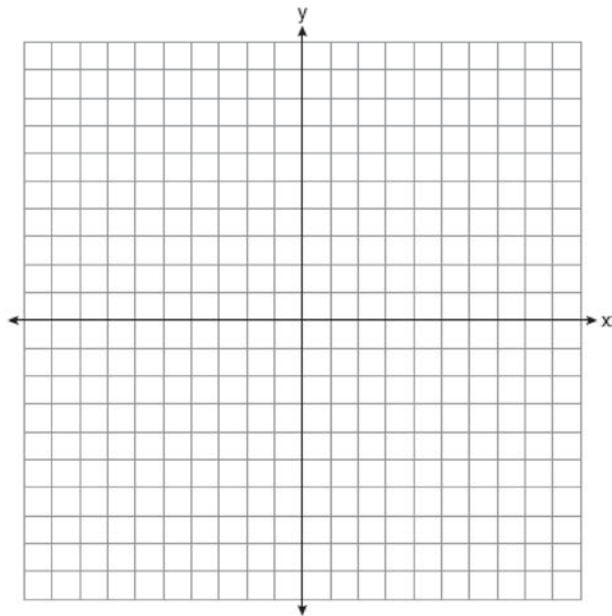
335 The coordinates of the endpoints of $\overline{AB}$ are $A(2,3)$ and $B(5,-1)$. Determine the length of $\overline{A'B'}$, the image of $\overline{AB}$, after a dilation of $\frac{1}{2}$ centered at the origin. [The use of the set of axes below is optional.]
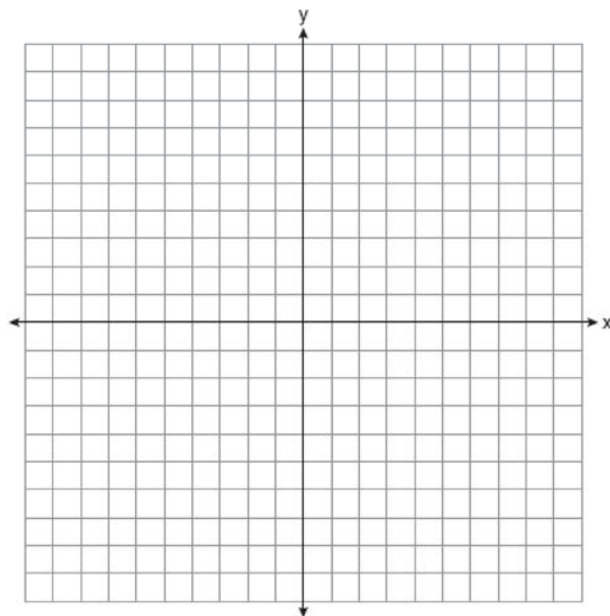
336 Aliyah says that when the line $4x + 3y = 24$ is dilated by a scale factor of 2 centered at the point $(3,4)$, the equation of the dilated line is $y = -\frac{4}{3}x + 16$. Is Aliyah correct? Explain why.

[The use of the set of axes below is optional.]
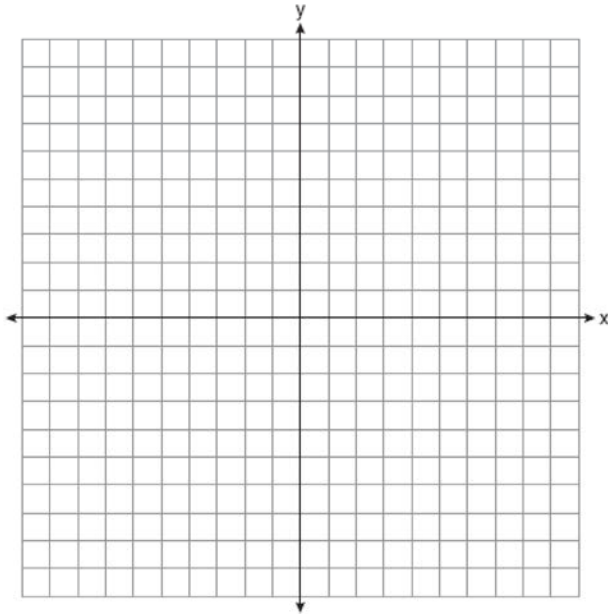
337 Line ℓ is mapped onto line m by a dilation centered at the origin with a scale factor of 2. The equation of line ℓ is $3x - y = 4$. Determine and state an equation for line m.

338 Which point shown in the graph below is the image of point P after a counterclockwise rotation of $90°$ about the origin?
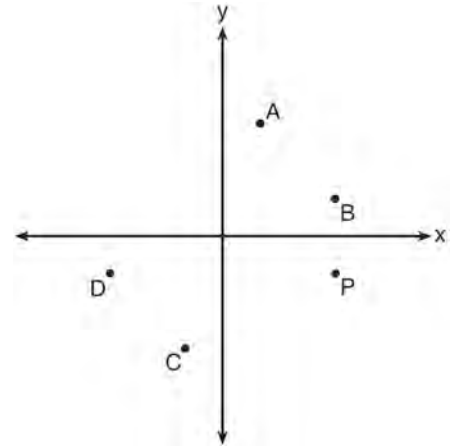
1) A
2) B
3) C
4) D

339 The grid below shows $\triangle ABC$ and $\triangle DEF$.
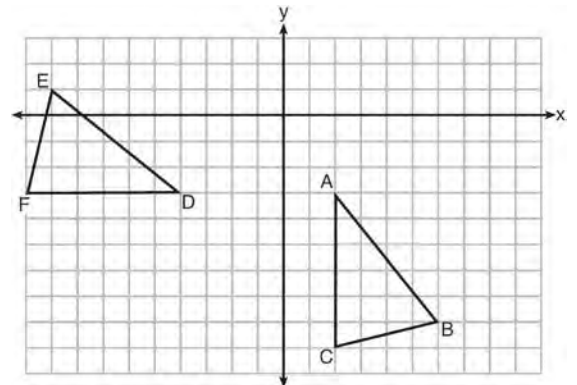
Let $\triangle A'B'C'$ be the image of $\triangle ABC$ after a rotation about point A. Determine and state the location of B' if the location of point C' is $(8,-3)$. Explain your answer. Is $\triangle DEF$ congruent to $\triangle A'B'C'$? Explain your answer.

G.CO.A.5: REFLECTIONS

340 Triangle *ABC* is graphed on the set of axes below. Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a reflection over the line $x = 1$.
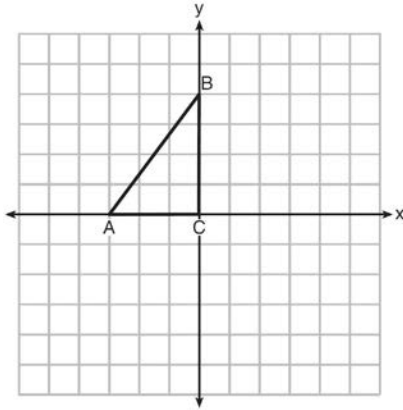
G.SRT.A.2: DILATIONS

341 The image of $\triangle ABC$ after a dilation of scale factor k centered at point A is $\triangle ADE$, as shown in the diagram below.
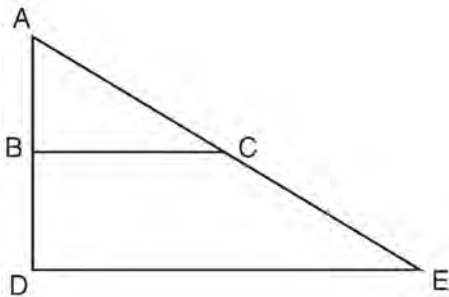
Which statement is always true?
1) $2AB = AD$
2) $\overline{AD} \perp \overline{DE}$
3) $AC = CE$
4) $\overline{BC} \parallel \overline{DE}$

342 In the diagram below, $\triangle ABE$ is the image of $\triangle ACD$ after a dilation centered at the origin. The coordinates of the vertices are $A(0,0)$, $B(3,0)$, $C(4.5,0)$, $D(0,6)$, and $E(0,4)$.
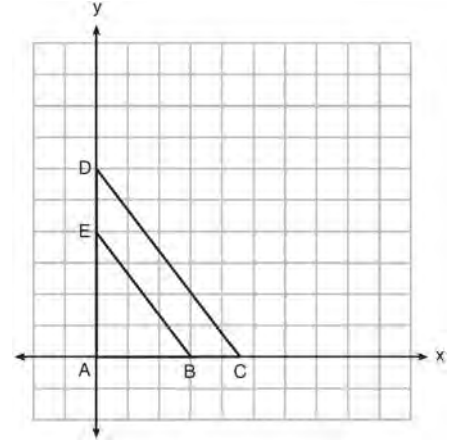
The ratio of the lengths of $\overline{BE}$ to $\overline{CD}$ is
1) $\dfrac{2}{3}$
2) $\dfrac{3}{2}$
3) $\dfrac{3}{4}$
4) $\dfrac{4}{3}$

343 If $\triangle ABC$ is dilated by a scale factor of 3, which statement is true of the image $\triangle A'B'C'$?
1) $3A'B' = AB$
2) $B'C' = 3BC$
3) $m\angle A' = 3(m\angle A)$
4) $3(m\angle C') = m\angle C$

344 A triangle is dilated by a scale factor of 3 with the center of dilation at the origin. Which statement is true?
1) The area of the image is nine times the area of the original triangle.
2) The perimeter of the image is nine times the perimeter of the original triangle.
3) The slope of any side of the image is three times the slope of the corresponding side of the original triangle.
4) The measure of each angle in the image is three times the measure of the corresponding angle of the original triangle.

345 Rectangle $A'B'C'D'$ is the image of rectangle $ABCD$ after a dilation centered at point A by a scale factor of $\frac{2}{3}$. Which statement is correct?
1) Rectangle $A'B'C'D'$ has a perimeter that is $\frac{2}{3}$ the perimeter of rectangle $ABCD$.
2) Rectangle $A'B'C'D'$ has a perimeter that is $\frac{3}{2}$ the perimeter of rectangle $ABCD$.
3) Rectangle $A'B'C'D'$ has an area that is $\frac{2}{3}$ the area of rectangle $ABCD$.
4) Rectangle $A'B'C'D'$ has an area that is $\frac{3}{2}$ the area of rectangle $ABCD$.

346 Given square $RSTV$, where $RS = 9$ cm. If square $RSTV$ is dilated by a scale factor of 3 about a given center, what is the perimeter, in centimeters, of the image of $RSTV$ after the dilation?
1) 12
2) 27
3) 36
4) 108

347 Triangle RJM has an area of 6 and a perimeter of 12. If the triangle is dilated by a scale factor of 3 centered at the origin, what are the area and perimeter of its image, triangle $R'J'M'$?
1) area of 9 and perimeter of 15
2) area of 18 and perimeter of 36
3) area of 54 and perimeter of 36
4) area of 54 and perimeter of 108

348 Triangle QRS is graphed on the set of axes below.
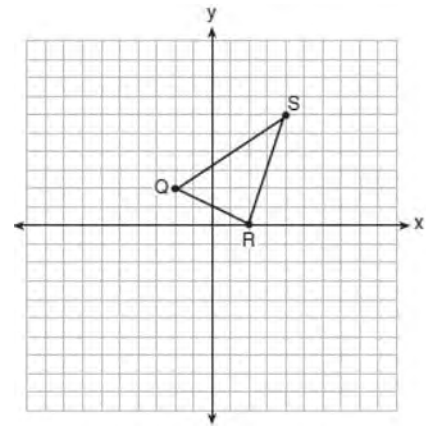
On the same set of axes, graph and label $\triangle Q'R'S'$, the image of $\triangle QRS$ after a dilation with a scale factor of $\frac{3}{2}$ centered at the origin. Use slopes to explain why $Q'R' \parallel QR$.

81

349 Triangle *ABC* and triangle *ADE* are graphed on the set of axes below.
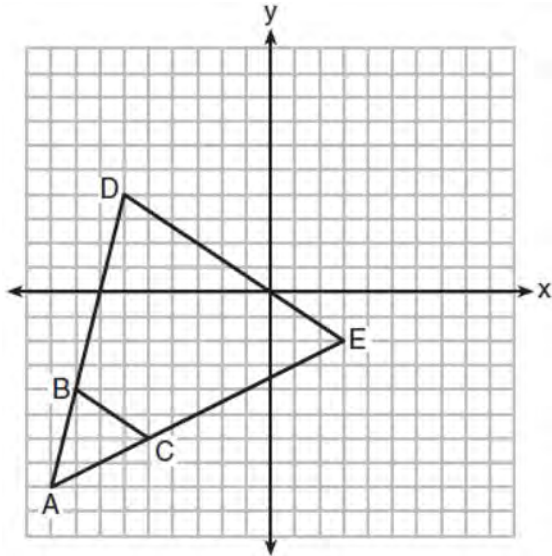
Describe a transformation that maps triangle *ABC* onto triangle *ADE*. Explain why this transformation makes triangle *ADE* similar to triangle *ABC*.

350 Triangle *ABC* and point $D(1,2)$ are graphed on the set of axes below.
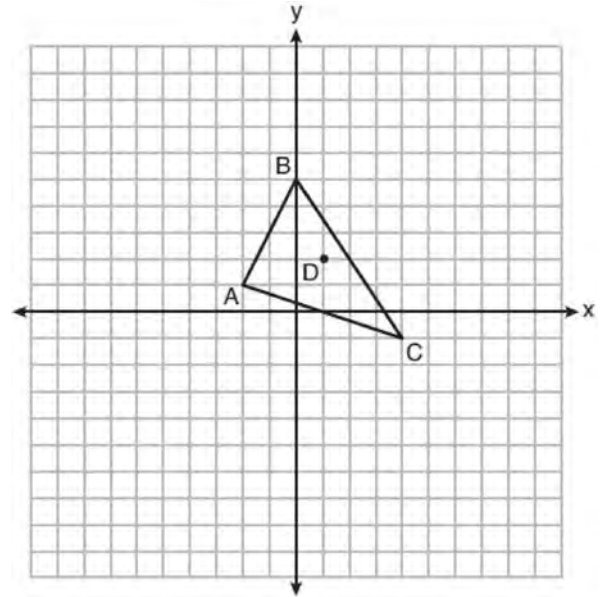
Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$, after a dilation of scale factor 2 centered at point *D*.

351 Triangle *A'B'C'* is the image of triangle *ABC* after a dilation with a scale factor of $\frac{1}{2}$ and centered at point *A*. Is triangle *ABC* congruent to triangle *A'B'C'*? Explain your answer.

G.CO.A.3: MAPPING A POLYGON ONTO ITSELF

352 In the diagram below, a square is graphed in the coordinate plane.
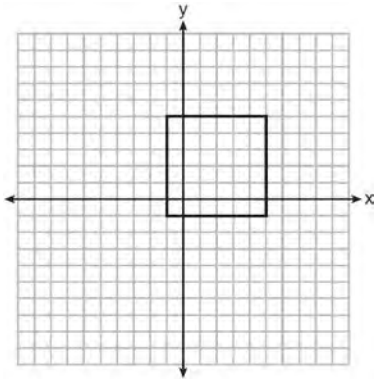
A reflection over which line does *not* carry the square onto itself?
1) $x = 5$
2) $y = 2$
3) $y = x$
4) $x + y = 4$

353 The figure below shows a rhombus with noncongruent diagonals.
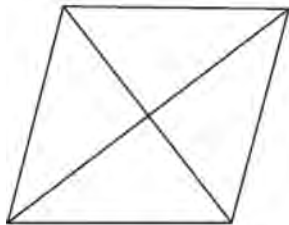
Which transformation would *not* carry this rhombus onto itself?
1) a reflection over the shorter diagonal
2) a reflection over the longer diagonal
3) a clockwise rotation of 90° about the intersection of the diagonals
4) a counterclockwise rotation of 180° about the intersection of the diagonals

354 As shown in the graph below, the quadrilateral is a rectangle.
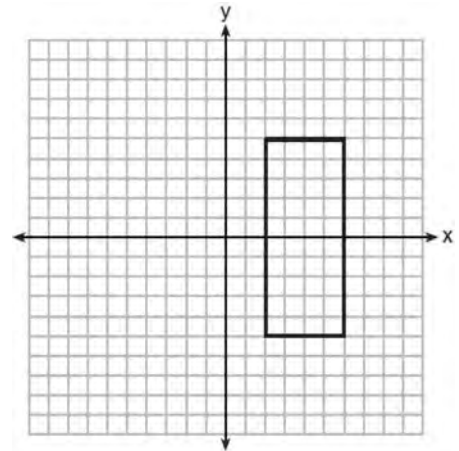
Which transformation would *not* map the rectangle onto itself?
1) a reflection over the *x*-axis
2) a reflection over the line $x = 4$
3) a rotation of 180° about the origin
4) a rotation of 180° about the point (4,0)

355 In the diagram below, rectangle *ABCD* has vertices whose coordinates are *A*(7,1), *B*(9,3), *C*(3,9), and *D*(1,7).
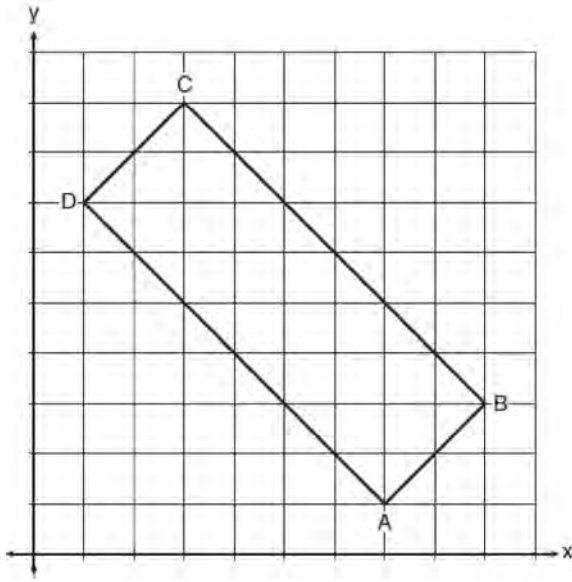
Which transformation will *not* carry the rectangle onto itself?
1) a reflection over the line $y = x$
2) a reflection over the line $y = -x + 10$
3) a rotation of 180° about the point (6,6)
4) a rotation of 180° about the point (5,5)

356 Which transformation carries the parallelogram below onto itself?
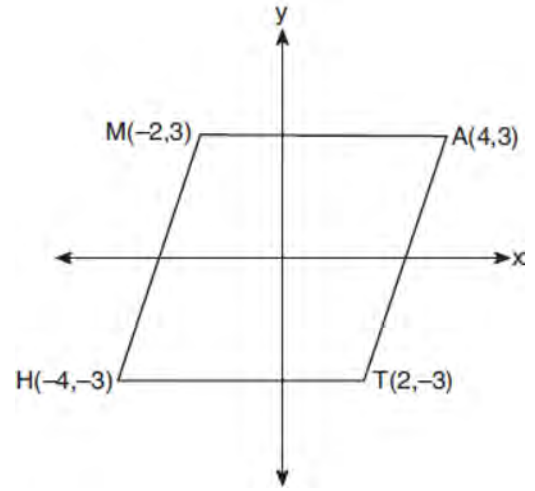
1) a reflection over $y = x$
2) a reflection over $y = -x$
3) a rotation of 90° counterclockwise about the origin
4) a rotation of 180° counterclockwise about the origin

357 A rhombus is graphed on the set of axes below.
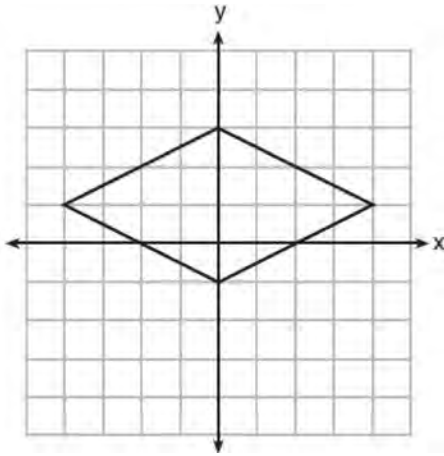
Which transformation would carry the rhombus onto itself?
1) 180° rotation counterclockwise about the origin
2) reflection over the line $y = \frac{1}{2}x + 1$
3) reflection over the line $y = 0$
4) reflection over the line $x = 0$

358 The regular polygon below is rotated about its center.
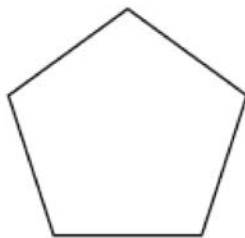
Which angle of rotation will carry the figure onto itself?
1) 60°
2) 108°
3) 216°
4) 540°

359 A regular pentagon is shown in the diagram below.
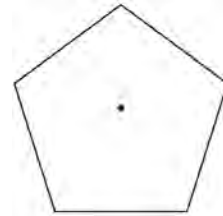
If the pentagon is rotated clockwise around its center, the minimum number of degrees it must be rotated to carry the pentagon onto itself is
1) 54°
2) 72°
3) 108°
4) 360°

360 Which rotation about its center will carry a regular decagon onto itself?
1) 54°
2) 162°
3) 198°
4) 252°

361 Which figure always has exactly four lines of reflection that map the figure onto itself?
1) square
2) rectangle
3) regular octagon
4) equilateral triangle

362 A regular decagon is rotated n degrees about its center, carrying the decagon onto itself. The value of n could be
1) 10°
2) 150°
3) 225°
4) 252°

363 Which transformation would *not* carry a square onto itself?
1) a reflection over one of its diagonals
2) a 90° rotation clockwise about its center
3) a 180° rotation about one of its vertices
4) a reflection over the perpendicular bisector of one side

364 A regular hexagon is rotated about its center. Which degree measure will carry the regular hexagon onto itself?
1) 45°
2) 90°
3) 120°
4) 135°

365 Which regular polygon has a minimum rotation of 45° to carry the polygon onto itself?
1) octagon
2) decagon
3) hexagon
4) pentagon

366 A regular hexagon is rotated in a counterclockwise direction about its center. Determine and state the minimum number of degrees in the rotation such that the hexagon will coincide with itself.

G.CO.A.5: COMPOSITIONS OF TRANSFORMATIONS

367 Identify which sequence of transformations could map pentagon *ABCDE* onto pentagon *A"B"C"D"E"*, as shown below.
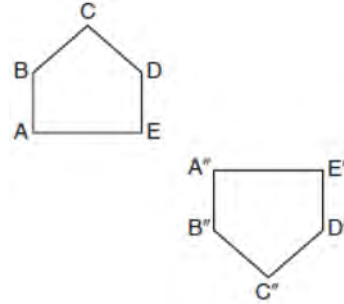
1) dilation followed by a rotation
2) translation followed by a rotation
3) line reflection followed by a translation
4) line reflection followed by a line reflection

368 In the diagram below, $\triangle ABC \cong \triangle DEF$.
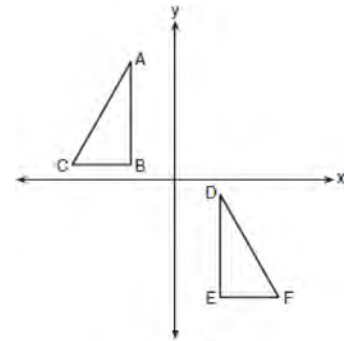
Which sequence of transformations maps $\triangle ABC$ onto $\triangle DEF$?
1) a reflection over the *x*-axis followed by a translation
2) a reflection over the *y*-axis followed by a translation
3) a rotation of 180° about the origin followed by a translation
4) a counterclockwise rotation of 90° about the origin followed by a translation

369 In the diagram below, congruent figures 1, 2, and 3 are drawn.
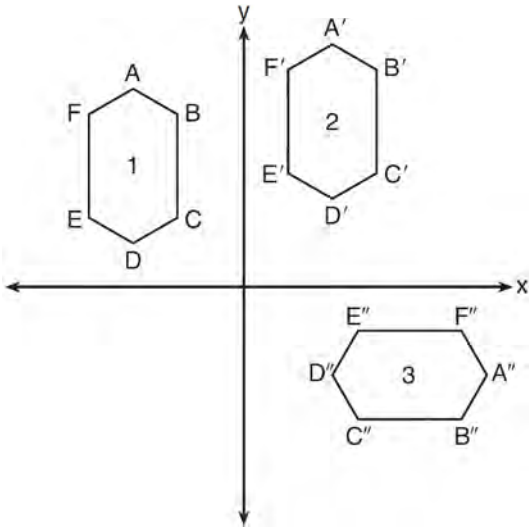
Which sequence of transformations maps figure 1 onto figure 2 and then figure 2 onto figure 3?
1) a reflection followed by a translation
2) a rotation followed by a translation
3) a translation followed by a reflection
4) a translation followed by a rotation

370 A sequence of transformations maps rectangle *ABCD* onto rectangle *A"B"C"D"*, as shown in the diagram below.
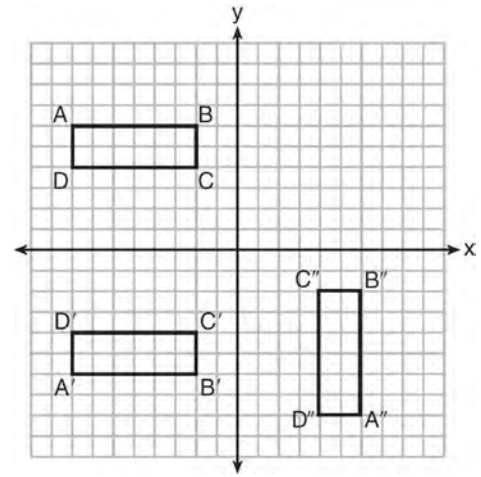
Which sequence of transformations maps *ABCD* onto *A'B'C'D'* and then maps *A'B'C'D'* onto *A"B"C"D"*?
1) a reflection followed by a rotation
2) a reflection followed by a translation
3) a translation followed by a rotation
4) a translation followed by a reflection

371 Triangle *ABC* and triangle *DEF* are graphed on the set of axes below.
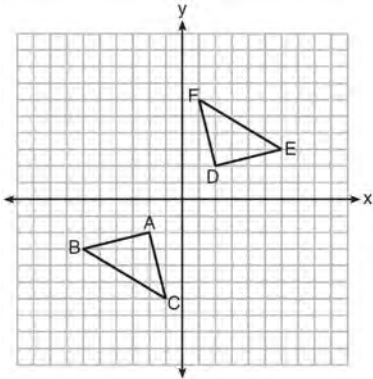
Which sequence of transformations maps triangle *ABC* onto triangle *DEF*?
1) a reflection over the *x*-axis followed by a reflection over the *y*-axis
2) a 180° rotation about the origin followed by a reflection over the line $y = x$
3) a 90° clockwise rotation about the origin followed by a reflection over the *y*-axis
4) a translation 8 units to the right and 1 unit up followed by a 90° counterclockwise rotation about the origin

372 On the set of axes below, $\triangle ABC$ has vertices at $A(-2,0)$, $B(2,-4)$, $C(4,2)$, and $\triangle DEF$ has vertices at $D(4,0)$, $E(-4,8)$, $F(-8,-4)$.
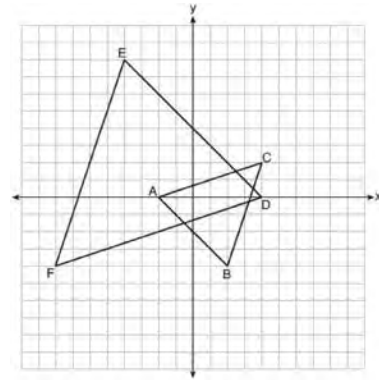
Which sequence of transformations will map $\triangle ABC$ onto $\triangle DEF$?
1) a dilation of $\triangle ABC$ by a scale factor of 2 centered at point *A*
2) a dilation of $\triangle ABC$ by a scale factor of $\frac{1}{2}$ centered at point *A*
3) a dilation of $\triangle ABC$ by a scale factor of 2 centered at the origin, followed by a rotation of 180° about the origin
4) a dilation of $\triangle ABC$ by a scale factor of $\frac{1}{2}$ centered at the origin, followed by a rotation of 180° about the origin

373 On the set of axes below, triangle *ABC* is graphed. Triangles *A′B′C′* and *A″B″C″*, the images of triangle *ABC*, are graphed after a sequence of rigid motions.
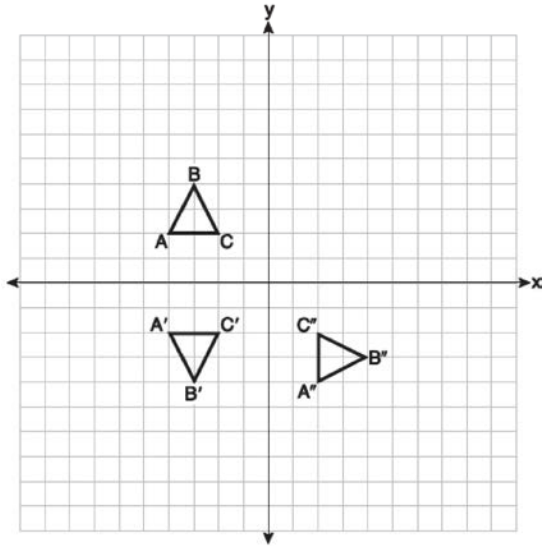
Identify which sequence of rigid motions maps △*ABC* onto △*A′B′C′* and then maps △*A′B′C′* onto △*A″B″C″*.
1) a rotation followed by another rotation
2) a translation followed by a reflection
3) a reflection followed by a translation
4) a reflection followed by a rotation

374 Triangles *ABC* and *RST* are graphed on the set of axes below.
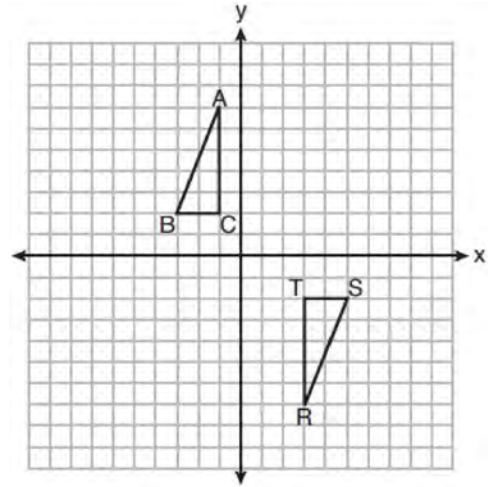
Which sequence of rigid motions will prove △*ABC* ≅ △*RST*?
1) a line reflection over $y = x$
2) a rotation of $180°$ centered at $(1,0)$
3) a line reflection over the *x*-axis followed by a translation of 6 units right
4) a line reflection over the *x*-axis followed by a line reflection over $y = 1$

375 On the set of axes below, pentagon *ABCDE* is congruent to *A"B"C"D"E"*.
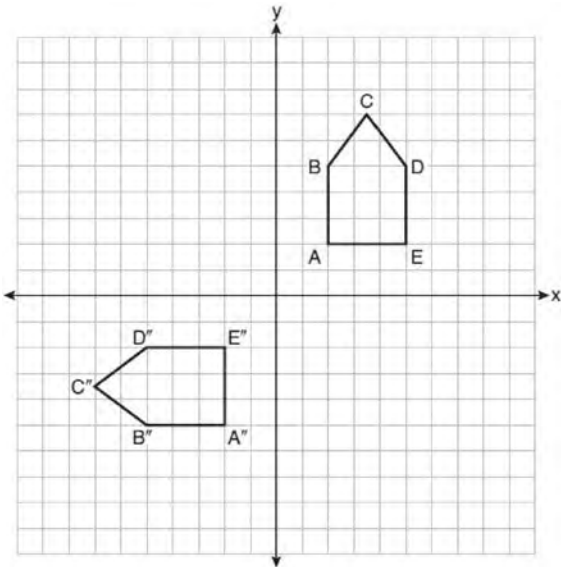
Which describes a sequence of rigid motions that maps *ABCDE* onto *A"B"C"D"E"*?
1) a rotation of 90° counterclockwise about the origin followed by a reflection over the *x*-axis
2) a rotation of 90° counterclockwise about the origin followed by a translation down 7 units
3) a reflection over the *y*-axis followed by a reflection over the *x*-axis
4) a reflection over the *x*-axis followed by a rotation of 90° counterclockwise about the origin

376 Triangle *ABC* and triangle *DEF* are drawn below.
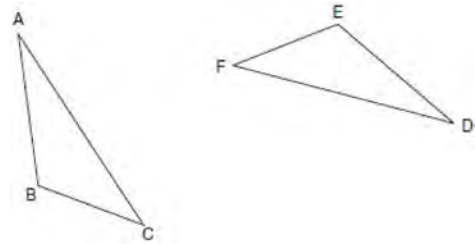
If $\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$, and $\angle A \cong \angle D$, write a sequence of transformations that maps triangle *ABC* onto triangle *DEF*.

377 Describe a sequence of transformations that will map △*ABC* onto △*DEF* as shown below.

90
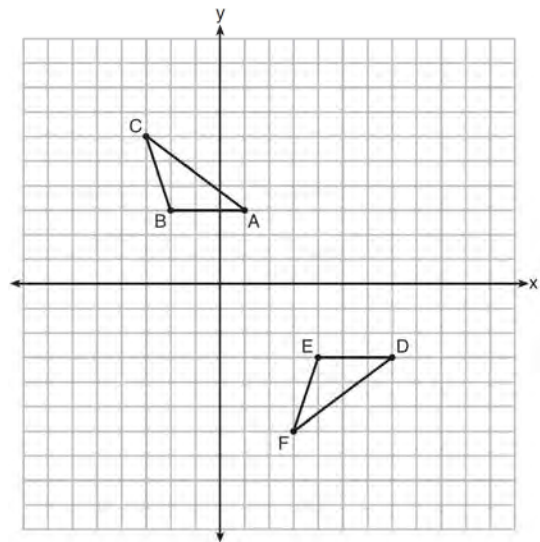
378 In the diagram below, $\triangle ABC$ has coordinates $A(1,1)$, $B(4,1)$, and $C(4,5)$. Graph and label $\triangle A''B''C''$, the image of $\triangle ABC$ after the translation five units to the right and two units up followed by the reflection over the line $y = 0$.
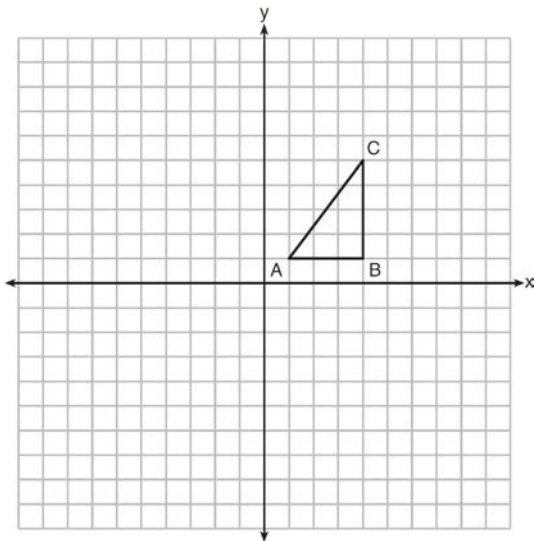
379 The graph below shows $\triangle ABC$ and its image, $\triangle A''B''C''$.
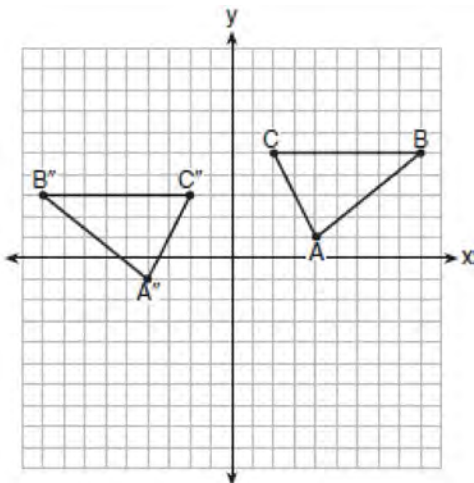
Describe a sequence of rigid motions which would map $\triangle ABC$ onto $\triangle A''B''C''$.

380 Quadrilateral *MATH* and its image *M"A"T"H"* are graphed on the set of axes below.
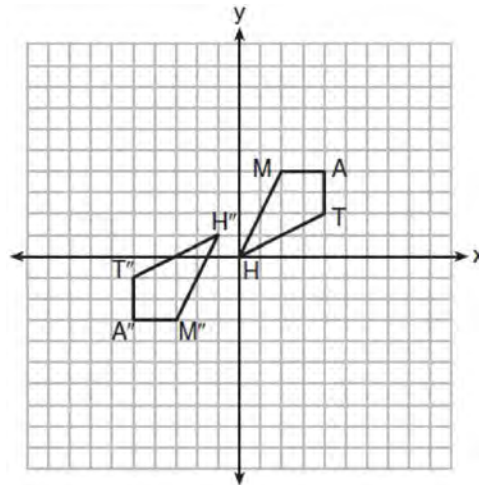
Describe a sequence of transformations that maps quadrilateral *MATH* onto quadrilateral *M"A"T"H"*.

381 Quadrilaterals *BIKE* and *GOLF* are graphed on the set of axes below.
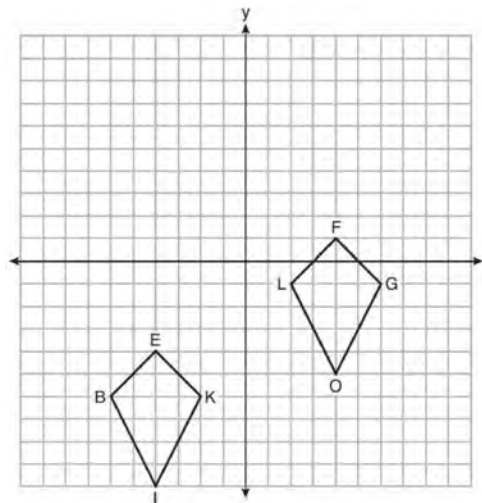
Describe a sequence of transformations that maps quadrilateral *BIKE* onto quadrilateral *GOLF*.

91

382 Trapezoids *ABCD* and *A"B"C"D"* are graphed on the set of axes below.
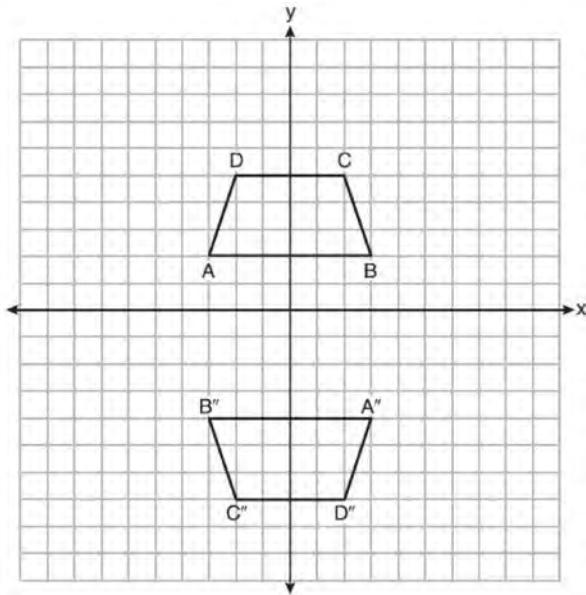
Describe a sequence of transformations that maps trapezoid *ABCD* onto trapezoid *A"B"C"D"*.

383 On the set of axes below, △*ABC* is graphed with coordinates *A*(−2,−1), *B*(3,−1), and *C*(−2,−4). Triangle *QRS*, the image of △*ABC*, is graphed with coordinates *Q*(−5,2), *R*(−5,7), and *S*(−8,2).
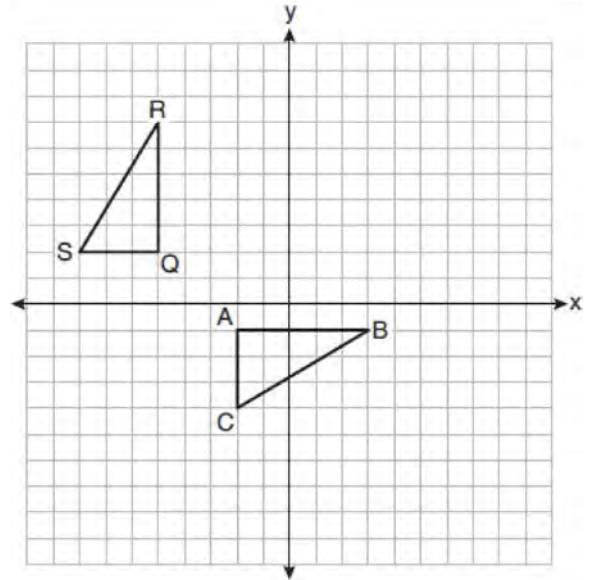
Describe a sequence of transformations that would map △*ABC* onto △*QRS*.

384 On the set of axes below, △*ABC* ≅ △*STU*.
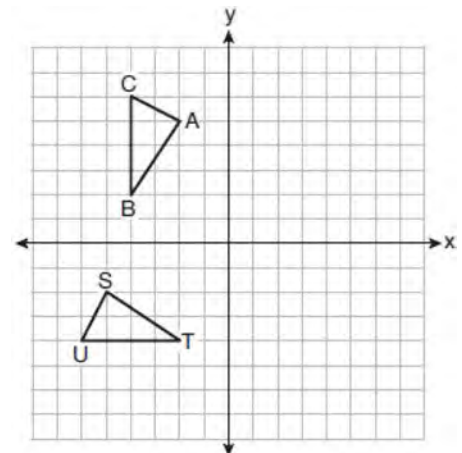
Describe a sequence of rigid motions that maps △*ABC* onto △*STU*.

385 On the set of axes below, $\triangle ABC \cong \triangle DEF$.
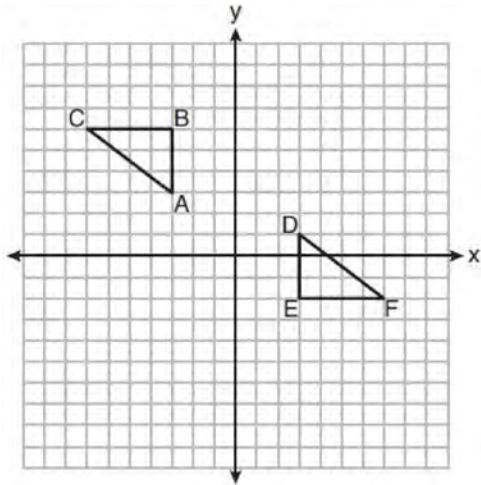
Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle DEF$.

G.SRT.A.2: COMPOSITIONS OF TRANSFORMATIONS

386 Which sequence of transformations will map $\triangle ABC$ onto $\triangle A'B'C'$?
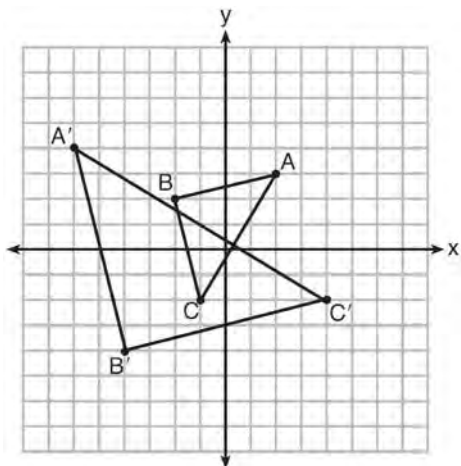
1) reflection and translation
2) rotation and reflection
3) translation and dilation
4) dilation and rotation

387 Given: $\triangle AEC$, $\triangle DEF$, and $\overline{FE} \perp \overline{CE}$
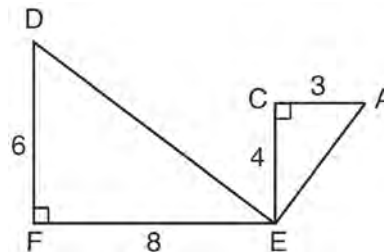
What is a correct sequence of similarity transformations that shows $\triangle AEC \sim \triangle DEF$?
1) a rotation of 180 degrees about point E followed by a horizontal translation
2) a counterclockwise rotation of 90 degrees about point E followed by a horizontal translation
3) a rotation of 180 degrees about point E followed by a dilation with a scale factor of 2 centered at point E
4) a counterclockwise rotation of 90 degrees about point E followed by a dilation with a scale factor of 2 centered at point E

388 In regular hexagon $ABCDEF$ shown below, $\overline{AD}$, $\overline{BE}$, and $\overline{CF}$ all intersect at G.
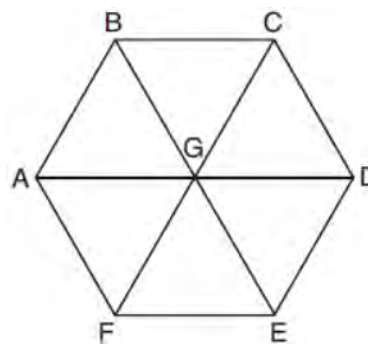
When $\triangle ABG$ is reflected over $\overline{BG}$ and then rotated 180° about point G, $\triangle ABG$ is mapped onto
1) $\triangle FEG$
2) $\triangle AFG$
3) $\triangle CBG$
4) $\triangle DEG$

93

389 In the diagram below, $\triangle DEF$ is the image of $\triangle ABC$ after a clockwise rotation of 180° and a dilation where $AB = 3$, $BC = 5.5$, $AC = 4.5$, $DE = 6$, $FD = 9$, and $EF = 11$.
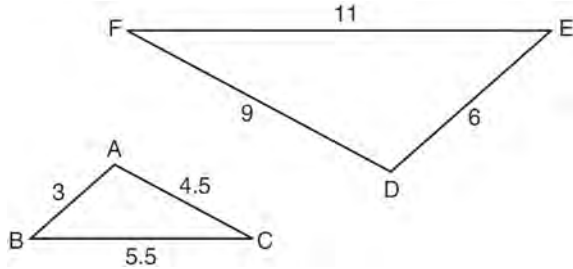
Which relationship must always be true?

1) $\dfrac{m\angle A}{m\angle D} = \dfrac{1}{2}$

2) $\dfrac{m\angle C}{m\angle F} = \dfrac{2}{1}$

3) $\dfrac{m\angle A}{m\angle C} = \dfrac{m\angle F}{m\angle D}$

4) $\dfrac{m\angle B}{m\angle E} = \dfrac{m\angle C}{m\angle F}$

390 In the diagram below, $\triangle ADE$ is the image of $\triangle ABC$ after a reflection over the line AC followed by a dilation of scale factor $\dfrac{AE}{AC}$ centered at point A.
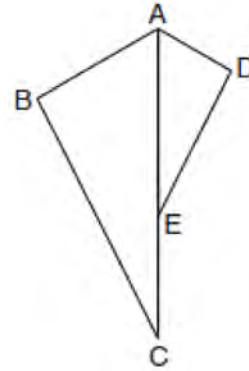
Which statement must be true?

1) $m\angle BAC \cong m\angle AED$

2) $m\angle ABC \cong m\angle ADE$

3) $m\angle DAE \cong \dfrac{1}{2} m\angle BAC$

4) $m\angle ACB \cong \dfrac{1}{2} m\angle DAB$

391 Triangle *PQR* is shown on the set of axes below.
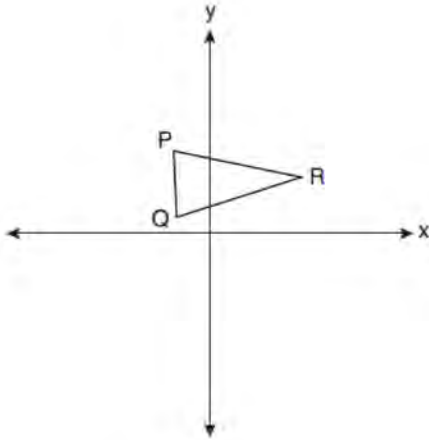
Which quadrant will contain point R'', the image of point R, after a 90° clockwise rotation centered at (0,0) followed by a reflection over the *x*-axis?

1) I
2) II
3) III
4) IV

392 Triangle $A'B'C'$ is the image of $\triangle ABC$ after a dilation followed by a translation. Which statement(s) would always be true with respect to this sequence of transformations?

    I. $\triangle ABC \cong \triangle A'B'C'$
    II. $\triangle ABC \sim \triangle A'B'C'$
    III. $\overline{AB} \parallel \overline{A'B'}$
    IV. $AA' = BB'$

1) II, only
2) I and II
3) II and III
4) II, III, and IV

393 In the diagram below, triangles *XYZ* and *UVZ* are drawn such that $\angle X \cong \angle U$ and $\angle XZY \cong \angle UZV$.
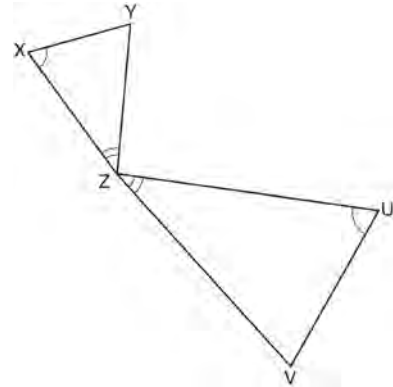
Describe a sequence of similarity transformations that shows $\triangle XYZ$ is similar to $\triangle UVZ$.

<u>G.CO.B.6: PROPERTIES OF TRANSFORMATIONS</u>

394 The image of $\triangle ABC$ after a rotation of 90° clockwise about the origin is $\triangle DEF$, as shown below.
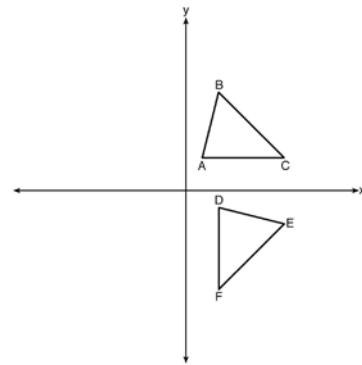
Which statement is true?

1) $\overline{BC} \cong \overline{DE}$
2) $\overline{AB} \cong \overline{DF}$
3) $\angle C \cong \angle E$
4) $\angle A \cong \angle D$

395 Quadrilateral *ABCD* is graphed on the set of axes below.
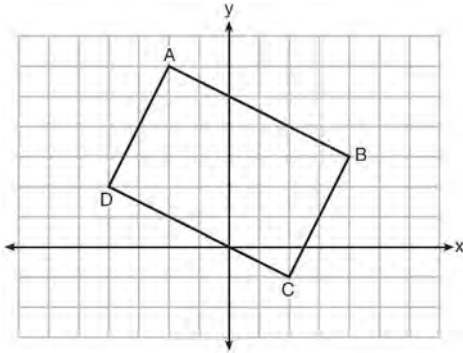
When *ABCD* is rotated 90° in a counterclockwise direction about the origin, its image is quadrilateral *A'B'C'D'*. Is distance preserved under this rotation, and which coordinates are correct for the given vertex?
1) no and $C'(1,2)$
2) no and $D'(2,4)$
3) yes and $A'(6,2)$
4) yes and $B'(-3,4)$

396 After a counterclockwise rotation about point *X*, scalene triangle *ABC* maps onto △*RST*, as shown in the diagram below.
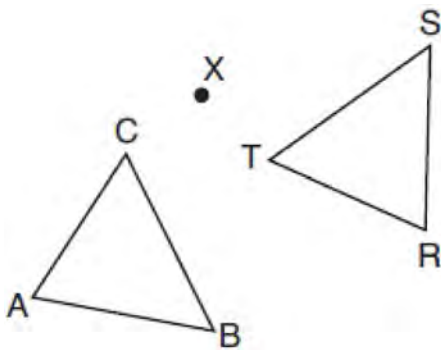
Which statement must be true?
1) $\angle A \cong \angle R$
2) $\angle A \cong \angle S$
3) $\overline{CB} \cong \overline{TR}$
4) $\overline{CA} \cong \overline{TS}$

397 In the diagram below, a sequence of rigid motions maps *ABCD* onto *JKLM*.
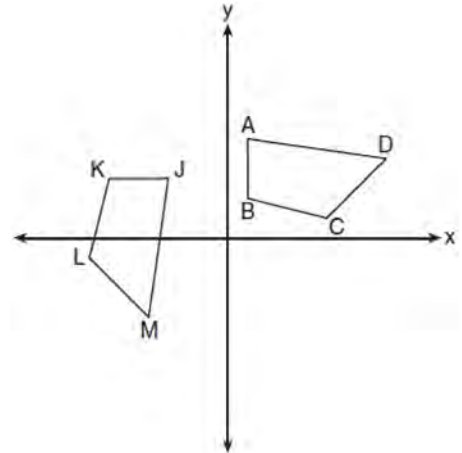
If m∠*A* = 82°, m∠*B* = 104°, and m∠*L* = 121°, the measure of ∠*M* is
1) 53°
2) 82°
3) 104°
4) 121°

398 In the diagram below, △*ABC* with sides 13, 15, and 16, is mapped onto △*DEF* after a clockwise rotation of 90° about point *P*.
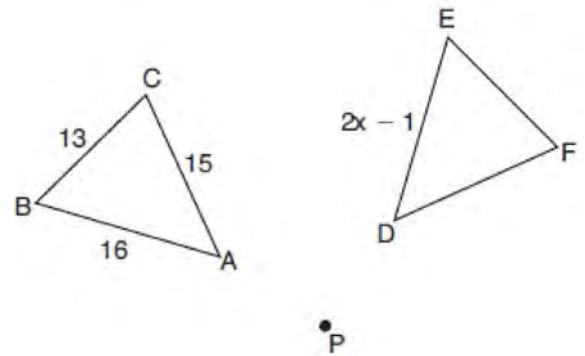
If *DE* = 2*x* − 1, what is the value of *x*?
1) 7
2) 7.5
3) 8
4) 8.5

96

399 Rhombus *ABCD* can be mapped onto rhombus *KLMN* by a rotation about point *P*, as shown below.
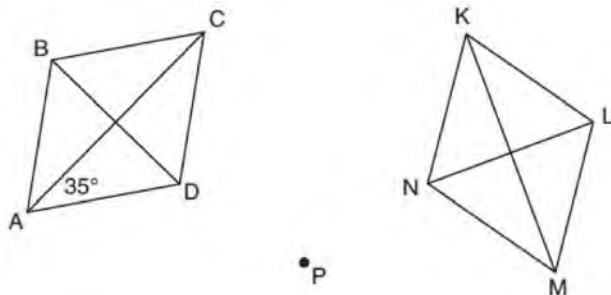
What is the measure of ∠*KNM* if the measure of ∠*CAD* = 35?
1) 35°
2) 55°
3) 70°
4) 110°

400 If △*ABC* is mapped onto △*DEF* after a line reflection and △*DEF* is mapped onto △*XYZ* after a translation, the relationship between △*ABC* and △*XYZ* is that they are always
1) congruent and similar
2) congruent but not similar
3) similar but not congruent
4) neither similar nor congruent

401 Triangle *MNP* is the image of triangle *JKL* after a 120° counterclockwise rotation about point *Q*. If the measure of angle *L* is 47° and the measure of angle *N* is 57°, determine the measure of angle *M*. Explain how you arrived at your answer.
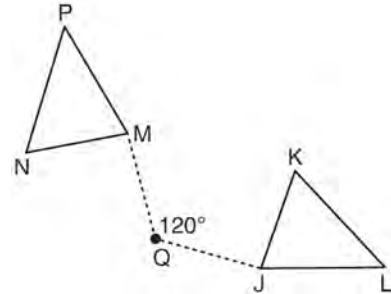
402 Triangle *A'B'C'* is the image of triangle *ABC* after a translation of 2 units to the right and 3 units up. Is triangle *ABC* congruent to triangle *A'B'C'*? Explain why.

G.CO.A.2: IDENTIFYING TRANSFORMATIONS

403 Which transformation of $\overline{OA}$ would result in an image parallel to $\overline{OA}$?
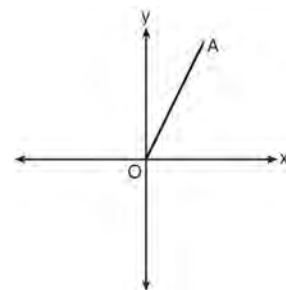
1) a translation of two units down
2) a reflection over the *x*-axis
3) a reflection over the *y*-axis
4) a clockwise rotation of 90° about the origin

97

404 In the diagram below, which single transformation was used to map triangle *A* onto triangle *B*?
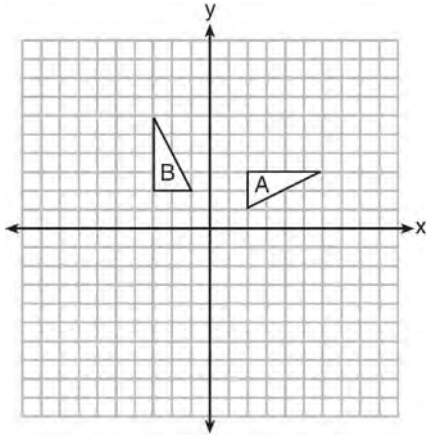
1) line reflection
2) rotation
3) dilation
4) translation

405 On the set of axes below, rectangle *ABCD* can be proven congruent to rectangle *KLMN* using which transformation?
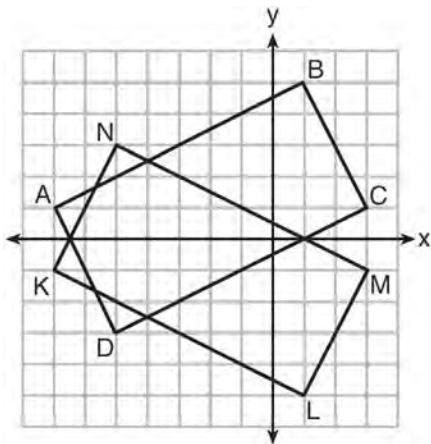
1) rotation
2) translation
3) reflection over the *x*-axis
4) reflection over the *y*-axis

406 The graph below shows two congruent triangles, *ABC* and *A'B'C'*.
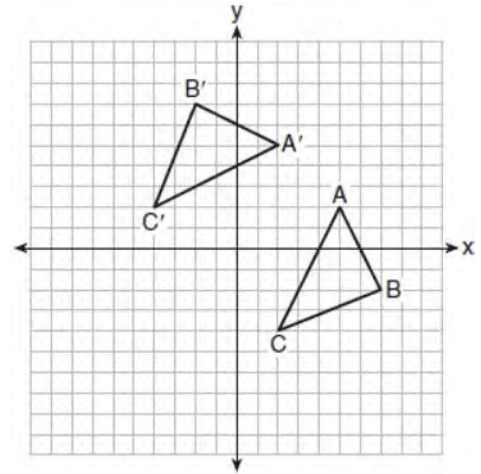
Which rigid motion would map △*ABC* onto △*A'B'C'*?
1) a rotation of 90 degrees counterclockwise about the origin
2) a translation of three units to the left and three units up
3) a rotation of 180 degrees about the origin
4) a reflection over the line $y = x$

407 In the diagram below, line *m* is parallel to line *n*. Figure 2 is the image of Figure 1 after a reflection over line *m*. Figure 3 is the image of Figure 2 after a reflection over line *n*.
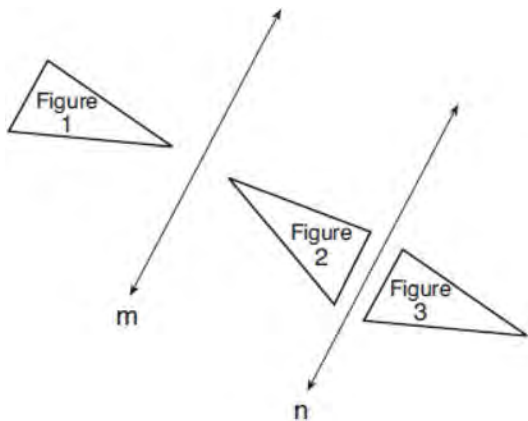
Which single transformation would carry Figure 1 onto Figure 3?
1) a dilation
2) a rotation
3) a reflection
4) a translation

408 The vertices of $\triangle JKL$ have coordinates $J(5,1)$, $K(-2,-3)$, and $L(-4,1)$. Under which transformation is the image $\triangle J'K'L'$ *not* congruent to $\triangle JKL$?
1) a translation of two units to the right and two units down
2) a counterclockwise rotation of 180 degrees around the origin
3) a reflection over the *x*-axis
4) a dilation with a scale factor of 2 and centered at the origin

409 If $\triangle A'B'C'$ is the image of $\triangle ABC$, under which transformation will the triangles *not* be congruent?
1) reflection over the *x*-axis
2) translation to the left 5 and down 4
3) dilation centered at the origin with scale factor 2
4) rotation of 270° counterclockwise about the origin

410 Under which transformation would $\triangle A'B'C'$, the image of $\triangle ABC$, *not* be congruent to $\triangle ABC$?
1) reflection over the *y*-axis
2) rotation of 90° clockwise about the origin
3) translation of 3 units right and 2 units down
4) dilation with a scale factor of 2 centered at the origin

411 The image of $\triangle DEF$ is $\triangle D'E'F'$. Under which transformation will he triangles *not* be congruent?
1) a reflection through the origin
2) a reflection over the line $y = x$
3) a dilation with a scale factor of 1 centered at (2,3)
4) a dilation with a scale factor of $\frac{3}{2}$ centered at the origin

412 Which transformation would *not* always produce an image that would be congruent to the original figure?
1) translation
2) dilation
3) rotation
4) reflection

413 Triangle *ABC* has vertices at *A*(−5,2), *B*(−4,7), and *C*(−2,7), and triangle *DEF* has vertices at *D*(3,2), *E*(2,7), and *F*(0,7). Graph and label $\triangle ABC$ and $\triangle DEF$ on the set of axes below. Determine and state the single transformation where $\triangle DEF$ is the image of $\triangle ABC$. Use your transformation to explain why $\triangle ABC \cong \triangle DEF$.
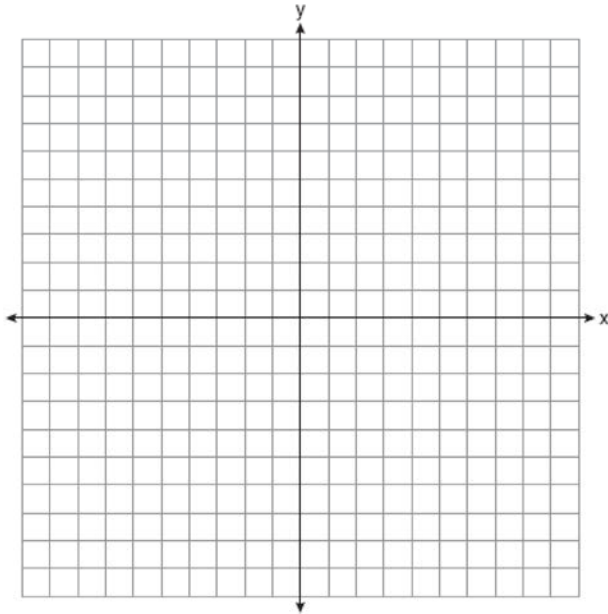
G.CO.A.2: ANALYTICAL REPRESENTATIONS OF TRANSFORMATIONS

414 Which transformation would result in the perimeter of a triangle being different from the perimeter of its image?
1) $(x,y) \rightarrow (y,x)$
2) $(x,y) \rightarrow (x,-y)$
3) $(x,y) \rightarrow (4x,4y)$
4) $(x,y) \rightarrow (x+2,y-5)$

415 The vertices of $\triangle PQR$ have coordinates *P*(2,3), *Q*(3,8), and *R*(7,3). Under which transformation of $\triangle PQR$ are distance and angle measure preserved?
1) $(x,y) \rightarrow (2x,3y)$
2) $(x,y) \rightarrow (x+2,3y)$
3) $(x,y) \rightarrow (2x,y+3)$
4) $(x,y) \rightarrow (x+2,y+3)$

G.SRT.B.5: SIMILARITY

416 Triangles *ABC* and *DEF* are drawn below.
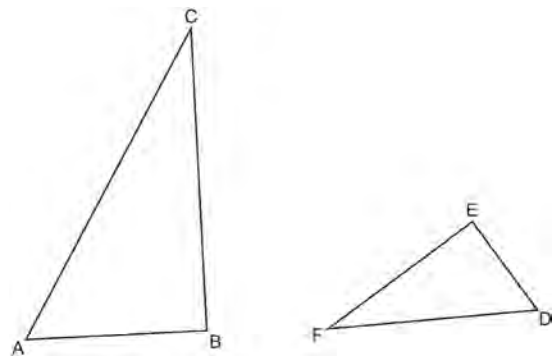
If *AB* = 9, *BC* = 15, *DE* =6, *EF* = 10, and $\angle B \cong \angle E$, which statement is true?
1) $\angle CAB \cong \angle DEF$
2) $\dfrac{AB}{CB} = \dfrac{FE}{DE}$
3) $\triangle ABC \sim \triangle DEF$
4) $\dfrac{AB}{DE} = \dfrac{FE}{CB}$

417 In the diagram below, $\triangle ABC \sim \triangle DEF$.
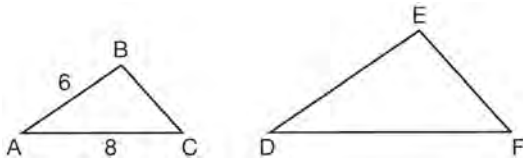
If $AB = 6$ and $AC = 8$, which statement will justify similarity by SAS?
1) $DE = 9$, $DF = 12$, and $\angle A \cong \angle D$
2) $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$
3) $DE = 36$, $DF = 64$, and $\angle C \cong \angle F$
4) $DE = 15$, $DF = 20$, and $\angle C \cong \angle F$

418 As shown in the diagram below, $\overline{AB}$ and $\overline{CD}$ intersect at E, and $\overline{AC} \parallel \overline{BD}$.
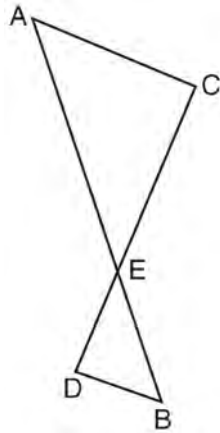
Given $\triangle AEC \sim \triangle BED$, which equation is true?
1) $\dfrac{CE}{DE} = \dfrac{EB}{EA}$
2) $\dfrac{AE}{BE} = \dfrac{AC}{BD}$
3) $\dfrac{EC}{AE} = \dfrac{BE}{ED}$
4) $\dfrac{ED}{EC} = \dfrac{AC}{BD}$

419 Using the information given below, which set of triangles can *not* be proven similar?

1)

2)

3)

4)

101
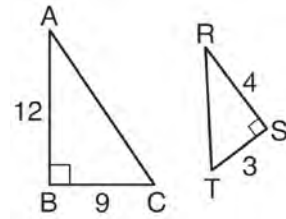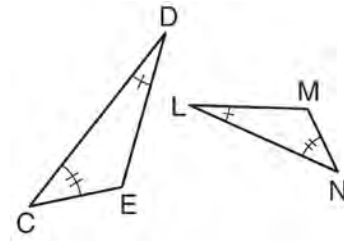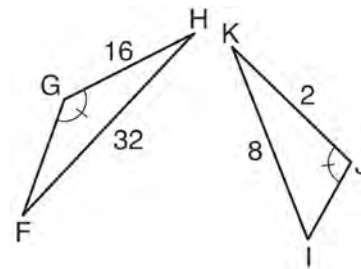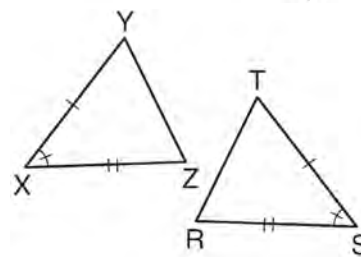
420 In the diagram below, $AC = 7.2$ and $CE = 2.4$.
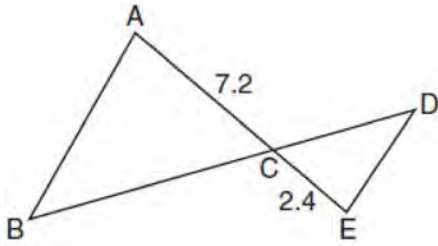
Which statement is *not* sufficient to prove
$\triangle ABC \sim \triangle EDC$?
1) $\overline{AB} \parallel \overline{ED}$
2) $DE = 2.7$ and $AB = 8.1$
3) $CD = 3.6$ and $BC = 10.8$
4) $DE = 3.0$, $AB = 9.0$, $CD = 2.9$, and $BC = 8.7$

421 In the diagram below, $\overline{XS}$ and $\overline{YR}$ intersect at Z.
Segments XY and RS are drawn perpendicular to $\overline{YR}$
to form triangles XYZ and SRZ.
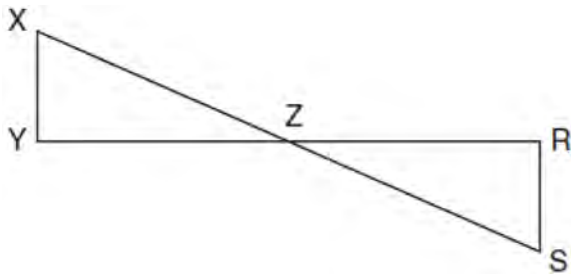
Which statement is always true?
1) $(XY)(SR) = (XZ)(RZ)$
2) $\triangle XYZ \cong \triangle SRZ$
3) $\overline{XS} \cong \overline{YR}$
4) $\dfrac{XY}{SR} = \dfrac{YZ}{RZ}$

422 In the diagram below of right triangle AED,
$\overline{BC} \parallel \overline{DE}$.
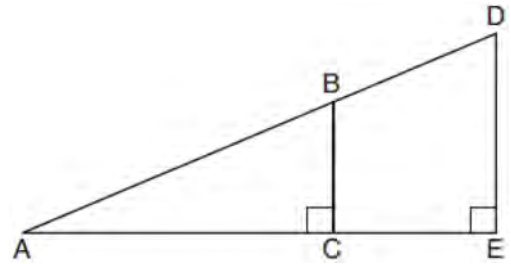
Which statement is always true?
1) $\dfrac{AC}{BC} = \dfrac{DE}{AE}$
2) $\dfrac{AB}{AD} = \dfrac{BC}{DE}$
3) $\dfrac{AC}{CE} = \dfrac{BC}{DE}$
4) $\dfrac{DE}{BC} = \dfrac{DB}{AB}$

423 Given right triangle ABC with a right angle at C,
$m\angle B = 61°$. Given right triangle RST with a right
angle at T, $m\angle R = 29°$.
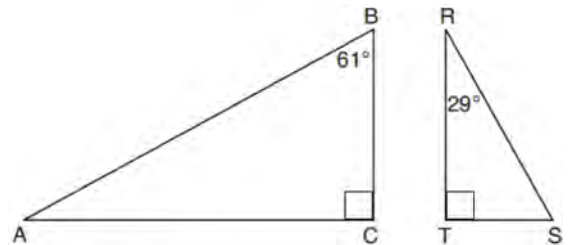
Which proportion in relation to $\triangle ABC$ and $\triangle RST$
is *not* correct?
1) $\dfrac{AB}{RS} = \dfrac{RT}{AC}$
2) $\dfrac{BC}{ST} = \dfrac{AB}{RS}$
3) $\dfrac{BC}{ST} = \dfrac{AC}{RT}$
4) $\dfrac{AB}{AC} = \dfrac{RS}{RT}$

424 In the diagram below, $\triangle ABC \sim \triangle DEC$.
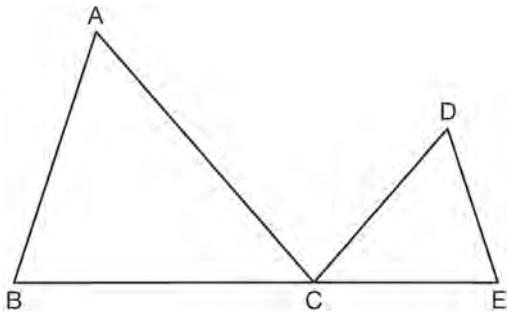
If $AC = 12$, $DC = 7$, $DE = 5$, and the perimeter of $\triangle ABC$ is 30, what is the perimeter of $\triangle DEC$?
1)   12.5
2)   14.0
3)   14.8
4)   17.5

425 In $\triangle SCU$ shown below, points T and O are on $\overline{SU}$ and $\overline{CU}$, respectively. Segment OT is drawn so that $\angle C \cong \angle OTU$.
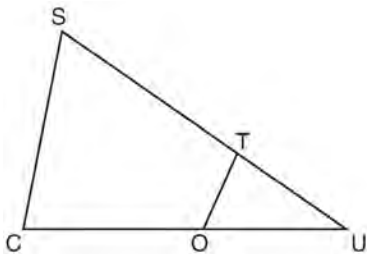
If $TU = 4$, $OU = 5$, and $OC = 7$, what is the length of $\overline{ST}$?
1)   5.6
2)   8.75
3)   11
4)   15

426 In triangle CHR, O is on $\overline{HR}$, and D is on $\overline{CR}$ so that $\angle H \cong \angle RDO$.
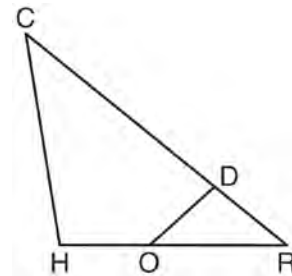
If $RD = 4$, $RO = 6$, and $OH = 4$, what is the length of $\overline{CD}$?
1) $2\frac{2}{3}$
2) $6\frac{2}{3}$
3)   11
4)   15

427 In the diagram below, $\overline{AD}$ intersects $\overline{BE}$ at C, and $\overline{AB} \parallel \overline{DE}$.
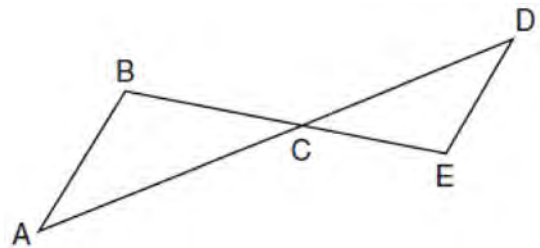
If $CD = 6.6$ cm, $DE = 3.4$ cm, $CE = 4.2$ cm, and $BC = 5.25$ cm, what is the length of $\overline{AC}$, to the nearest hundredth of a centimeter?
1)   2.70
2)   3.34
3)   5.28
4)   8.25

103

428 In the diagram below, $\overline{AF}$, and $\overline{DB}$ intersect at C, and $\overline{AD}$ and $\overline{FBE}$ are drawn such that m$\angle D$ = 65°, m$\angle CBE$ = 115°, DC = 7.2, AC = 9.6, and FC = 21.6.
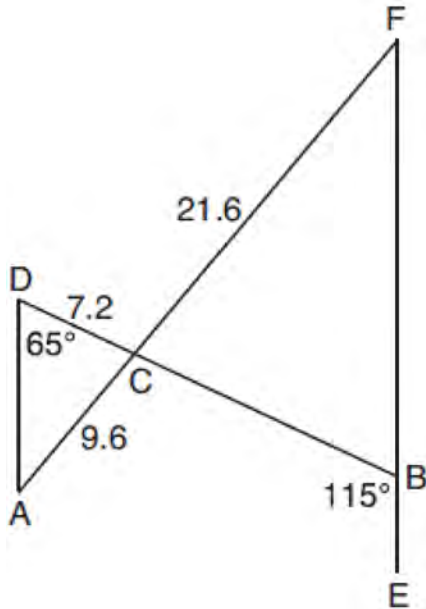
What is the length of $\overline{CB}$?
1) 3.2
2) 4.8
3) 16.2
4) 19.2

429 In $\triangle ABC$ shown below, $\angle ACB$ is a right angle, E is a point on $\overline{AC}$, and $\overline{ED}$ is drawn perpendicular to hypotenuse $\overline{AB}$.
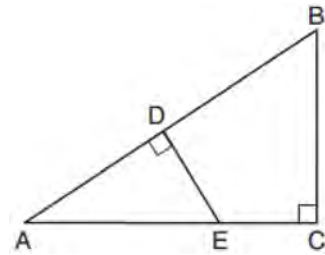
If AB = 9, BC = 6, and DE = 4, what is the length of $\overline{AE}$?
1) 5
2) 6
3) 7
4) 8

430 In the diagram below, $\overline{BC}$ connects points B and C on the congruent sides of isosceles triangle ADE, such that $\triangle ABC$ is isosceles with vertex angle A.
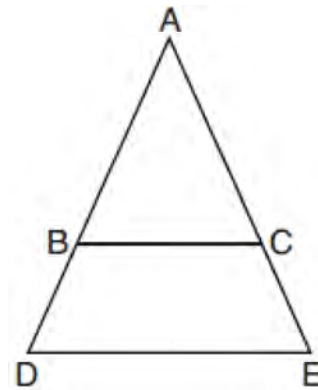
If AB = 10, BD = 5, and DE = 12, what is the length of $\overline{BC}$?
1) 6
2) 7
3) 8
4) 9

431 Triangle *JGR* is similar to triangle *MST*. Which statement is *not* always true?
1) $\angle J \cong \angle M$
2) $\angle G \cong \angle T$
3) $\angle R \cong \angle T$
4) $\angle G \cong \angle S$

432 The ratio of similarity of $\triangle BOY$ to $\triangle GRL$ is $1:2$. If $BO = x + 3$ and $GR = 3x - 1$, then the length of $\overline{GR}$ is
1) 5
2) 7
3) 10
4) 20

433 In the diagram below, $\overline{CD}$ is the altitude drawn to the hypotenuse $\overline{AB}$ of right triangle *ABC*.
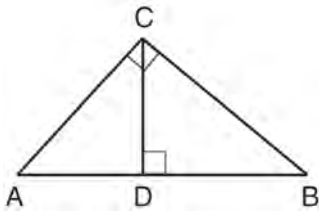
Which lengths would *not* produce an altitude that measures $6\sqrt{2}$?
1) $AD = 2$ and $DB = 36$
2) $AD = 3$ and $AB = 24$
3) $AD = 6$ and $DB = 12$
4) $AD = 8$ and $AB = 17$

434 Kirstie is testing values that would make triangle *KLM* a right triangle when $\overline{LN}$ is an altitude, and $KM = 16$, as shown below.
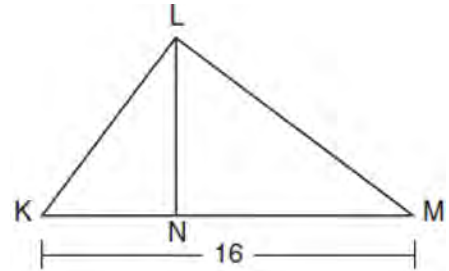
Which lengths would make triangle *KLM* a right triangle?
1) $LM = 13$ and $KN = 6$
2) $LM = 12$ and $NM = 9$
3) $KL = 11$ and $KN = 7$
4) $LN = 8$ and $NM = 10$

435 In the accompanying diagram of right triangle *ABC*, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$.
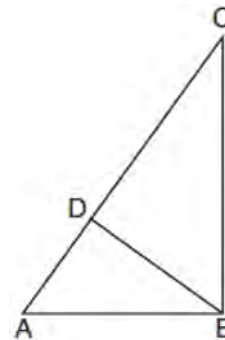
Which statement must always be true?
1) $\dfrac{AD}{AB} = \dfrac{BC}{AC}$
2) $\dfrac{AD}{AB} = \dfrac{AB}{AC}$
3) $\dfrac{BD}{BC} = \dfrac{AB}{AD}$
4) $\dfrac{AB}{BC} = \dfrac{BD}{AC}$

105

436 In the diagram below of right triangle ABC, altitude $\overline{CD}$ intersects hypotenuse $\overline{AB}$ at D.
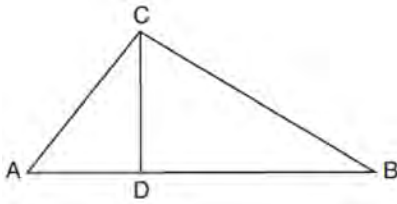
Which equation is always true?

1) $\dfrac{AD}{AC} = \dfrac{CD}{BC}$

2) $\dfrac{AD}{CD} = \dfrac{BD}{CD}$

3) $\dfrac{AC}{CD} = \dfrac{BC}{CD}$

4) $\dfrac{AD}{AC} = \dfrac{AC}{BD}$

437 In $\triangle RST$ shown below, altitude $\overline{SU}$ is drawn to $\overline{RT}$ at U.
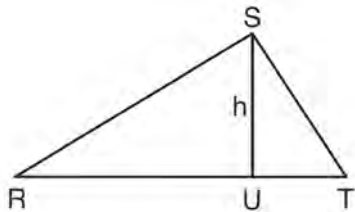
If $SU = h$, $UT = 12$, and $RT = 42$, which value of h will make $\triangle RST$ a right triangle with $\angle RST$ as a right angle?

1) $6\sqrt{3}$

2) $6\sqrt{10}$

3) $6\sqrt{14}$

4) $6\sqrt{35}$

438 In the diagram of right triangle ABC, $\overline{CD}$ intersects hypotenuse $\overline{AB}$ at D.
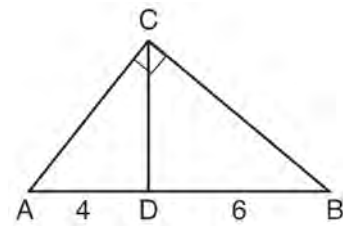
If $AD = 4$ and $DB = 6$, which length of $\overline{AC}$ makes $\overline{CD} \perp \overline{AB}$?

1) $2\sqrt{6}$

2) $2\sqrt{10}$

3) $2\sqrt{15}$

4) $4\sqrt{2}$

439 In the diagram below of $\triangle ABC$, $\angle ABC$ is a right angle, $AC = 12$, $AD = 8$, and altitude $\overline{BD}$ is drawn.
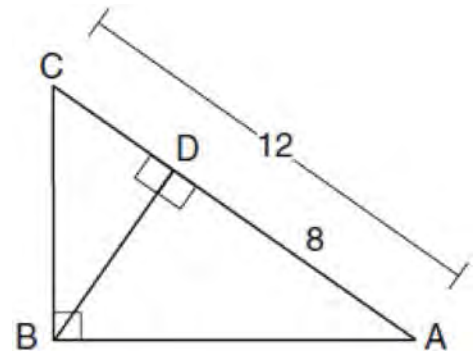
What is the length of $\overline{BC}$?

1) $4\sqrt{2}$

2) $4\sqrt{3}$

3) $4\sqrt{5}$

4) $4\sqrt{6}$

440 In the diagram below of right triangle ABC, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$.
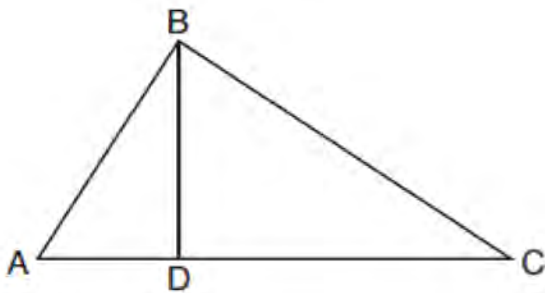
If $BD = 4$, $AD = x - 6$, and $CD = x$, what is the length of $\overline{CD}$?
1) 5
2) 2
3) 8
4) 11

441 In the diagram below of right triangle KMI, altitude $\overline{IG}$ is drawn to hypotenuse $\overline{KM}$.
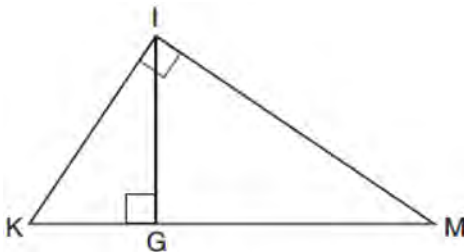
If $KG = 9$ and $IG = 12$, the length of $\overline{IM}$ is
1) 15
2) 16
3) 20
4) 25

442 In right triangle RST below, altitude $\overline{SV}$ is drawn to hypotenuse $\overline{RT}$.
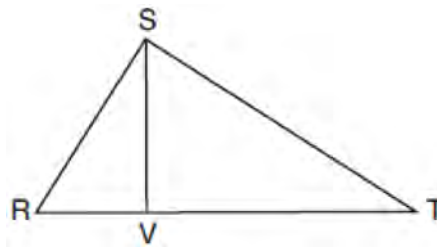
If $RV = 4.1$ and $TV = 10.2$, what is the length of $\overline{ST}$, to the *nearest tenth*?
1) 6.5
2) 7.7
3) 11.0
4) 12.1

443 Line segment CD is the altitude drawn to hypotenuse $\overline{EF}$ in right triangle ECF. If $EC = 10$ and $EF = 24$, then, to the *nearest tenth*, ED is
1) 4.2
2) 5.4
3) 15.5
4) 21.8

444 In right triangle RST, altitude $\overline{TV}$ is drawn to hypotenuse $\overline{RS}$. If $RV = 12$ and $RT = 18$, what is the length of $\overline{SV}$?
1) $6\sqrt{5}$
2) 15
3) $6\sqrt{6}$
4) 27

445 To find the distance across a pond from point *B* to point *C*, a surveyor drew the diagram below. The measurements he made are indicated on his diagram.
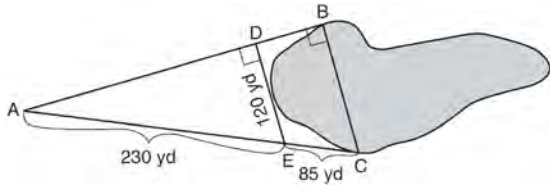
Use the surveyor's information to determine and state the distance from point *B* to point *C*, to the *nearest yard*.

446 Triangles *RST* and *XYZ* are drawn below. If *RS* = 6, *ST* = 14, *XY* = 9, *YZ* = 21, and ∠*S* ≅ ∠*Y*, is △*RST* similar to △*XYZ*? Justify your answer.
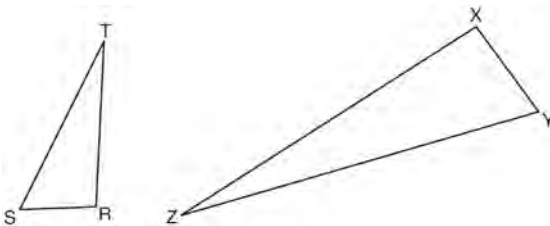
447 In the model below, a support wire for a telephone pole is attached to the pole and anchored to a stake in the ground 15 feet from the base of the telephone pole. Jamal places a 6-foot wooden pole under the support wire parallel to the telephone pole, such that one end of the pole is on the ground and the top of the pole is touching the support wire. He measures the distance between the bottom of the pole and the stake in the ground.
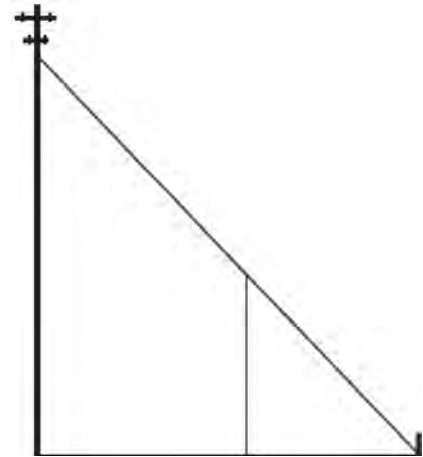
Jamal says he can approximate how high the support wire attaches to the telephone pole by using similar triangles. Explain why the triangles are similar.

448 A flagpole casts a shadow 16.60 meters long. Tim stands at a distance of 12.45 meters from the base of the flagpole, such that the end of Tim's shadow meets the end of the flagpole's shadow. If Tim is 1.65 meters tall, determine and state the height of the flagpole to the *nearest tenth of a meter*.

449 The aspect ratio (the ratio of screen width to height) of a rectangular flat-screen television is 16:9. The length of the diagonal of the screen is the television's screen size. Determine and state, to the *nearest inch*, the screen size (diagonal) of this flat-screen television with a screen height of 20.6 inches.

450 In right triangle *ABC* shown below, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$. Explain why $\triangle ABC \sim \triangle ACD$.
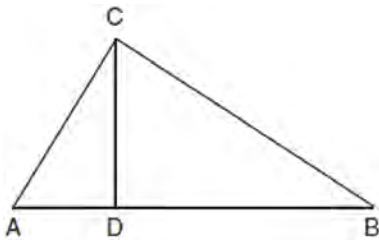
451 In right triangle *PRT*, m∠P = 90°, altitude $\overline{PQ}$ is drawn to hypotenuse $\overline{RT}$, RT = 17, and PR = 15.
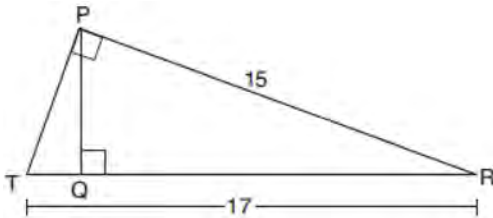
Determine and state, to the *nearest tenth*, the length of $\overline{RQ}$.

452 In the diagram below, the line of sight from the park ranger station, *P*, to the lifeguard chair, *L*, on the beach of a lake is perpendicular to the path joining the campground, *C*, and the first aid station, *F*. The campground is 0.25 mile from the lifeguard chair. The straight paths from both the campground and first aid station to the park ranger station are perpendicular.
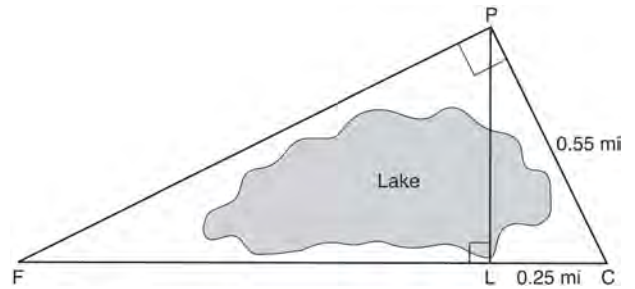
If the path from the park ranger station to the campground is 0.55 mile, determine and state, to the *nearest hundredth of a mile*, the distance between the park ranger station and the lifeguard chair. Gerald believes the distance from the first aid station to the campground is at least 1.5 miles. Is Gerald correct? Justify your answer.

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TRIGONOMETRY
G.SRT.C.6: TRIGONOMETRIC RATIOS

453 In the diagram below, $\triangle ERM \sim \triangle JTM$.
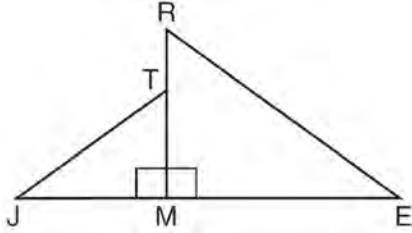
Which statement is always true?

1) $\cos J = \dfrac{RM}{RE}$

2) $\cos R = \dfrac{JM}{JT}$

3) $\tan T = \dfrac{RM}{EM}$

4) $\tan E = \dfrac{TM}{JM}$

454 In the diagram of right triangle ADE below, $\overline{BC} \parallel \overline{DE}$.
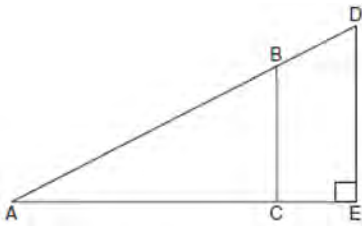
Which ratio is always equivalent to the sine of $\angle A$?

1) $\dfrac{AD}{DE}$

2) $\dfrac{AE}{AD}$

3) $\dfrac{BC}{AB}$

4) $\dfrac{AB}{AC}$

455 In the diagram below of right triangle ABC, altitude $\overline{BD}$ is drawn.
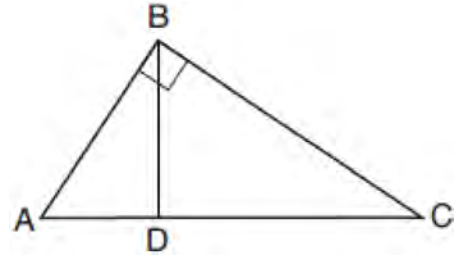
Which ratio is always equivalent to $\cos A$?

1) $\dfrac{AB}{BC}$

2) $\dfrac{BD}{BC}$

3) $\dfrac{BD}{AB}$

4) $\dfrac{BC}{AC}$

G.SRT.C.7: COFUNCTIONS

456 In scalene triangle ABC shown in the diagram below, m$\angle C = 90°$.
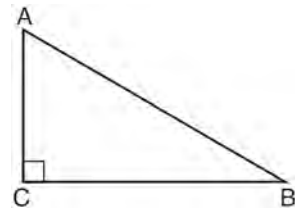
Which equation is always true?
1) $\sin A = \sin B$
2) $\cos A = \cos B$
3) $\cos A = \sin C$
4) $\sin A = \cos B$

110

457 In $\triangle ABC$ below, angle C is a right angle.
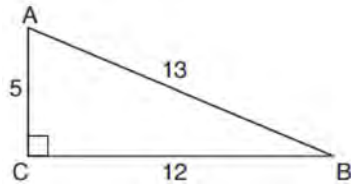
Which statement must be true?
1) $\sin A = \cos B$
2) $\sin A = \tan B$
3) $\sin B = \tan A$
4) $\sin B = \cos B$

458 Which expression is always equivalent to $\sin x$ when $0° < x < 90°$?
1) $\cos(90° - x)$
2) $\cos(45° - x)$
3) $\cos(2x)$
4) $\cos x$

459 In $\triangle ABC$, the complement of $\angle B$ is $\angle A$. Which statement is always true?
1) $\tan \angle A = \tan \angle B$
2) $\sin \angle A = \sin \angle B$
3) $\cos \angle A = \tan \angle B$
4) $\sin \angle A = \cos \angle B$

460 In right triangle ABC, m$\angle C = 90°$. If $\cos B = \dfrac{5}{13}$, which function also equals $\dfrac{5}{13}$?
1) $\tan A$
2) $\tan B$
3) $\sin A$
4) $\sin B$

461 In right triangle ABC, m$\angle C = 90°$ and $AC \neq BC$. Which trigonometric ratio is equivalent to $\sin B$?
1) $\cos A$
2) $\cos B$
3) $\tan A$
4) $\tan B$

462 The expression $\sin 57°$ is equal to
1) $\tan 33°$
2) $\cos 33°$
3) $\tan 57°$
4) $\cos 57°$

463 In $\triangle ABC$, where $\angle C$ is a right angle, $\cos A = \dfrac{\sqrt{21}}{5}$. What is $\sin B$?
1) $\dfrac{\sqrt{21}}{5}$
2) $\dfrac{\sqrt{21}}{2}$
3) $\dfrac{2}{5}$
4) $\dfrac{5}{\sqrt{21}}$

464 In a right triangle, $\sin(40 - x)° = \cos(3x)°$. What is the value of x?
1) 10
2) 15
3) 20
4) 25

465 In a right triangle, the acute angles have the relationship $\sin(2x + 4) = \cos(46)$. What is the value of x?
1) 20
2) 21
3) 24
4) 25

466 If $\sin(2x + 7)° = \cos(4x - 7)°$, what is the value of x?
1) 7
2) 15
3) 21
4) 30

467 For the acute angles in a right triangle, $\sin(4x)° = \cos(3x + 13)°$. What is the number of degrees in the measure of the *smaller* angle?
1) 11°
2) 13°
3) 44°
4) 52°

468 When instructed to find the length of $\overline{HJ}$ in right triangle HJG, Alex wrote the equation $\sin 28° = \dfrac{HJ}{20}$ while Marlene wrote $\cos 62° = \dfrac{HJ}{20}$. Are both students' equations correct? Explain why.
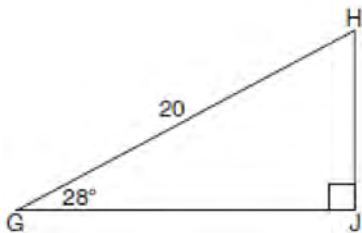
469 Explain why $\cos(x) = \sin(90 - x)$ for x such that $0 < x < 90$.

470 In right triangle ABC with the right angle at C, $\sin A = 2x + 0.1$ and $\cos B = 4x - 0.7$. Determine and state the value of x. Explain your answer.

471 Find the value of R that will make the equation $\sin 73° = \cos R$ true when $0° < R < 90°$. Explain your answer.

472 Given: Right triangle ABC with right angle at C. If $\sin A$ increases, does $\cos B$ increase or decrease? Explain why.

G.SRT.C.8: USING TRIGONOMETRY TO FIND A SIDE

473 Given the right triangle in the diagram below, what is the value of x, to the *nearest foot*?
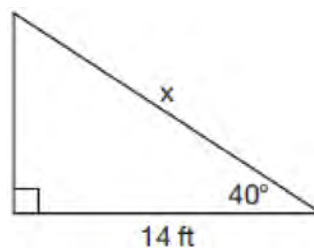
1) 11
2) 17
3) 18
4) 22

Geometry Regents Exam Questions by State Standard: Topic

474 As shown in the diagram below, the angle of elevation from a point on the ground to the top of the tree is 34°.
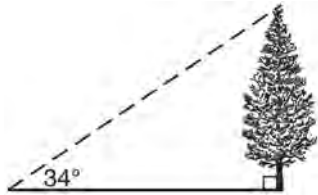
If the point is 20 feet from the base of the tree, what is the height of the tree, to the *nearest tenth of a foot*?
1) 29.7
2) 16.6
3) 13.5
4) 11.2

475 A man was parasailing above a lake at an angle of elevation of 32° from a boat, as modeled in the diagram below.
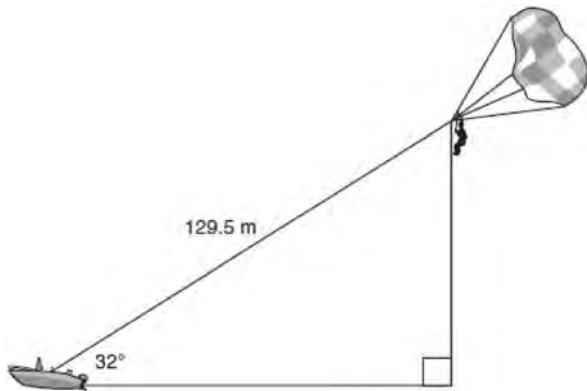
If 129.5 meters of cable connected the boat to the parasail, approximately how many meters above the lake was the man?
1) 68.6
2) 80.9
3) 109.8
4) 244.4

476 Yolanda is making a springboard to use for gymnastics. She has 8-inch-tall springs and wants to form a 16.5° angle with the base, as modeled in the diagram below.
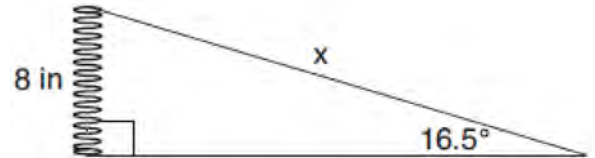
To the *nearest tenth of an inch*, what will be the length of the springboard, *x*?
1) 2.3
2) 8.3
3) 27.0
4) 28.2

477 The diagram below shows two similar triangles.
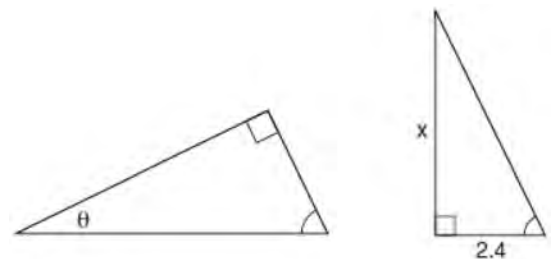
If $\tan \theta = \dfrac{3}{7}$, what is the value of *x*, to the *nearest tenth*?
1) 1.2
2) 5.6
3) 7.6
4) 8.8

478 A 20-foot support post leans against a wall, making a 70° angle with the ground. To the *nearest tenth of a foot*, how far up the wall will the support post reach?
1) 6.8
2) 6.9
3) 18.7
4) 18.8

479 A ladder 20 feet long leans against a building, forming an angle of 71° with the level ground. To the *nearest foot*, how high up the wall of the building does the ladder touch the building?
1) 15
2) 16
3) 18
4) 19

480 In right triangle *ABC*, m∠*A* = 32°, m∠*B* = 90°, and *AC* = 6.2 cm. What is the length of $\overline{BC}$, to the *nearest tenth of a centimeter*?
1) 3.3
2) 3.9
3) 5.3
4) 11.7

481 From a point on the ground one-half mile from the base of a historic monument, the angle of elevation to its top is 11.87°. To the *nearest foot*, what is the height of the monument?
1) 543
2) 555
3) 1086
4) 1110

482 Chelsea is sitting 8 feet from the foot of a tree. From where she is sitting, the angle of elevation of her line of sight to the top of the tree is 36°. If her line of sight starts 1.5 feet above ground, how tall is the tree, to the *nearest foot*?
1) 8
2) 7
3) 6
4) 4

483 A 15-foot ladder leans against a wall and makes an angle of 65° with the ground. What is the horizontal distance from the wall to the base of the ladder, to the *nearest tenth of a foot*?
1) 6.3
2) 7.0
3) 12.9
4) 13.6

484 A carpenter leans an extension ladder against a house to reach the bottom of a window 30 feet above the ground. As shown in the diagram below, the ladder makes a 70° angle with the ground. To the *nearest foot*, determine and state the length of the ladder.
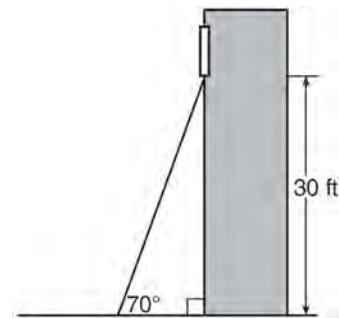
485 In the diagram below, a window of a house is 15 feet above the ground. A ladder is placed against the house with its base at an angle of 75° with the ground. Determine and state the length of the ladder to the *nearest tenth of a foot*.
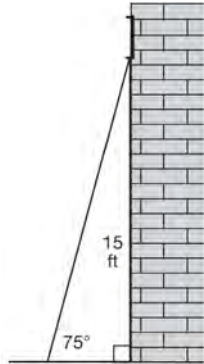
486 Diego needs to install a support beam to hold up his new birdhouse, as modeled below. The base of the birdhouse is $24\frac{1}{2}$ inches long. The support beam will form an angle of 38° with the vertical post. Determine and state the approximate length of the support beam, x, to the *nearest inch*.
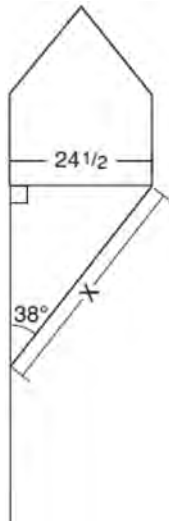
487 As shown in the diagram below, an island (*I*) is due north of a marina (*M*). A boat house (*H*) is 4.5 miles due west of the marina. From the boat house, the island is located at an angle of 54° from the marina.
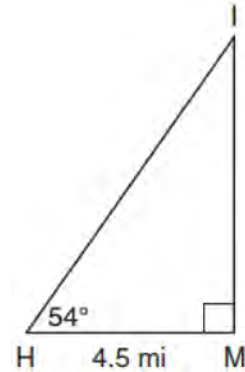
Determine and state, to the *nearest tenth of a mile*, the distance from the boat house (*H*) to the island (*I*). Determine and state, to the *nearest tenth of a mile*, the distance from the island (*I*) to the marina (*M*).

488 A homeowner is building three steps leading to a
deck, as modeled by the diagram below. All three
step rises, $\overline{HA}$, $\overline{FG}$, and $\overline{DE}$, are congruent, and all
three step runs, $\overline{HG}$, $\overline{FE}$, and $\overline{DC}$, are congruent.
Each step rise is perpendicular to the step run it
joins. The measure of $\angle CAB = 36°$ and
$\angle CBA = 90°$.
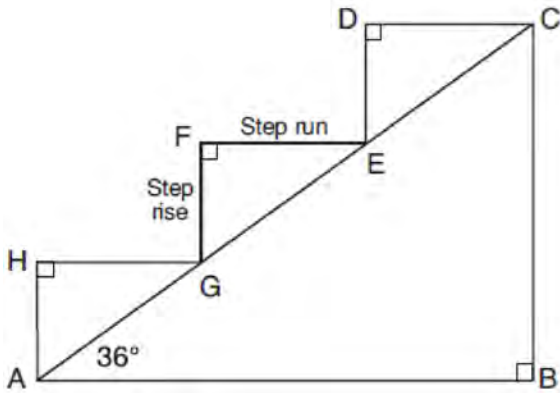
If each step run is parallel to $\overline{AB}$ and has a length of
10 inches, determine and state the length of each
step rise, to the *nearest tenth of an inch*. Determine
and state the length of $\overline{AC}$, to the *nearest inch*.

489 As modeled in the diagram below, an access ramp starts on flat ground and ends at the beginning of the top step.
Each step is 6 inches tall and 8 inches deep.
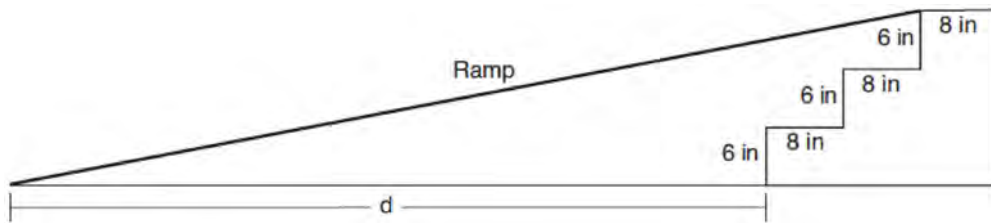
If the angle of elevation of the ramp is 4.76°, determine and state the length of the ramp, to the *nearest tenth of a
foot*. Determine and state, to the *nearest tenth of a foot*, the horizontal distance, *d*, from the bottom of the stairs to
the bottom of the ramp.

490   David has just finished building his treehouse and still needs to buy a ladder to be attached to the ledge of the treehouse and anchored at a point on the ground, as modeled below. David is standing 1.3 meters from the stilt supporting the treehouse. This is the point on the ground where he has decided to anchor the ladder. The angle of elevation from his eye level to the bottom of the treehouse is 56 degrees. David's eye level is 1.5 meters above the ground.
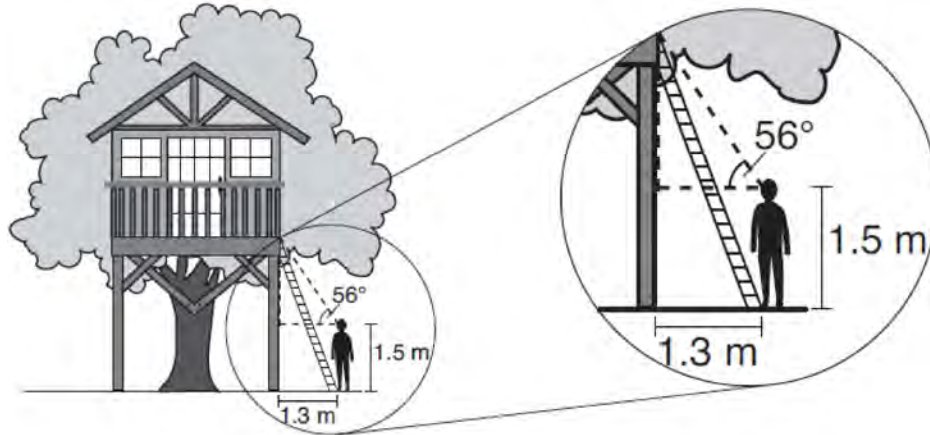
Determine and state the minimum length of a ladder, to the *nearest tenth of a meter*, that David will need to buy for his treehouse.

491   As shown below, a canoe is approaching a lighthouse on the coastline of a lake. The front of the canoe is 1.5 feet above the water and an observer in the lighthouse is 112 feet above the water.

(Not drawn to scale)
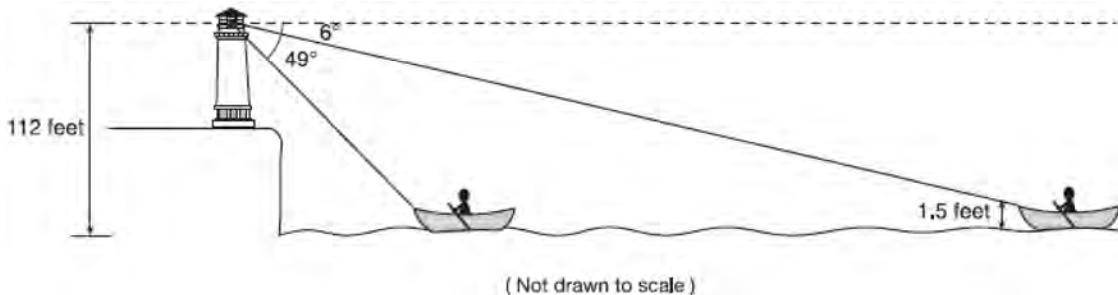
At 5:00, the observer in the lighthouse measured the angle of depression to the front of the canoe to be 6°. Five minutes later, the observer measured and saw the angle of depression to the front of the canoe had increased by 49°. Determine and state, to the *nearest foot per minute*, the average speed at which the canoe traveled toward the lighthouse.

492 The map below shows the three tallest mountain peaks in New York State: Mount Marcy, Algonquin Peak, and Mount Haystack. Mount Haystack, the shortest peak, is 4960 feet tall. Surveyors have determined the horizontal distance between Mount Haystack and Mount Marcy is 6336 feet and the horizontal distance between Mount Marcy and Algonquin Peak is 20,493 feet.
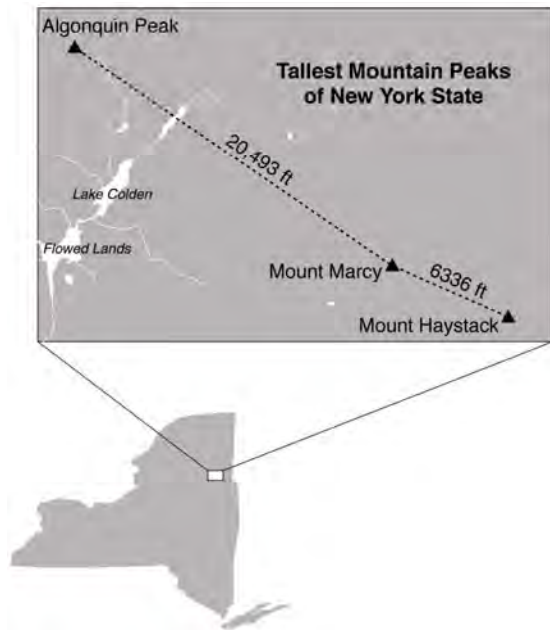
The angle of depression from the peak of Mount Marcy to the peak of Mount Haystack is 3.47 degrees. The angle of elevation from the peak of Algonquin Peak to the peak of Mount Marcy is 0.64 degrees. What are the heights, to the *nearest foot*, of Mount Marcy and Algonquin Peak? Justify your answer.

493 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point *A*, the angle of elevation from the ship to the light was 7°. A short time later, at point *D*, the angle of elevation was 16°.
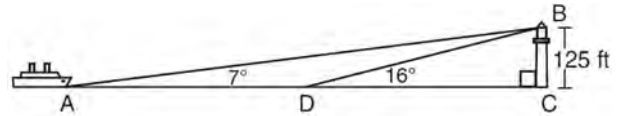
To the *nearest foot*, determine and state how far the ship traveled from point *A* to point *D*.

494 Cathy wants to determine the height of the flagpole shown in the diagram below. She uses a survey instrument to measure the angle of elevation to the top of the flagpole, and determines it to be 34.9°. She walks 8 meters closer and determines the new measure of the angle of elevation to be 52.8°. At each measurement, the survey instrument is 1.7 meters above the ground.
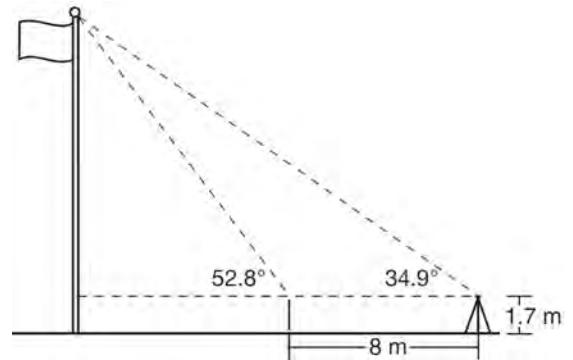
Determine and state, to the *nearest tenth of a meter*, the height of the flagpole.

118

495 The map of a campground is shown below. Campsite *C*, first aid station *F*, and supply station *S* lie along a straight path. The path from the supply station to the tower, *T*, is perpendicular to the path from the supply station to the campsite. The length of path $\overline{FS}$ is 400 feet. The angle formed by path $\overline{TF}$ and path $\overline{FS}$ is 72°. The angle formed by path $\overline{TC}$ and path $\overline{CS}$ is 55°.

Campground Map
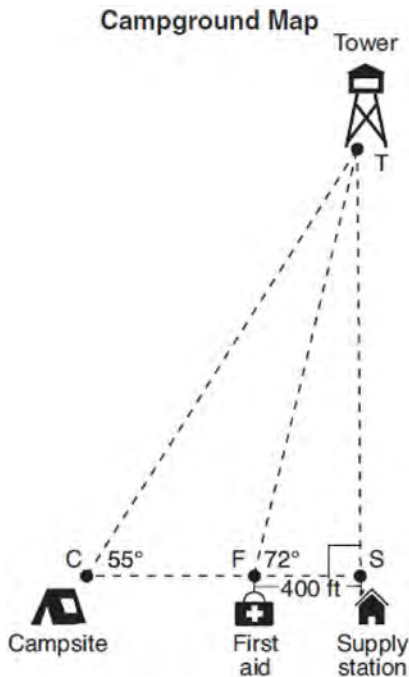
Determine and state, to the *nearest foot*, the distance from the campsite to the tower.

496 Nick wanted to determine the length of one blade of the windmill pictured below. He stood at a point on the ground 440 feet from the windmill's base. Using surveyor's tools, Nick measured the angle between the ground and the highest point reached by the top blade and found it was 38.8°. He also measured the angle between the ground and the lowest point of the top blade, and found it was 30°.
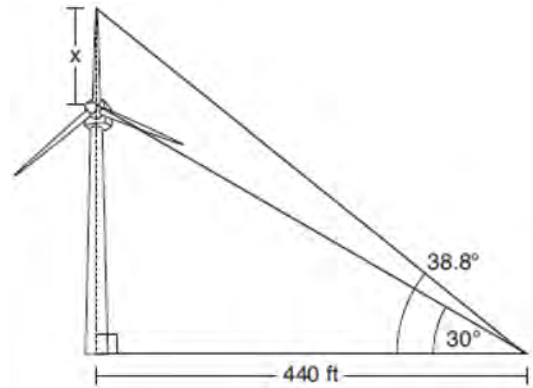
Determine and state a blade's length, *x*, to the *nearest foot*.

497 Freda, who is training to use a radar system, detects an airplane flying at a constant speed and heading in a straight line to pass directly over her location. She sees the airplane at an angle of elevation of 15° and notes that it is maintaining a constant altitude of 6250 feet. One minute later, she sees the airplane at an angle of elevation of 52°. How far has the airplane traveled, to the *nearest foot*? Determine and state the speed of the airplane, to the *nearest mile per hour*.

498 A support wire reaches from the top of a pole to a clamp on the ground. The pole is perpendicular to the level ground and the clamp is 10 feet from the base of the pole. The support wire makes a 68° angle with the ground. Find the length of the support wire to the *nearest foot*.

119

G.SRT.C.8: USING TRIGONOMETRY TO FIND
AN ANGLE

499 In the diagram below of right triangle ABC,
$AC = 8$, and $AB = 17$.
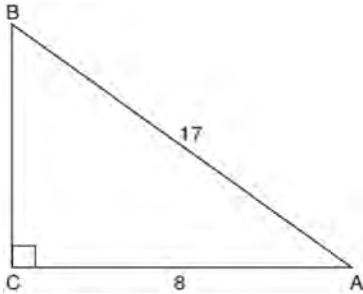
Which equation would determine the value of angle
A?

1) $\sin A = \dfrac{8}{17}$

2) $\tan A = \dfrac{8}{15}$

3) $\cos A = \dfrac{15}{17}$

4) $\tan A = \dfrac{15}{8}$

500 In the diagram of right triangle ABC shown below,
$AB = 14$ and $AC = 9$.
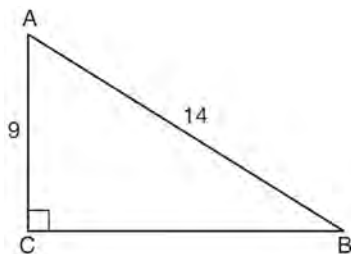
What is the measure of $\angle A$, to the *nearest degree*?
1) 33
2) 40
3) 50
4) 57

501 In the diagram of $\triangle RST$ below, m$\angle T = 90°$,
$RS = 65$, and $ST = 60$.
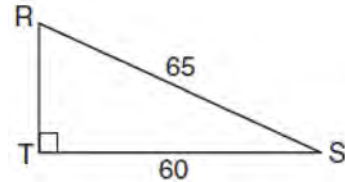
What is the measure of $\angle S$, to the *nearest degree*?
1) 23°
2) 43°
3) 47°
4) 67°

502 To build a handicapped-access ramp, the building
code states that for every 1 inch of vertical rise in
height, the ramp must extend out 12 inches
horizontally, as shown in the diagram below.
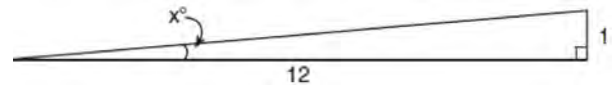
What is the angle of inclination, x, of this ramp, to
the *nearest hundredth of a degree*?
1) 4.76
2) 4.78
3) 85.22
4) 85.24

120

503 In the diagram below of $\triangle HAR$ and $\triangle NTY$, angles H and N are right angles, and $\triangle HAR \sim \triangle NTY$.
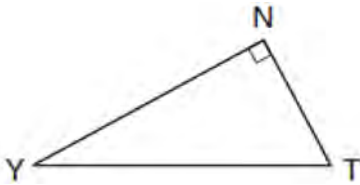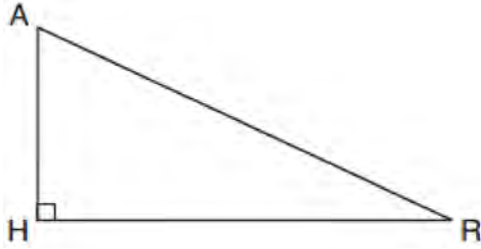
If $AR = 13$ and $HR = 12$, what is the measure of angle Y, to the *nearest degree*?
1) 23°
2) 25°
3) 65°
4) 67°

504 Kayla was cutting right triangles from wood to use for an art project. Two of the right triangles she cut are shown below.
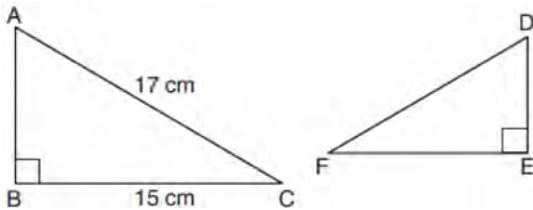
If $\triangle ABC \sim \triangle DEF$, with right angles B and E, $BC = 15$ cm, and $AC = 17$ cm, what is the measure of $\angle F$, to the *nearest degree*?
1) 28°
2) 41°
3) 62°
4) 88°

505 A man who is 5 feet 9 inches tall casts a shadow of 8 feet 6 inches. Assuming that the man is standing perpendicular to the ground, what is the angle of elevation from the end of the shadow to the top of the man's head, to the *nearest tenth of a degree*?
1) 34.1
2) 34.5
3) 42.6
4) 55.9

506 In right triangle ABC, hypotenuse $\overline{AB}$ has a length of 26 cm, and side $\overline{BC}$ has a length of 17.6 cm. What is the measure of angle B, to the *nearest degree*?
1) 48°
2) 47°
3) 43°
4) 34°

507 A 12-foot ladder leans against a building and reaches a window 10 feet above ground. What is the measure of the angle, to the *nearest degree*, that the ladder forms with the ground?
1) 34
2) 40
3) 50
4) 56

508 The diagram below shows a ramp connecting the ground to a loading platform 4.5 feet above the ground. The ramp measures 11.75 feet from the ground to the top of the loading platform.
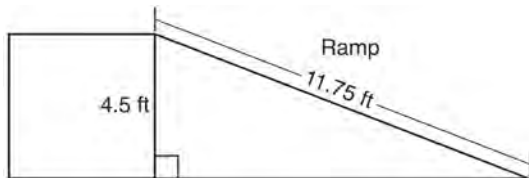
Determine and state, to the *nearest degree*, the angle of elevation formed by the ramp and the ground.

509 As modeled below, a movie is projected onto a large outdoor screen. The bottom of the 60-foot-tall screen is 12 feet off the ground. The projector sits on the ground at a horizontal distance of 75 feet from the screen.
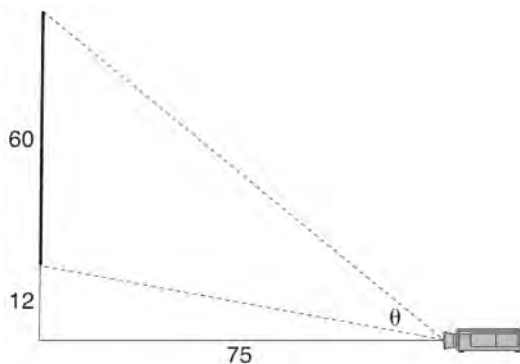
Determine and state, to the *nearest tenth of a degree*, the measure of θ, the projection angle.

510 An airplane took off at a constant angle of elevation. After the plane traveled for 25 miles, it reached an altitude of 5 miles, as modeled below.
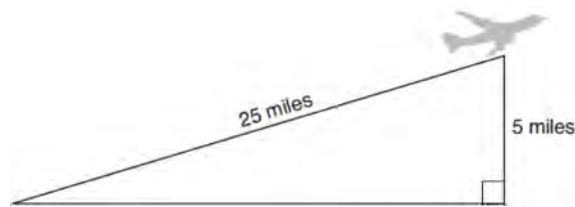
To the *nearest tenth of a degree*, what was the angle of elevation?

511 A ladder leans against a building. The top of the ladder touches the building 10 feet above the ground. The foot of the ladder is 4 feet from the building. Find, to the *nearest degree*, the angle that the ladder makes with the level ground.

512 Bob places an 18-foot ladder 6 feet from the base of his house and leans it up against the side of his house. Find, to the *nearest degree*, the measure of the angle the bottom of the ladder makes with the ground.

LOGIC
G.CO.B.7: TRIANGLE CONGRUENCY

513 Which statement is sufficient evidence that $\triangle DEF$ is congruent to $\triangle ABC$?
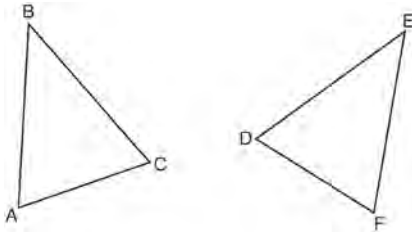
1) $AB = DE$ and $BC = EF$
2) $\angle D \cong \angle A$, $\angle B \cong \angle E$, $\angle C \cong \angle F$
3) There is a sequence of rigid motions that maps $\overline{AB}$ onto $\overline{DE}$, $\overline{BC}$ onto $\overline{EF}$, and $\overline{AC}$ onto $\overline{DF}$.
4) There is a sequence of rigid motions that maps point A onto point D, $\overline{AB}$ onto $\overline{DE}$, and $\angle B$ onto $\angle E$.

514 In the two distinct acute triangles ABC and DEF, $\angle B \cong \angle E$. Triangles ABC and DEF are congruent when there is a sequence of rigid motions that maps
1) $\angle A$ onto $\angle D$, and $\angle C$ onto $\angle F$
2) $\overline{AC}$ onto $\overline{DF}$, and $\overline{BC}$ onto $\overline{EF}$
3) $\angle C$ onto $\angle F$, and $\overline{BC}$ onto $\overline{EF}$
4) point A onto point D, and $\overline{AB}$ onto $\overline{DE}$

515 Triangles JOE and SAM are drawn such that $\angle E \cong \angle M$ and $\overline{EJ} \cong \overline{MS}$. Which mapping would *not* always lead to $\triangle JOE \cong \triangle SAM$?
1) $\angle J$ maps onto $\angle S$
2) $\angle O$ maps onto $\angle A$
3) $\overline{EO}$ maps onto $\overline{MA}$
4) $\overline{JO}$ maps onto $\overline{SA}$

516 Given right triangles ABC and DEF where $\angle C$ and $\angle F$ are right angles, $\overline{AC} \cong \overline{DF}$ and $\overline{CB} \cong \overline{FE}$. Describe a precise sequence of rigid motions which would show $\triangle ABC \cong \triangle DEF$.
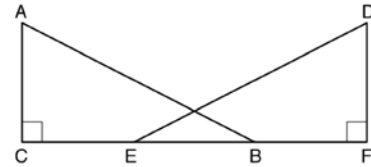
517 In the diagram below, $\triangle ABC$ and $\triangle XYZ$ are graphed.
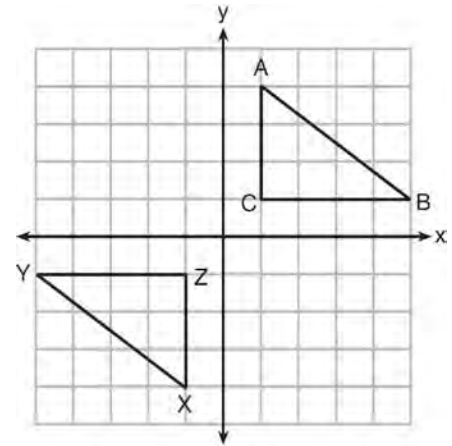
Use the properties of rigid motions to explain why $\triangle ABC \cong \triangle XYZ$.

518 In the diagram below, right triangle PQR is transformed by a sequence of rigid motions that maps it onto right triangle NML.
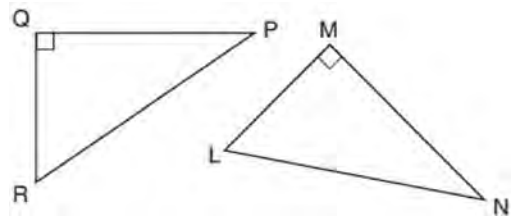
Write a set of three congruency statements that would show ASA congruency for these triangles.

519 In the diagram below of △ABC and △XYZ, a sequence of rigid motions maps ∠A onto ∠X, ∠C onto ∠Z, and $\overline{AC}$ onto $\overline{XZ}$.
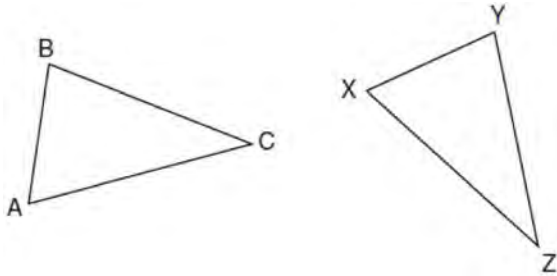
Determine and state whether $\overline{BC} \cong \overline{YZ}$. Explain why.

520 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points A, C, D, and F are collinear on line ℓ.
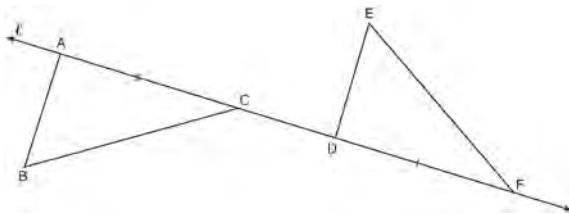
Let △D'E'F' be the image of △DEF after a translation along ℓ, such that point D is mapped onto point A. Determine and state the location of F'. Explain your answer. Let △D"E"F" be the image of △D'E'F' after a reflection across line ℓ. Suppose that E" is located at B. Is △DEF congruent to △ABC? Explain your answer.

521 As graphed on the set of axes below, △A'B'C' is the image of △ABC after a sequence of transformations.
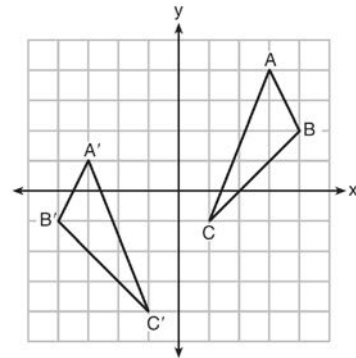
Is △A'B'C' congruent to △ABC? Use the properties of rigid motion to explain your answer.

522 In the graph below, △ABC has coordinates A(−9,2), B(−6,−6), and C(−3,−2), and △RST has coordinates R(−2,9), S(5,6), and T(2,3).
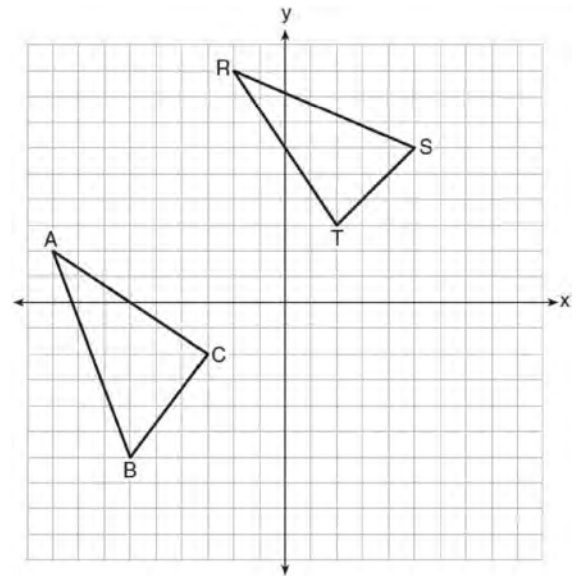
Is △ABC congruent to △RST? Use the properties of rigid motions to explain your reasoning.

523 Given: *D* is the image of *A* after a reflection over $\overleftrightarrow{CH}$.

$\overleftrightarrow{CH}$ is the perpendicular bisector of $\overline{BCE}$

$\triangle ABC$ and $\triangle DEC$ are drawn

Prove: $\triangle ABC \cong \triangle DEC$
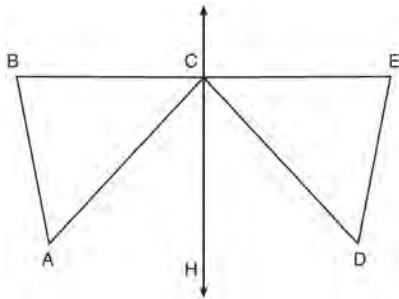
524 After a reflection over a line, $\triangle A'B'C'$ is the image of $\triangle ABC$. Explain why triangle *ABC* is congruent to triangle $\triangle A'B'C'$.

G.CO.B.8: TRIANGLE CONGRUENCY

525 In the diagram of $\triangle LAC$ and $\triangle DNC$ below, $\overline{LA} \cong \overline{DN}$, $\overline{CA} \cong \overline{CN}$, and $\overline{DAC} \perp \overline{LCN}$.
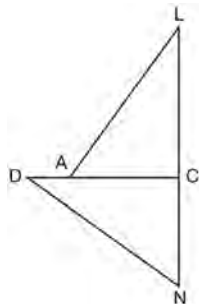
a) Prove that $\triangle LAC \cong \triangle DNC$.
b) Describe a sequence of rigid motions that will map $\triangle LAC$ onto $\triangle DNC$.

G.SRT.B.5: TRIANGLE CONGRUENCY

526 Given $\triangle ABC \cong \triangle DEF$, which statement is *not* always true?
1) $\overline{BC} \cong \overline{DF}$
2) $m\angle A = m\angle D$
3) area of $\triangle ABC = $ area of $\triangle DEF$
4) perimeter of $\triangle ABC = $ perimeter of $\triangle DEF$

527 Skye says that the two triangles below are congruent. Margaret says that the two triangles are similar.
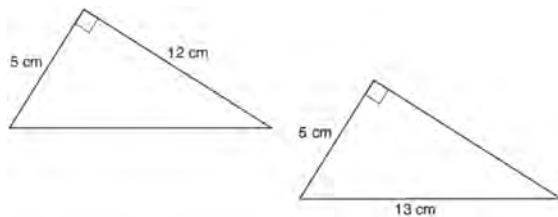
Are Skye and Margaret both correct? Explain why.

G.CO.C.10: TRIANGLE PROOFS

528 Line segment *EA* is the perpendicular bisector of
$\overline{ZT}$, and $\overline{ZE}$ and $\overline{TE}$ are drawn.
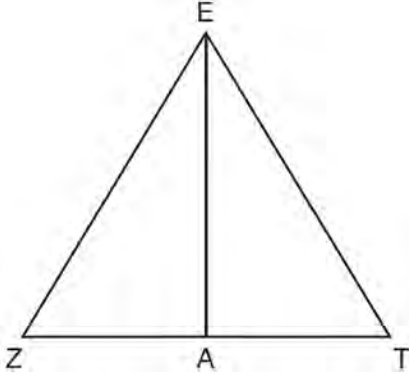
Which conclusion can *not* be proven?
1) $\overline{EA}$ bisects angle *ZET*.
2) Triangle *EZT* is equilateral.
3) $\overline{EA}$ is a median of triangle *EZT*.
4) Angle *Z* is congruent to angle *T*.

529 Given: $\triangle XYZ$, $\overline{XY} \cong \overline{ZY}$, and $\overline{YW}$ bisects $\angle XYZ$
Prove that $\angle YWZ$ is a right angle.
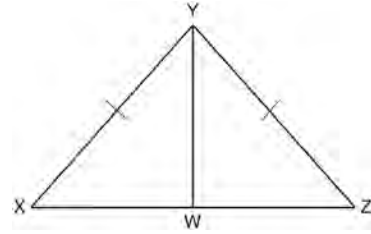
530 Prove the sum of the exterior angles of a triangle is
360°.

126
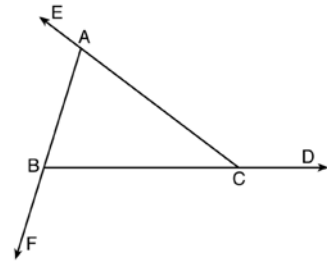
531 Given the theorem, "The sum of the measures of the interior angles of a triangle is 180°," complete the proof for this theorem.
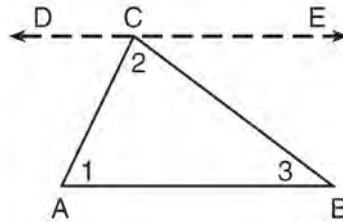
Given: $\triangle ABC$

Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180°$

Fill in the missing reasons below.

Statements	Reasons
(1) $\triangle ABC$	(1) Given
(2) Through point C, draw $\overrightarrow{DCE}$ parallel to $\overline{AB}$.	(2) _____
(3) $m\angle 1 = m\angle ACD$, $m\angle 3 = m\angle BCE$	(3) _____
(4) $m\angle ACD + m\angle 2 + m\angle BCE = 180°$	(4) _____
(5) $m\angle 1 + m\angle 2 + m\angle 3 = 180°$	(5) _____

G.SRT.B.5: TRIANGLE PROOFS

532 Two right triangles must be congruent if
1) an acute angle in each triangle is congruent
2) the lengths of the hypotenuses are equal
3) the corresponding legs are congruent
4) the areas are equal

533 Kelly is completing a proof based on the figure below.
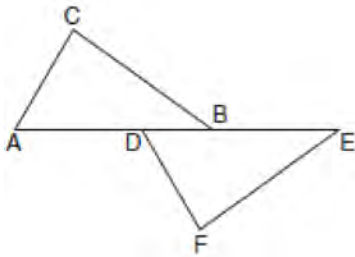
She was given that $\angle A \cong \angle EDF$, and has already proven $\overline{AB} \cong \overline{DE}$. Which pair of corresponding parts and triangle congruency method would *not* prove $\triangle ABC \cong \triangle DEF$?
1) $\overline{AC} \cong \overline{DF}$ and SAS
2) $\overline{BC} \cong \overline{EF}$ and SAS
3) $\angle C \cong \angle F$ and AAS
4) $\angle CBA \cong \angle FED$ and ASA

534 In the diagram below, $\overline{AC}$ and $\overline{BD}$ intersect at E.
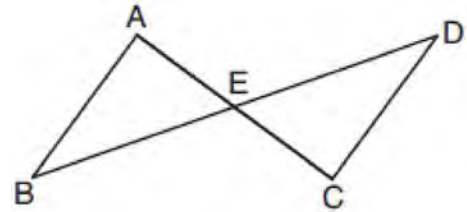
Which information is always sufficient to prove $\triangle ABE \cong \triangle CDE$?
1) $\overline{AB} \parallel \overline{CD}$
2) $\overline{AB} \cong \overline{CD}$ and $\overline{BE} \cong \overline{DE}$
3) E is the midpoint of $\overline{AC}$.
4) $\overline{BD}$ and $\overline{AC}$ bisect each other.

535 Given: $\triangle ABE$ and $\triangle CBD$ shown in the diagram below with $\overline{DB} \cong \overline{BE}$
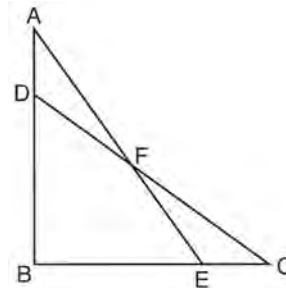
Which statement is needed to prove $\triangle ABE \cong \triangle CBD$ using only SAS $\cong$ SAS?
1) $\angle CDB \cong \angle AEB$
2) $\angle AFD \cong \angle EFC$
3) $\overline{AD} \cong \overline{CE}$
4) $\overline{AE} \cong \overline{CD}$

536 In the diagram below, $\overline{AKS}$, $\overline{NKC}$, $\overline{AN}$, and $\overline{SC}$ are drawn such that $\overline{AN} \cong \overline{SC}$.
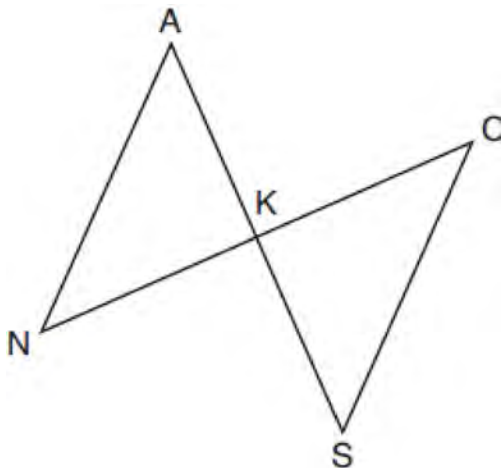
Which additional statement is sufficient to prove $\triangle KAN \cong \triangle KSC$ by AAS?
1) $\overline{AS}$ and $\overline{NC}$ bisect each other.
2) K is the midpoint of $\overline{NC}$.
3) $\overline{AS} \perp \overline{CN}$
4) $\overline{AN} \parallel \overline{SC}$

537 Given: $\overline{RS}$ and $\overline{TV}$ bisect each other at point X
TR and SV are drawn

Prove: $\overline{TR} \parallel \overline{SV}$

Fill in the missing statement and reasons below.

Statements	Reasons
1 $\triangle ABC$, $\overline{AEC}$, $\overline{BDE}$ with $\angle ABE \cong \angle CBE$, and $\angle ADE \cong \angle CDE$	1 Given
2 $\overline{BD} \cong \overline{BD}$	2
3 $\angle BDA$ and $\angle ADE$ are supplementary. $\angle BDC$ and $\angle CDE$ are supplementary.	3 Linear pairs of angles are supplementary.
4	4 Supplements of congruent angles are congruent.
5 $\triangle ABD \cong \triangle CBD$	5 ASA
6 $\overline{AD} \cong \overline{CD}$, $\overline{AB} \cong \overline{CB}$	6
7 $\overline{BDE}$ is the perpendicular bisector of $\overline{AC}$.	7
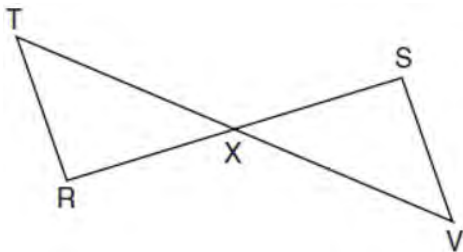
538 Given: $\triangle ABC$, $\overline{AEC}$, $\overline{BDE}$ with $\angle ABE \cong \angle CBE$, and $\angle ADE \cong \angle CDE$
Prove: $\overline{BDE}$ is the perpendicular bisector of $\overline{AC}$

539   In the diagram below, $\triangle ABE \cong \triangle CBD$.
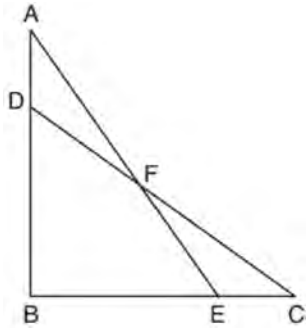
Prove: $\triangle AFD \cong \triangle CFE$

G.CO.C.11: QUADRILATERAL PROOFS

540   In parallelogram $ABCD$ shown below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E.
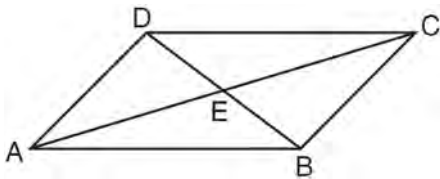
Prove: $\angle ACD \cong \angle CAB$

541   Given: Quadrilateral $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ that bisect each other, and $\angle 1 \cong \angle 2$
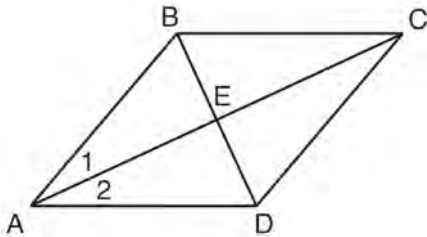
Prove: $\triangle ACD$ is an isosceles triangle and $\triangle AEB$ is a right triangle

542   Given: Parallelogram $ABCD$, $\overline{BF} \perp \overline{AFD}$, and $\overline{DE} \perp \overline{BEC}$
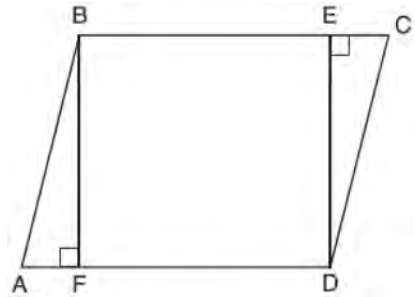
Prove: $BEDF$ is a rectangle

G.SRT.B.5: QUADRILATERAL PROOFS

543   Given: Quadrilateral $ABCD$ is a parallelogram with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at E
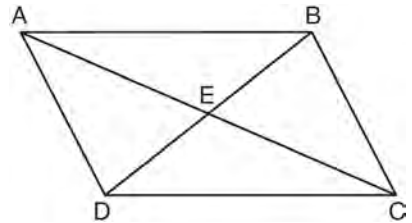
Prove: $\triangle AED \cong \triangle CEB$
Describe a single rigid motion that maps $\triangle AED$ onto $\triangle CEB$.

544   Given: Parallelogram $ABCD$ with diagonal $\overline{AC}$ drawn
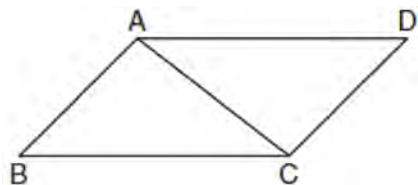
Prove: $\triangle ABC \cong \triangle CDA$

545 In the diagram of parallelogram *ABCD* below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$.
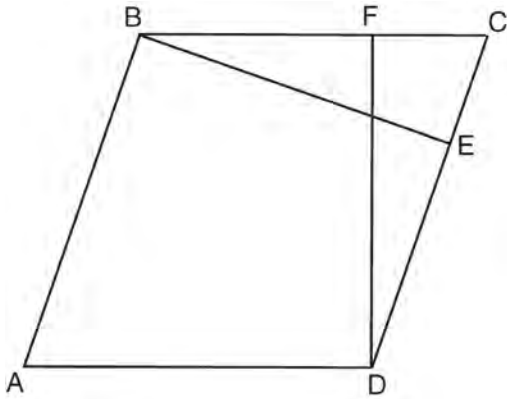
Prove *ABCD* is a rhombus.

546 Given: Parallelogram *ANDR* with $\overline{AW}$ and $\overline{DE}$ bisecting $\overline{NWD}$ and $\overline{REA}$ at points *W* and *E*, respectively
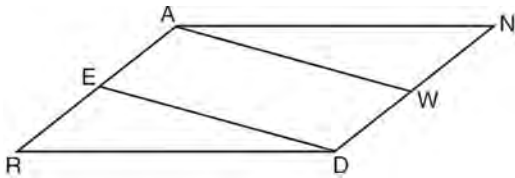
Prove that $\triangle ANW \cong \triangle DRE$. Prove that quadrilateral *AWDE* is a parallelogram.

547 In quadrilateral *ABCD*, $\overline{AB} \cong \overline{CD}$, $\overline{AB} \parallel \overline{CD}$, and $\overline{BF}$ and $\overline{DE}$ are perpendicular to diagonal $\overline{AC}$ at points *F* and *E*.
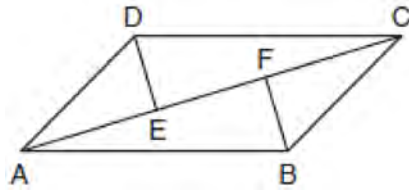
Prove: $\overline{AE} \cong \overline{CF}$

548 Given: Quadrilateral *MATH*, $\overline{HM} \cong \overline{AT}$, $\overline{HT} \cong \overline{AM}$, $\overline{HE} \perp \overline{MEA}$, and $\overline{HA} \perp \overline{AT}$
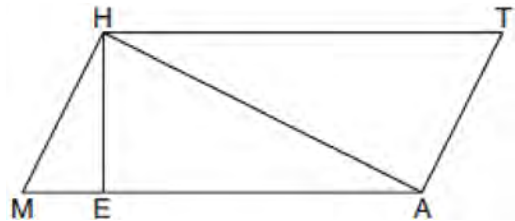
Prove: $TA \bullet HA = HE \bullet TH$

549 Isosceles trapezoid *ABCD* has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments *AE*, *BE*, *CE*, and *DE* are drawn in trapezoid *ABCD* such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.
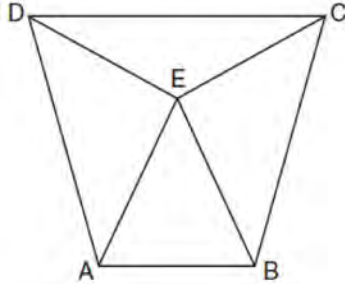
Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

550 In the diagram of quadrilateral *ABCD* with diagonal $\overline{AC}$ shown below, segments *GH* and *EF* are drawn, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$.
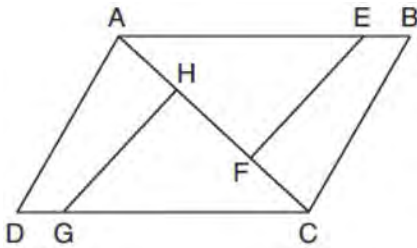
Prove: $\overline{EF} \cong \overline{GH}$

551 In quadrilateral *ABCD*, *E* and *F* are points on $\overline{BC}$ and $\overline{AD}$, respectively, and $\overline{BGD}$ and $\overline{EGF}$ are drawn such that $\angle ABG \cong \angle CDG$, $\overline{AB} \cong \overline{CD}$, and $\overline{CE} \cong \overline{AF}$.
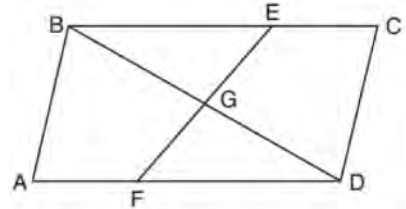
Prove: $\overline{FG} \cong \overline{EG}$

G.SRT.B.5: CIRCLE PROOFS

552 In the diagram below, secant $\overline{ACD}$ and tangent $\overline{AB}$ are drawn from external point *A* to circle *O*.
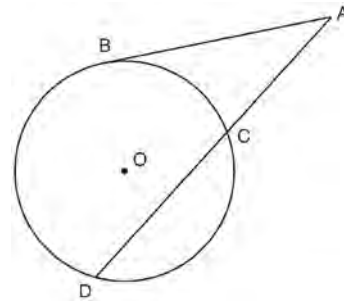
Prove the theorem: If a secant and a tangent are drawn to a circle from an external point, the product of the lengths of the secant segment and its external segment equals the length of the tangent segment squared. $(AC \cdot AD = AB^2)$

553 Given: Circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E
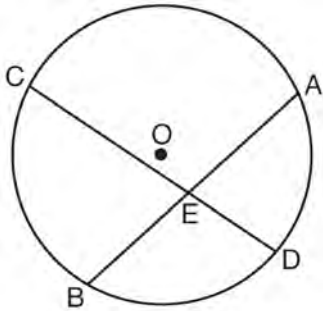
Theorem: If two chords intersect in a circle, the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the other chord. Prove this theorem by proving $AE \cdot EB = CE \cdot ED$.

554 In the diagram below of circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overline{ADE}$, and chord $\overline{AB}$ is drawn.
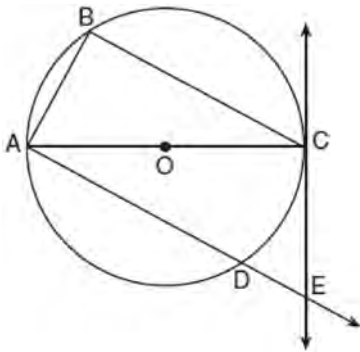
Prove: $\dfrac{BC}{CA} = \dfrac{AB}{EC}$

G.SRT.A.3: SIMILARITY PROOFS

555 In the diagram below, $\overline{AB} \parallel \overline{DFC}$, $\overline{EDA} \parallel \overline{CBG}$, and $\overline{EFB}$ and $\overline{AG}$ are drawn.
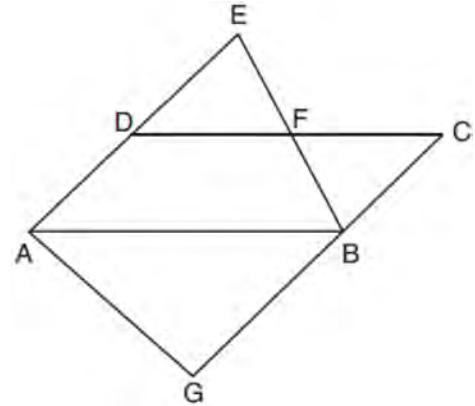
Which statement is always true?
1) $\triangle DEF \cong \triangle CBF$
2) $\triangle BAG \cong \triangle BAE$
3) $\triangle BAG \sim \triangle AEB$
4) $\triangle DEF \sim \triangle AEB$

556 In the diagram below, $\angle GRS \cong \angle ART$, $GR = 36$, $SR = 45$, $AR = 15$, and $RT = 18$.
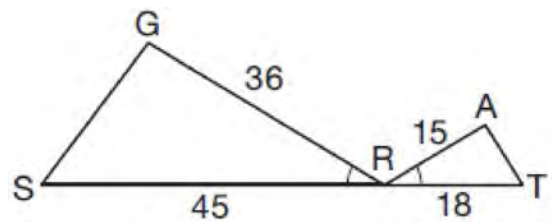
Which triangle similarity statement is correct?
1) $\triangle GRS \sim \triangle ART$ by AA.
2) $\triangle GRS \sim \triangle ART$ by SAS.
3) $\triangle GRS \sim \triangle ART$ by SSS.
4) $\triangle GRS$ is not similar to $\triangle ART$.

133

557 Given: Parallelogram *ABCD*, $\overline{EFG}$, and diagonal $\overline{DFB}$
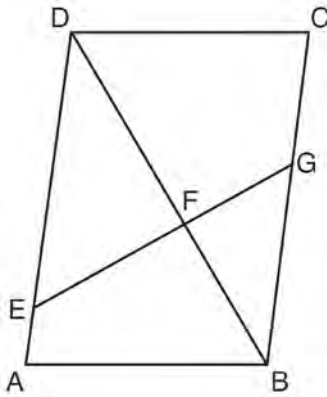
Prove: $\triangle DEF \sim \triangle BGF$

558 In the diagram below, $\triangle A'B'C'$ is the image of $\triangle ABC$ after a transformation.
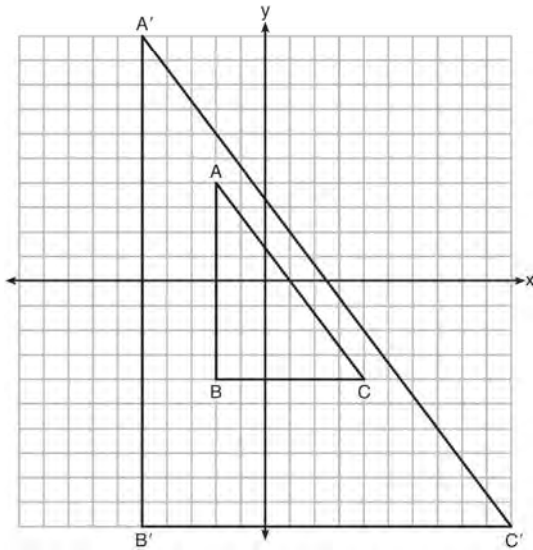
Describe the transformation that was performed. Explain why $\triangle A'B'C' \sim \triangle ABC$.

559 In the diagram below, $\overline{GI}$ is parallel to $\overline{NT}$, and $\overline{IN}$ intersects $\overline{GT}$ at *A*.
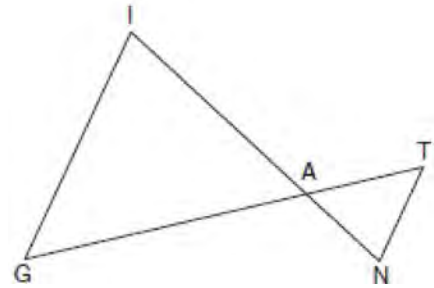
Prove: $\triangle GIA \sim \triangle TNA$

G.C.A.1: SIMILARITY PROOFS

560 As shown in the diagram below, circle *A* has a radius of 3 and circle *B* has a radius of 5.
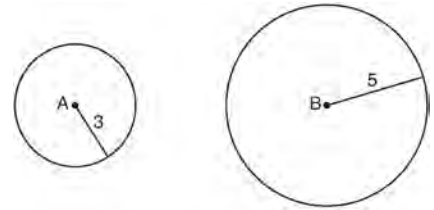
Use transformations to explain why circles *A* and *B* are similar.

Geometry Regents Exam Questions by State Standard: Topic
Answer Section

  1 ANS: 4   PTS: 2   REF: 061501geo   NAT: G.GMD.B.4
      TOP: Rotations of Two-Dimensional Objects
  2 ANS: 4   PTS: 2   REF: 081503geo   NAT: G.GMD.B.4
      TOP: Rotations of Two-Dimensional Objects
  3 ANS: 3   PTS: 2   REF: 061601geo   NAT: G.GMD.B.4
      TOP: Rotations of Two-Dimensional Objects
  4 ANS: 1

$$V = \frac{1}{3}\,\pi(4)^2(6) = 32\pi$$

      PTS: 2   REF: 061718geo   NAT: G.GMD.B.4   TOP: Rotations of Two-Dimensional Objects
  5 ANS: 3

$$v = \pi r^2 h \quad (1)\ 6^2 \cdot 10 = 360$$

$$150\pi = \pi r^2 h \quad (2)\ 10^2 \cdot 6 = 600$$

$$150 = r^2 h \quad (3)\ 5^2 \cdot 6 = 150$$

$$(4)\ 3^2 \cdot 10 = 900$$

      PTS: 2   REF: 081713geo   NAT: G.GMD.B.4   TOP: Rotations of Two-Dimensional Objects
  6 ANS: 4   PTS: 2   REF: 011810geo   NAT: G.GMD.B.4
      TOP: Rotations of Two-Dimensional Objects
  7 ANS: 3   PTS: 2   REF: 061816geo   NAT: G.GMD.B.4
      TOP: Rotations of Two-Dimensional Objects
  8 ANS: 1   PTS: 2   REF: 081603geo   NAT: G.GMD.B.4
      TOP: Rotations of Two-Dimensional Objects
  9 ANS: 2   PTS: 2   REF: 061903geo   NAT: G.GMD.B.4
      TOP: Rotations of Two-Dimensional Objects
10 ANS: 4   PTS: 2   REF: 081803geo   NAT: G.GMD.B.4
      TOP: Rotations of Two-Dimensional Objects
11 ANS: 3   PTS: 2   REF: 011911geo   NAT: G.GMD.B.4
      TOP: Rotations of Two-Dimensional Objects
12 ANS: 4   PTS: 2   REF: 081911geo   NAT: G.GMD.B.4
      TOP: Rotations of Two-Dimensional Objects
13 ANS: 2   PTS: 2   REF: 061506geo   NAT: G.GMD.B.4
      TOP: Cross-Sections of Three-Dimensional Objects
14 ANS: 2   PTS: 2   REF: 011805geo   NAT: G.GMD.B.4
      TOP: Cross-Sections of Three-Dimensional Objects
15 ANS: 1   PTS: 2   REF: 011601geo   NAT: G.GMD.B.4
      TOP: Cross-Sections of Three-Dimensional Objects
16 ANS: 2   PTS: 2   REF: 081701geo   NAT: G.GMD.B.4
      TOP: Cross-Sections of Three-Dimensional Objects
17 ANS: 3   PTS: 2   REF: 081613geo   NAT: G.GMD.B.4
      TOP: Cross-Sections of Three-Dimensional Objects

18 ANS: 4   PTS: 2   REF: 011723geo   NAT: G.GMD.B.4
   TOP: Cross-Sections of Three-Dimensional Objects
19 ANS: 3   PTS: 2   REF: 081805geo   NAT: G.GMD.B.4
   TOP: Cross-Sections of Three-Dimensional Objects
20 ANS: 4   PTS: 2   REF: 012019geo   NAT: G.GMD.B.4
   TOP: Cross-Sections of Three-Dimensional Objects
21 ANS:
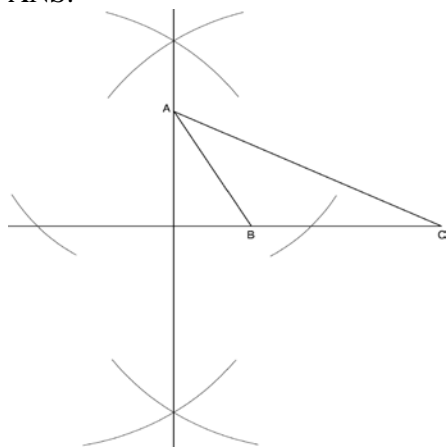
   PTS: 2   REF: fall1409geo   NAT: G.CO.D.12   TOP: Constructions
   KEY: parallel and perpendicular lines
22 ANS:

   $SAS \cong SAS$
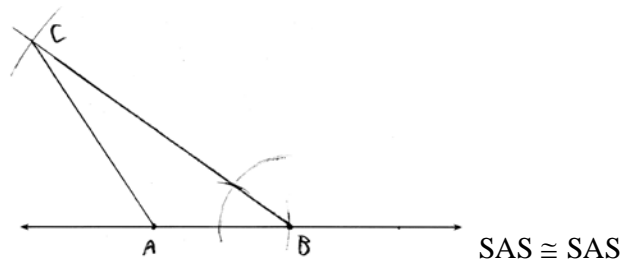
   PTS: 4   REF: 011634geo   NAT: G.CO.D.12   TOP: Constructions
   KEY: congruent and similar figures

23 ANS:
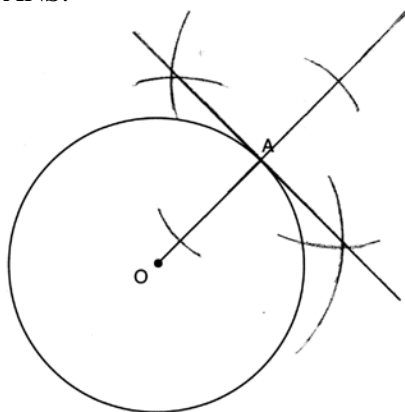
PTS: 2   REF: 061631geo   NAT: G.CO.D.12   TOP: Constructions
KEY: parallel and perpendicular lines

24 ANS:
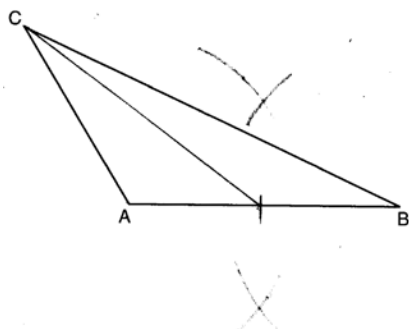
PTS: 2   REF: 081628geo   NAT: G.CO.D.12   TOP: Constructions
KEY: line bisector

25 ANS:
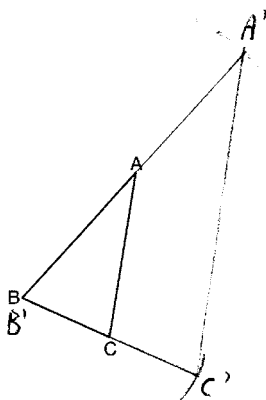
The length of $\overline{A'C'}$ is twice $\overline{AC}$.

PTS: 4   REF: 081632geo   NAT: G.CO.D.12   TOP: Constructions
KEY: congruent and similar figures

26 ANS:

30° △*CAD* is an equilateral triangle, so ∠*CAB* = 60°. Since $\overrightarrow{AD}$ is an angle bisector, ∠*CAD* = 30°.

PTS: 2   REF: 081929geo   NAT: G.CO.D.12   TOP: Constructions
KEY: equilateral triangles

27 ANS:
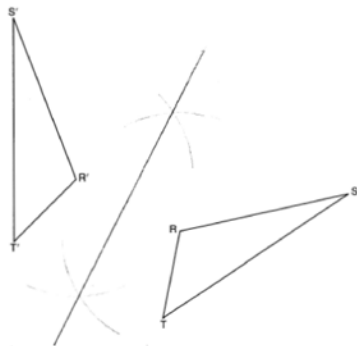
PTS: 2   REF: 011725geo   NAT: G.CO.D.12   TOP: Constructions
KEY: line bisector

28 ANS:
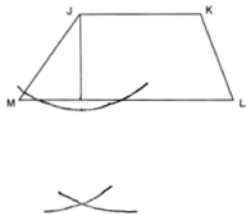
PTS: 2   REF: 061725geo   NAT: G.CO.D.12   TOP: Constructions
KEY: parallel and perpendicular lines

29 ANS:
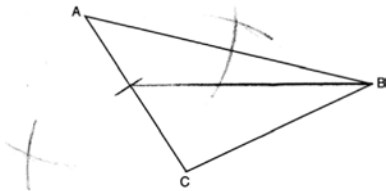
PTS: 2   REF: 061829geo   NAT: G.CO.D.12   TOP: Constructions
KEY: line bisector

30 ANS:
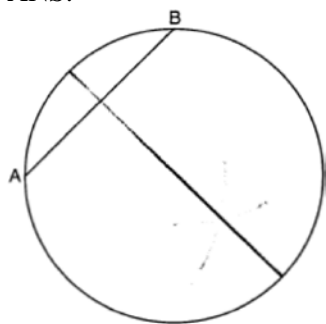
PTS: 2   REF: 081825geo   NAT: G.CO.D.12   TOP: Constructions
KEY: parallel and perpendicular lines

31 ANS:
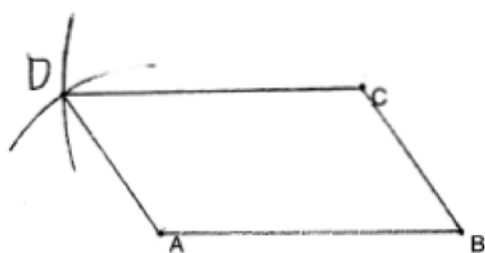
PTS: 2   REF: 011929geo   NAT: G.CO.D.12   TOP: Constructions
KEY: equilateral triangles

32 ANS:
Yes, because a dilation preserves angle measure.

PTS: 4   REF: 081932geo   NAT: G.CO.D.12   TOP: Constructions
KEY: congruent and similar figures

33 ANS:
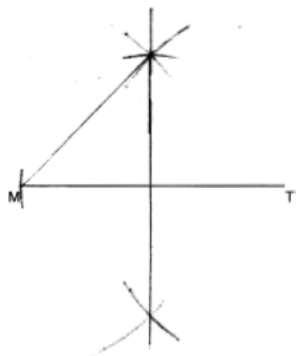
PTS: 2   REF: 012029geo   NAT: G.CO.D.12   TOP: Constructions
KEY: parallel and perpendicular lines

34 ANS:
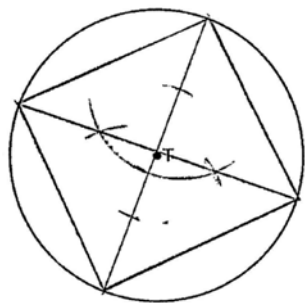
PTS: 2 REF: 061525geo NAT: G.CO.D.13 TOP: Constructions

35 ANS:
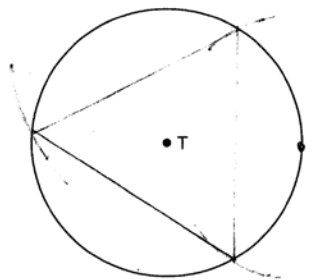
PTS: 2 REF: 081526geo NAT: G.CO.D.13 TOP: Constructions

36 ANS:
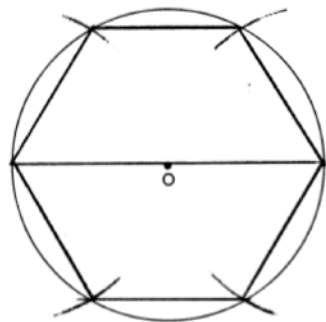
PTS: 2 REF: 081728geo NAT: G.CO.D.13 TOP: Constructions

37 ANS:
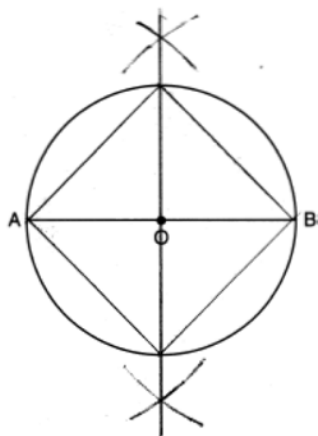
PTS: 2   REF: 011826geo   NAT: G.CO.D.13   TOP: Constructions

38 ANS:
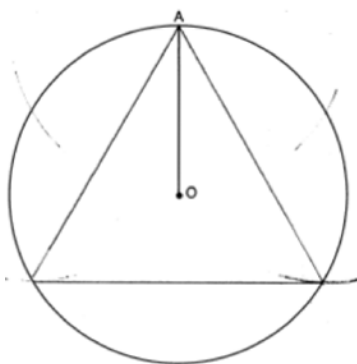
PTS: 2   REF: 061931geo   NAT: G.CO.D.13   TOP: Constructions

39 ANS:
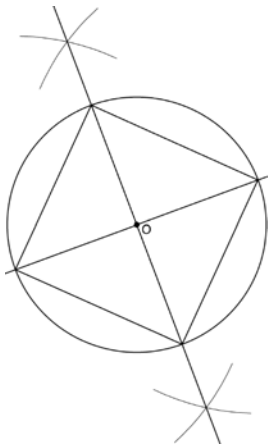
Since the square is inscribed, each vertex of the square is on the circle and the diagonals of the square are diameters of the circle. Therefore, each angle of the square is an inscribed angle in the circle that intercepts the circle at the endpoints of the diameters. Each angle of the square, which is an inscribed angle, measures 90 degrees. Therefore, the measure of the arc intercepted by two adjacent sides of the square is 180 degrees because it is twice the measure of its inscribed angle.

PTS: 4   REF: fall1412geo   NAT: G.CO.D.13   TOP: Constructions

40 ANS:
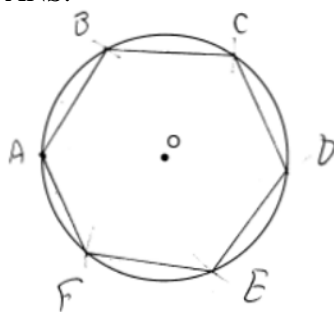
Right triangle because $\angle CBF$ is inscribed in a semi-circle.

PTS: 4   REF: 011733geo   NAT: G.CO.D.13   TOP: Constructions

41 ANS: 4

$$x = -6 + \frac{1}{6}(6 - -6) = -6 + 2 = -4 \quad y = -2 + \frac{1}{6}(7 - -2) = -2 + \frac{9}{6} = -\frac{1}{2}$$

PTS: 2   REF: 081618geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

42 ANS: 4

$$-5 + \frac{3}{5}(5 - -5) \quad -4 + \frac{3}{5}(1 - -4)$$

$$-5 + \frac{3}{5}(10) \quad\quad -4 + \frac{3}{5}(5)$$

$$-5 + 6 \quad\quad\quad -4 + 3$$

$$1 \quad\quad\quad\quad -1$$

PTS: 2   REF: spr1401geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

43 ANS: 1

$$3 + \frac{2}{5}(8 - 3) = 3 + \frac{2}{5}(5) = 3 + 2 = 5 \quad 5 + \frac{2}{5}(-5 - 5) = 5 + \frac{2}{5}(-10) = 5 - 4 = 1$$

PTS: 2   REF: 011720geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

44 ANS: 2

$$-4 + \frac{2}{5}(6 - -4) = -4 + \frac{2}{5}(10) = -4 + 4 = 0 \quad 5 + \frac{2}{5}(20 - 5) = 5 + \frac{2}{5}(15) = 5 + 6 = 11$$

PTS: 2   REF: 061715geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

45 ANS: 1

$$-8 + \frac{3}{8}(16 - -8) = -8 + \frac{3}{8}(24) = -8 + 9 = 1 \quad -2 + \frac{3}{8}(6 - -2) = -2 + \frac{3}{8}(8) = -2 + 3 = 1$$

PTS: 2   REF: 081717geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

46 ANS: 2

$$-4 + \frac{2}{5}(1 - -4) = -4 + \frac{2}{5}(5) = -4 + 2 = -2 \quad -2 + \frac{2}{5}(8 - -2) = -2 + \frac{2}{5}(10) = -2 + 4 = 2$$

PTS: 2   REF: 061814geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

47 ANS: 1

$-8 + \dfrac{3}{5}(7--8) = -8 + 9 = 1 \quad 7 + \dfrac{3}{5}(-13-7) = 7 - 12 = -5$

PTS: 2 REF: 081815geo NAT: G.GPE.B.6 TOP: Directed Line Segments

48 ANS: 1

$-1 + \dfrac{1}{3}(8--1) = -1 + \dfrac{1}{3}(9) = -1 + 3 = 2 \quad -3 + \dfrac{1}{3}(9--3) = -3 + \dfrac{1}{3}(12) = -3 + 4 = 1$

PTS: 2 REF: 011915geo NAT: G.GPE.B.6 TOP: Directed Line Segments

49 ANS: 4

$-8 + \dfrac{2}{3}(10--8) = -8 + \dfrac{2}{3}(18) = -8 + 12 = 4 \quad 4 + \dfrac{2}{3}(-2-4) = 4 + \dfrac{2}{3}(-6) = 4 - 4 = 0$

PTS: 2 REF: 061919geo NAT: G.GPE.B.6 TOP: Directed Line Segments

50 ANS: 3

$-9 + \dfrac{1}{3}(9--9) = -9 + \dfrac{1}{3}(18) = -9 + 6 = -3 \quad 8 + \dfrac{1}{3}(-4-8) = 8 + \dfrac{1}{3}(-12) = 8 - 4 = 4$

PTS: 2 REF: 081903geo NAT: G.GPE.B.6 TOP: Directed Line Segments

51 ANS: 4

$-7 + \dfrac{1}{4}(5--7) = -7 + \dfrac{1}{4}(12) = -7 + 3 = -4 \quad -5 + \dfrac{1}{4}(3--5) = -5 + \dfrac{1}{4}(8) = -5 + 2 = -3$

PTS: 2 REF: 012005geo NAT: G.GPE.B.6 TOP: Directed Line Segments

52 ANS: 1

$x = -5 + \dfrac{1}{3}(4--5) = -5 + 3 = -2 \quad y = 2 + \dfrac{1}{3}(-10-2) = 2 - 4 = -2$

PTS: 2 REF: 011806geo NAT: G.GPE.B.6 TOP: Directed Line Segments

53 ANS:
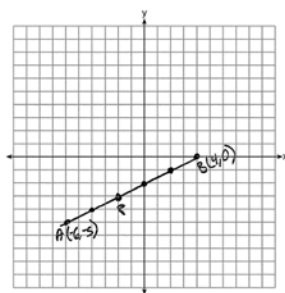
$-6 + \dfrac{2}{5}(4--6) \quad -5 + \dfrac{2}{5}(0--5) \quad (-2,-3)$

$-6 + \dfrac{2}{5}(10) \qquad -5 + \dfrac{2}{5}(5)$

$-6 + 4 \qquad\qquad -5 + 2$

$-2 \qquad\qquad\quad -3$

PTS: 2 REF: 061527geo NAT: G.GPE.B.6 TOP: Directed Line Segments

54 ANS:
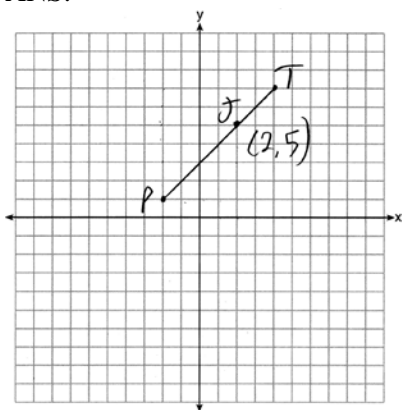
$x = \frac{2}{3}(4 - -2) = 4$ $-2 + 4 = 2$ $J(2,5)$

$y = \frac{2}{3}(7 - 1) = 4$ $1 + 4 = 5$

PTS: 2   REF: 011627geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

55 ANS:

$4 + \frac{4}{9}(22 - 4)$ $2 + \frac{4}{9}(2 - 2)$ $(12,2)$

$4 + \frac{4}{9}(18)$ $2 + \frac{4}{9}(0)$

$4 + 8$ $2 + 0$

12   2

PTS: 2   REF: 061626geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

56 ANS:

$\frac{2}{5} \cdot (16 - 1) = 6$ $\frac{2}{5} \cdot (14 - 4) = 4$ $(1 + 6, 4 + 4) = (7,8)$

PTS: 2   REF: 081531geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

57 ANS: 1
Alternate interior angles

PTS: 2   REF: 061517geo   NAT: G.CO.C.9   TOP: Lines and Angles
58 ANS: 1   PTS: 2   REF: 011606geo   NAT: G.CO.C.9
TOP: Lines and Angles
59 ANS: 2   PTS: 2   REF: 081601geo   NAT: G.CO.C.9
TOP: Lines and Angles
60 ANS: 3   PTS: 2   REF: 061802geo   NAT: G.CO.C.9
TOP: Lines and Angles

61 ANS: 1

$$\frac{f}{4} = \frac{15}{6}$$

$f = 10$

PTS: 2   REF: 061617geo   NAT: G.CO.C.9   TOP: Lines and Angles

62 ANS: 2
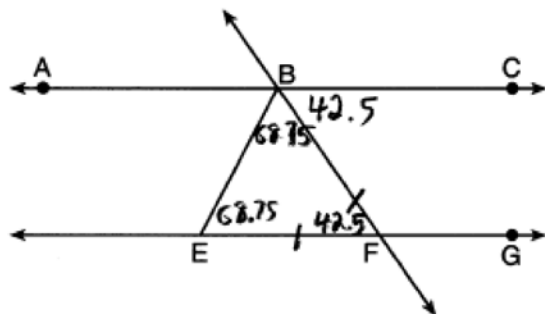
PTS: 2   REF: 011818geo   NAT: G.CO.C.9   TOP: Lines and Angles

63 ANS: 4   PTS: 2   REF: 081801geo   NAT: G.CO.C.9

TOP: Lines and Angles

64 ANS: 3

$180 - (48 + 66) = 180 - 114 = 66$

PTS: 2   REF: 012001geo   NAT: G.CO.C.9   TOP: Lines and Angles

65 ANS: 4   PTS: 2   REF: 081611geo   NAT: G.CO.C.9

TOP: Lines and Angles

66 ANS:

Since linear angles are supplementary, m$\angle GIH = 65°$. Since $\overline{GH} \cong \overline{IH}$, m$\angle GHI = 50°$ $(180 - (65 + 65))$. Since $\angle EGB \cong \angle GHI$, the corresponding angles formed by the transversal and lines are congruent and $\overline{AB} \parallel \overline{CD}$.

PTS: 4   REF: 061532geo   NAT: G.CO.C.9   TOP: Lines and Angles

67 ANS: 1

$m = -\dfrac{2}{3}$ $1 = \left(-\dfrac{2}{3}\right)6 + b$

$1 = -4 + b$

$5 = b$

PTS: 2   REF: 081510geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines

KEY: write equation of parallel line

68 ANS: 4

The segment's midpoint is the origin and slope is −2. The slope of a perpendicular line is $\frac{1}{2}$. $y = \frac{1}{2}x + 0$

$$2y = x$$

$$2y - x = 0$$

PTS: 2   REF: 081724geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: perpendicular bisector

69 ANS: 1

$$m = \frac{-A}{B} = \frac{-2}{-1} = 2$$

$$m_{\perp} = -\frac{1}{2}$$

PTS: 2   REF: 061509geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: identify perpendicular lines

70 ANS: 1

$$m = \frac{-A}{B} = \frac{-3}{2} \quad m_{\perp} = \frac{2}{3}$$

PTS: 2   REF: 081908geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: identify perpendicular lines

71 ANS: 1

The slope of $3x + 2y = 12$ is $-\frac{3}{2}$, which is the opposite reciprocal of $\frac{2}{3}$.

PTS: 2   REF: 081811geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: identify perpendicular lines

72 ANS: 4

$$m = -\frac{1}{2} \quad -4 = 2(6) + b$$

$$m_{\perp} = 2 \quad \begin{array}{l} -4 = 12 + b \\ -16 = b \end{array}$$

PTS: 2   REF: 011602geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

73 ANS: 1

$$m = \left(\frac{-11 + 5}{2}, \frac{5 + -7}{2} \right) = (-3, -1) \quad m = \frac{5 - -7}{-11 - 5} = \frac{12}{-16} = -\frac{3}{4} \quad m_{\perp} = \frac{4}{3}$$

PTS: 2   REF: 061612geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: perpendicular bisector

74 ANS: 3

$$y = mx + b$$

$$2 = \frac{1}{2}(-2) + b$$

$$3 = b$$

PTS: 2   REF: 011701geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: write equation of parallel line

75 ANS: 2

$$m = \frac{3}{2} \qquad 1 = -\frac{2}{3}(-6) + b$$

$$m_{\perp} = -\frac{2}{3} \qquad \begin{aligned} 1 &= 4 + b \\ -3 &= b \end{aligned}$$

PTS: 2   REF: 061719geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

76 ANS: 1

$$m = \frac{-4}{-6} = \frac{2}{3}$$

$$m_{\perp} = -\frac{3}{2}$$

PTS: 2   REF: 011820geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

77 ANS: 2

$$m = \frac{3}{2}$$

$$m_{\perp} = -\frac{2}{3}$$

PTS: 2   REF: 061812geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

78 ANS: 2

$$m = \frac{-(-2)}{3} = \frac{2}{3}$$

PTS: 2   REF: 061916geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: write equation of parallel line

79 ANS:

$3y + 7 = 2x$ $y - 6 = \frac{2}{3}(x - 2)$

$3y = 2x - 7$

$y = \frac{2}{3}x - \frac{7}{3}$

PTS: 2   REF: 011925geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: write equation of parallel line

80 ANS:

$m = \frac{5}{4}; m_{\perp} = -\frac{4}{5}$ $y - 12 = -\frac{4}{5}(x - 5)$

PTS: 2   REF: 012031geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

81 ANS: 2

$6 + 6\sqrt{3} + 6 + 6\sqrt{3} \approx 32.8$

PTS: 2   REF: 011709geo   NAT: G.SRT.C.8   TOP: 30-60-90 Triangles

82 ANS: 3

$\sqrt{20^2 - 10^2} \approx 17.3$

PTS: 2   REF: 081608geo   NAT: G.SRT.C.8   TOP: 30-60-90 Triangles

83 ANS: 4

$\frac{2}{6} = \frac{5}{15}$

PTS: 2   REF: 081517geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

84 ANS: 3

$\frac{9}{5} = \frac{9.2}{x}$ $5.1 + 9.2 = 14.3$

$9x = 46$

$x \approx 5.1$

PTS: 2   REF: 061511geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

85 ANS: 2

$\frac{12}{4} = \frac{36}{x}$

$12x = 144$

$x = 12$

PTS: 2   REF: 061621geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

86 ANS: 4

$$\frac{2}{4} = \frac{9-x}{x}$$

$36 - 4x = 2x$

$x = 6$

PTS: 2   REF: 061705geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

87 ANS: 4

$$\frac{1}{3.5} = \frac{x}{18-x}$$

$3.5x = 18 - x$

$4.5x = 18$

$x = 4$

PTS: 2   REF: 081707geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

88 ANS: 3

$$\frac{24}{40} = \frac{15}{x}$$

$24x = 600$

$x = 25$

PTS: 2   REF: 011813geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

89 ANS: 4

$$\frac{5}{7} = \frac{x}{x+5} \quad 12\frac{1}{2} + 5 = 17\frac{1}{2}$$

$5x + 25 = 7x$

$2x = 25$

$x = 12\frac{1}{2}$

PTS: 2   REF: 061821geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

90 ANS: 2

$$\frac{x}{x+3} = \frac{14}{21} \qquad 14 - 6 = 8$$

$21x = 14x + 42$

$7x = 42$

$x = 6$

PTS: 2   REF: 081812geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

91 ANS: 3

$$\frac{x}{6.3} = \frac{3}{5} \quad \frac{y}{9.4} = \frac{6.3}{6.3 + 3.78}$$

$$x = 3.78 \qquad y \approx 5.9$$

PTS: 2   REF: 081816geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

92 ANS: 2

$$\frac{x}{15} = \frac{5}{12}$$

$$x = 6.25$$

PTS: 2   REF: 011906geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

93 ANS: 1

$$5x = 12 \cdot 7 \quad 16.8 + 7 = 23.8$$

$$5x = 84$$

$$x = 16.8$$

PTS: 2   REF: 061911geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

94 ANS: 4

$$\frac{2}{4} = \frac{8}{x+2} \quad 14 + 2 = 16$$

$$2x + 4 = 32$$

$$x = 14$$

PTS: 2   REF: 012024geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

95 ANS:

$$\frac{3.75}{5} = \frac{4.5}{6} \qquad \overline{AB} \text{ is parallel to } \overline{CD} \text{ because } \overline{AB} \text{ divides the sides proportionately.}$$

$$39.375 = 39.375$$

PTS: 2   REF: 061627geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

96 ANS: 2
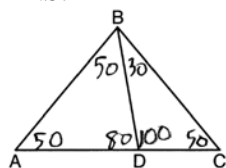
PTS: 2   REF: 081604geo   NAT: G.CO.C.10   TOP: Interior and Exterior Angles of Triangles

97 ANS: 2

$\angle B = 180 - (82 + 26) = 72; \ \angle DEC = 180 - 26 = 154; \ \angle EDB = 360 - (154 + 26 + 72) = 108; \ \angle BDF = \frac{108}{2} = 54;$

$\angle DFB = 180 - (54 + 72) = 54$

PTS: 2   REF: 061710geo   NAT: G.CO.C.10   TOP: Interior and Exterior Angles of Triangles

98   ANS: 4
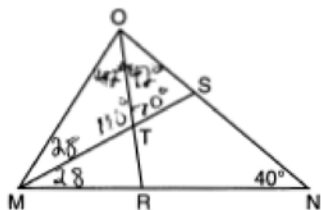
PTS: 2   REF: 061717geo   NAT: G.CO.C.10   TOP: Interior and Exterior Angles of Triangles

99   ANS: 4   PTS: 2   REF: 011916geo   NAT: G.CO.C.10
TOP: Exterior Angle Theorem

100 ANS: 4
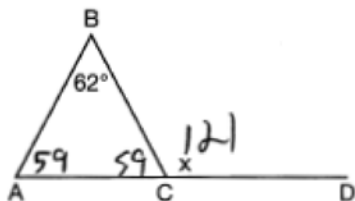
PTS: 2   REF: 081711geo   NAT: G.CO.C.10   TOP: Exterior Angle Theorem

101 ANS: 3

$6x - 40 + x + 20 = 180 - 3x$ $\mathrm{m}\angle BAC = 180 - (80 + 40) = 60$

$$10x = 200$$

$$x = 20$$

PTS: 2   REF: 011809geo   NAT: G.CO.C.10   TOP: Exterior Angle Theorem

102 ANS: 3
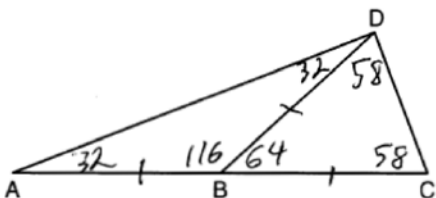
PTS: 2   REF: 081905geo   NAT: G.CO.C.10   TOP: Exterior Angle Theorem

103 ANS: 3

$\angle N$ is the smallest angle in $\triangle NYA$, so side $\overline{AY}$ is the shortest side of $\triangle NYA$. $\angle VYA$ is the smallest angle in $\triangle VYA$, so side $\overline{VA}$ is the shortest side of both triangles.

PTS: 2   REF: 011919geo   NAT: G.CO.C.10   TOP: Angle Side Relationship

104 ANS: 2   PTS: 2   REF: 012012geo   NAT: G.CO.C.10
TOP: Medians, Altitudes and Bisectors

105 ANS: 4   PTS: 2   REF: 081822geo   NAT: G.CO.C.10
TOP: Medians, Altitudes and Bisectors

106 ANS:

$\triangle MNO$ is congruent to $\triangle PNO$ by SAS. Since $\triangle MNO \cong \triangle PNO$, then $\overline{MO} \cong \overline{PO}$ by CPCTC. So $\overline{NO}$ must divide $\overline{MP}$ in half, and $MO = 8$.

PTS: 2   REF: fall1405geo   NAT: G.CO.C.10   TOP: Medians, Altitudes and Bisectors

107 ANS: 4   PTS: 2   REF: 011704geo   NAT: G.CO.C.10
TOP: Midsegments

108 ANS: 4   PTS: 2   REF: 081716geo   NAT: G.CO.C.10
TOP: Midsegments

109 ANS: 3

$2(2x+8) = 7x-2$ $AB = 7(6)-2 = 40$. Since $\overline{EF}$ is a midsegment, $EF = \dfrac{40}{2} = 20$. Since $\triangle ABC$ is equilateral,

$4x+16 = 7x-2$

$18 = 3x$

$6 = x$

$AE = BF = \dfrac{40}{2} = 20$. $40 + 20 + 20 + 20 = 100$

PTS: 2   REF: 061923geo   NAT: G.CO.C.10   TOP: Midsegments

110 ANS: 3

$\dfrac{1}{2} \times 24 = 12$

PTS: 2   REF: 012009geo   NAT: G.CO.C.10   TOP: Midsegments

111 ANS: 1   PTS: 2   REF: 081904geo   NAT: G.CO.C.10
TOP: Centroid, Orthocenter, Incenter and Circumcenter

112 ANS: 1

M is a centroid, and cuts each median 2:1.

PTS: 2   REF: 061818geo   NAT: G.CO.C.10
TOP: Centroid, Orthocenter, Incenter and Circumcenter

113 ANS:
$180 - 2(25) = 130$

PTS: 2   REF: 011730geo   NAT: G.CO.C.10
TOP: Centroid, Orthocenter, Incenter and Circumcenter

114 ANS:
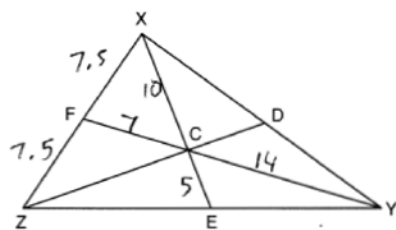
$7.5 + 7 + 10 = 24.5$

PTS: 2   REF: 012030geo   NAT: G.CO.C.10
TOP: Centroid, Orthocenter, Incenter and Circumcenter

115 ANS: 4

The slope of $\overline{BC}$ is $\frac{2}{5}$. Altitude is perpendicular, so its slope is $-\frac{5}{2}$.

PTS: 2　　　　REF: 061614geo　　NAT: G.GPE.B.4　　TOP: Triangles in the Coordinate Plane

116 ANS: 4　　　　PTS: 2　　　　REF: 011921geo　　NAT: G.GPE.B.4
TOP: Triangles in the Coordinate Plane

117 ANS: 1

$m_{\overline{RT}} = \frac{5--3}{4--2} = \frac{8}{6} = \frac{4}{3}$　$m_{\overline{ST}} = \frac{5-2}{4-8} = \frac{3}{-4} = -\frac{3}{4}$　Slopes are opposite reciprocals, so lines form a right angle.

PTS: 2　　　　REF: 011618geo　　NAT: G.GPE.B.4　　TOP: Triangles in the Coordinate Plane

118 ANS:

The slopes of perpendicular line are opposite reciprocals. Since the lines are perpendicular, they form right angles
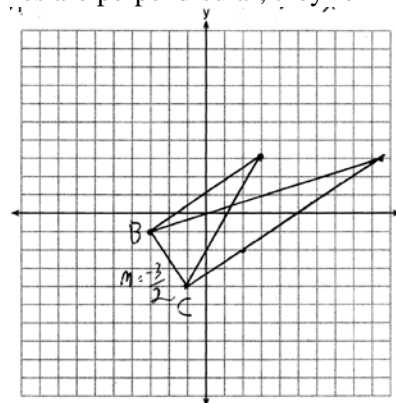
and a right triangle. $m_{\overline{BC}} = -\frac{3}{2}$　$-1 = \frac{2}{3}(-3) + b$　or　$-4 = \frac{2}{3}(-1) + b$

$m_{\perp} = \frac{2}{3}$　$-1 = -2 + b$　　$\frac{-12}{3} = \frac{-2}{3} + b$

$1 = b$

$3 = \frac{2}{3}x + 1$　　$-\frac{10}{3} = b$

$2 = \frac{2}{3}x$　　$3 = \frac{2}{3}x - \frac{10}{3}$

$3 = x$　　$9 = 2x - 10$

$19 = 2x$

$9.5 = x$

PTS: 4　　　　REF: 081533geo　　NAT: G.GPE.B.4　　TOP: Triangles in the Coordinate Plane

119 ANS:
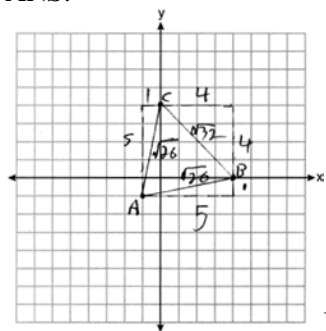
Because $\overline{AB} \cong \overline{AC}$, $\triangle ABC$ has two congruent sides and is isosceles. Because $\overline{AB} \cong \overline{BC}$ is not true, $\triangle ABC$ has sides that are not congruent and $\triangle ABC$ is not equilateral.

PTS: 4   REF: 061832geo   NAT: G.GPE.B.4   TOP: Triangles in the Coordinate Plane

120 ANS:
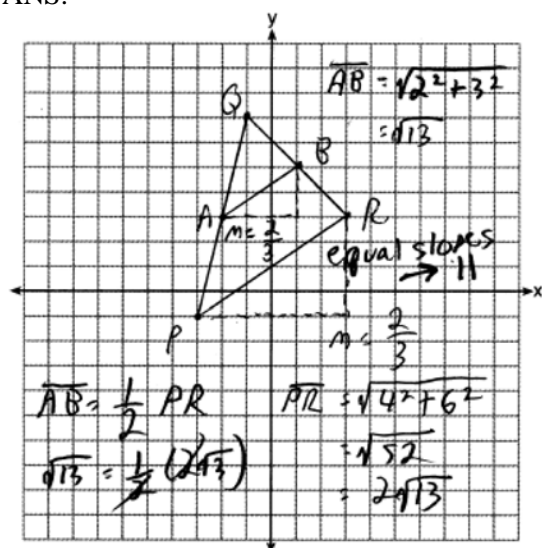
PTS: 4   REF: 081732geo   NAT: G.GPE.B.4   TOP: Triangles in the Coordinate Plane

121 ANS:

No. The midpoint of $\overline{DF}$ is $\left(\dfrac{1+4}{2}, \dfrac{-1+2}{2} \right) = (2.5, 0.5)$. A median from point E must pass through the midpoint.

PTS: 2   REF: 011930geo   NAT: G.GPE.B.4   TOP: Triangles in the Coordinate Plane

122 ANS:
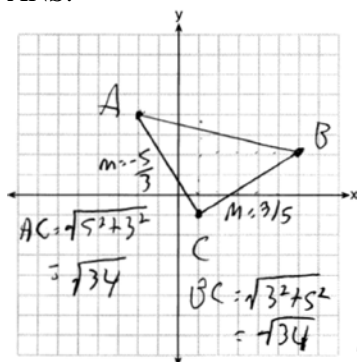
Triangle with vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$ (given); $m_{\overline{AC}} = -\dfrac{5}{3}$, $m_{\overline{BC}} = \dfrac{3}{5}$,

definition of slope; Because the slopes of the legs of the triangle are opposite reciprocals, the legs are perpendicular (definition of perpendicular); $\angle C$ is a right angle (definition of right angle); $\triangle ABC$ is a right triangle (if a triangle has a right angle, it is a right triangle); $\overline{AC} \cong \overline{BC} = \sqrt{34}$ (distance formula); $\triangle ABC$ is an isosceles triangle (an isosceles triangle has two congruent sides).

PTS: 4   REF: 011932geo   NAT: G.GPE.B.4   TOP: Triangles in the Coordinate Plane

123 ANS: 3
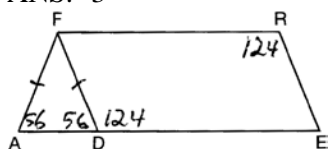
PTS: 2   REF: 081508geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

124 ANS: 3
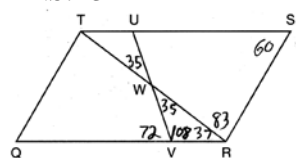
PTS: 2   REF: 011603geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

125 ANS: 1
$180 - (68 \cdot 2)$

PTS: 2   REF: 081624geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

126 ANS: 4
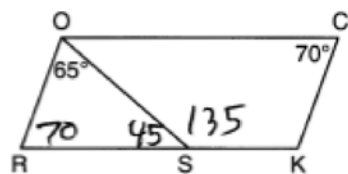
PTS: 2   REF: 081708geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

127 ANS: 2
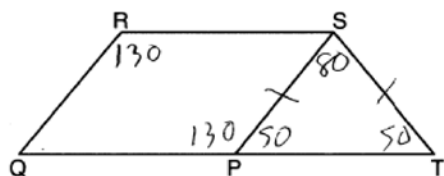
PTS: 2   REF: 061921geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

128 ANS: 2
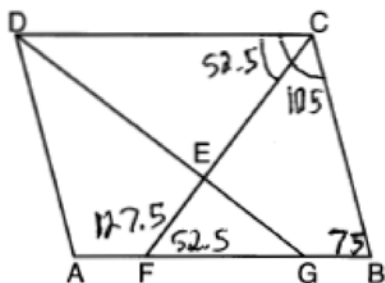
PTS: 2   REF: 081907geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

129 ANS:
Opposite angles in a parallelogram are congruent, so m∠O = 118°. The interior angles of a triangle equal 180°.
$180 - (118 + 22) = 40$.

PTS: 2   REF: 061526geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

130 ANS:

20°
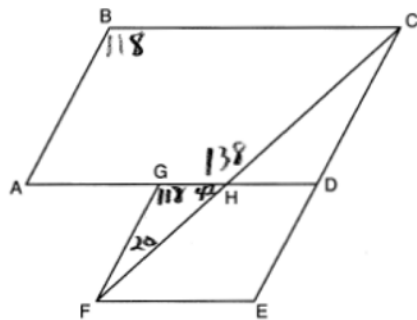
PTS: 2   REF: 011926geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

131 ANS:
∠D = 46° because the angles of a triangle equal 180°. ∠B = 46° because opposite angles of a parallelogram are congruent.

PTS: 2   REF: 081925geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

132 ANS: 2   PTS: 2   REF: 011802geo   NAT: G.CO.C.11
TOP: Parallelograms

133 ANS: 3
(3) Could be a trapezoid.

PTS: 2   REF: 081607geo   NAT: G.CO.C.11   TOP: Parallelograms

134 ANS: 2   PTS: 2   REF: 061720geo   NAT: G.CO.C.11
     TOP: Parallelograms
135 ANS: 4   PTS: 2   REF: 061513geo   NAT: G.CO.C.11
     TOP: Parallelograms
136 ANS: 4   PTS: 2   REF: 081813geo   NAT: G.CO.C.11
     TOP: Parallelograms
137 ANS: 2   PTS: 2   REF: 011912geo   NAT: G.CO.C.11
     TOP: Parallelograms
138 ANS: 3   PTS: 2   REF: 061912geo   NAT: G.CO.C.11
     TOP: Parallelograms
139 ANS:
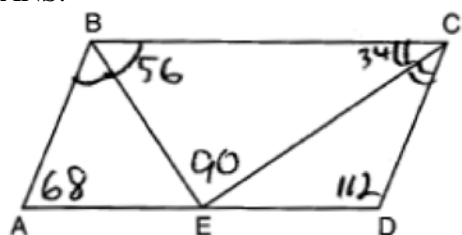
     PTS: 2   REF: 081826geo   NAT: G.CO.C.11   TOP: Parallelograms
140 ANS: 1

$$\frac{6.5}{10.5} = \frac{5.2}{x}$$

$$x = 8.4$$

     PTS: 2   REF: 012006geo   NAT: G.CO.C.11   TOP: Trapezoids
141 ANS: 4   PTS: 2   REF: 011705geo   NAT: G.CO.C.11
     TOP: Special Quadrilaterals
142 ANS: 4   PTS: 2   REF: 061813geo   NAT: G.CO.C.11
     TOP: Special Quadrilaterals
143 ANS: 2

$$ER = \sqrt{17^2 - 8^2} = 15$$

     PTS: 2   REF: 061917geo   NAT: G.CO.C.11   TOP: Special Quadrilaterals
144 ANS: 2   PTS: 2   REF: 081501geo   NAT: G.CO.C.11
     TOP: Special Quadrilaterals
145 ANS: 1
     1) opposite sides; 2) adjacent sides; 3) perpendicular diagonals; 4) diagonal bisects angle

     PTS: 2   REF: 061609geo   NAT: G.CO.C.11   TOP: Special Quadrilaterals
146 ANS: 1   PTS: 2   REF: 011716geo   NAT: G.CO.C.11
     TOP: Special Quadrilaterals
147 ANS: 3
     In (1) and (2), *ABCD* could be a rectangle with non-congruent sides. (4) is not possible

     PTS: 2   REF: 081714geo   NAT: G.CO.C.11   TOP: Special Quadrilaterals

148 ANS: 4   PTS: 2   REF: 011819geo NAT: G.CO.C.11
  TOP: Special Quadrilaterals
149 ANS: 3   PTS: 2   REF: 061924geo NAT: G.CO.C.11
  TOP: Special Quadrilaterals
150 ANS: 3   PTS: 2   REF: 081913geo NAT: G.CO.C.11
  TOP: Special Quadrilaterals
151 ANS: 1   PTS: 2   REF: 012004geo NAT: G.CO.C.11
  TOP: Special Quadrilaterals
152 ANS: 4   PTS: 2   REF: 061711geo NAT: G.CO.C.11
  TOP: Special Quadrilaterals
153 ANS: 2

$\sqrt{8^2 + 6^2} = 10$ for one side

  PTS: 2   REF: 011907geo NAT: G.CO.C.11 TOP: Special Quadrilaterals
154 ANS:
The four small triangles are 8-15-17 triangles. $4 \times 17 = 68$

  PTS: 2   REF: 081726geo NAT: G.CO.C.11 TOP: Special Quadrilaterals
155 ANS: 3

$\frac{7-1}{0-2} = \frac{6}{-2} = -3$ The diagonals of a rhombus are perpendicular.

  PTS: 2   REF: 011719geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
156 ANS: 4

$\frac{-2-1}{-1--3} = \frac{-3}{2}$ $\frac{3-2}{0-5} = \frac{1}{-5}$ $\frac{3-1}{0--3} = \frac{2}{3}$ $\frac{2--2}{5--1} = \frac{4}{6} = \frac{2}{3}$

  PTS: 2   REF: 081522geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
  KEY: general
157 ANS: 1

$m_{\overline{TA}} = -1$ $y = mx + b$

$m_{\overline{EM}} = 1$ $1 = 1(2) + b$

    $-1 = b$

  PTS: 2   REF: 081614geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
  KEY: general
158 ANS: 3

$M_x = \frac{-5+-1}{2} = -\frac{6}{2} = -3$ $M_y = \frac{5+-1}{2} = \frac{4}{2} = 2$

  PTS: 2   REF: 081902geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
  KEY: general

159 ANS:

$M\left(\dfrac{4+0}{2}, \dfrac{6-1}{2}\right) = M\left(2, \dfrac{5}{2}\right)$ $m = \dfrac{6--1}{4-0} = \dfrac{7}{4}$ $m_\perp = -\dfrac{4}{7}$ $y - 2.5 = -\dfrac{4}{7}(x-2)$ The diagonals, $\overline{MT}$ and $\overline{AH}$, of rhombus *MATH* are perpendicular bisectors of each other.

PTS: 4   REF: fall1411geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

160 ANS:

$m_{\overline{TS}} = \dfrac{-10}{6} = -\dfrac{5}{3}$ $m_{\overline{SR}} = \dfrac{3}{5}$ Since the slopes of $\overline{TS}$ and $\overline{SR}$ are opposite reciprocals, they are perpendicular and form a right angle. $\triangle RST$ is a right triangle because $\angle S$ is a right angle. $P(0,9)$ $m_{\overline{RP}} = \dfrac{-10}{6} = -\dfrac{5}{3}$ $m_{\overline{PT}} = \dfrac{3}{5}$

Since the slopes of all four adjacent sides ($\overline{TS}$ and $\overline{SR}$, $\overline{SR}$ and $\overline{RP}$, $\overline{PT}$ and $\overline{TS}$, $\overline{RP}$ and $\overline{PT}$) are opposite reciprocals, they are perpendicular and form right angles. Quadrilateral *RSTP* is a rectangle because it has four right angles.
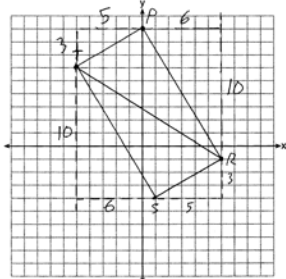
PTS: 6   REF: 061536geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

161 ANS:
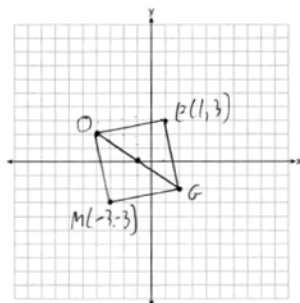
PTS: 2   REF: 011731geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

162 ANS:

$\overline{PQ}$ $\sqrt{(8-3)^2 + (3--2)^2} = \sqrt{50}$ $\overline{QR}$ $\sqrt{(1-8)^2 + (4-3)^2} = \sqrt{50}$ $\overline{RS}$ $\sqrt{(-4-1)^2 + (-1-4)^2} = \sqrt{50}$

$\overline{PS}$ $\sqrt{(-4-3)^2 + (-1--2)^2} = \sqrt{50}$ *PQRS* is a rhombus because all sides are congruent. $m\overline{PQ} = \dfrac{8-3}{3--2} = \dfrac{5}{5} = 1$

$m\overline{QR} = \dfrac{1-8}{4-3} = -7$ Because the slopes of adjacent sides are not opposite reciprocals, they are not perpendicular
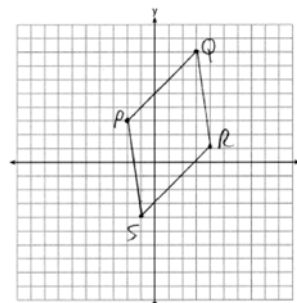
and do not form a right angle. Therefore *PQRS* is not a square.

PTS: 6   REF: 061735geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

163 ANS:

$\triangle PAT$ is an isosceles triangle because sides $\overline{AP}$ and $\overline{AT}$ are congruent ($\sqrt{3^2 + 11^2} = \sqrt{7^2 + 9^2} = \sqrt{130}$).
$R(2,9)$. Quadrilateral *PART* is a parallelogram because the opposite sides are parallel since they have equal slopes
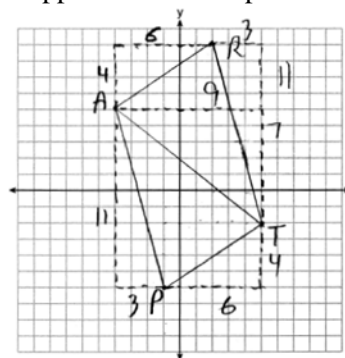
$(m\overline{AR} = \dfrac{4}{6} = \dfrac{2}{3};\ m\overline{PT} = \dfrac{4}{6} = \dfrac{2}{3};\ m\overline{PA} = -\dfrac{11}{3};\ m\overline{RT} = -\dfrac{11}{3})$

PTS: 6   REF: 011835geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

164 ANS:
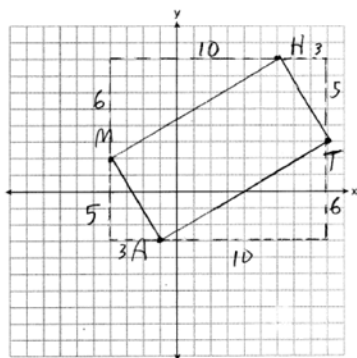
$$m_{\overline{MH}} = \frac{6}{10} = \frac{3}{5}, m_{\overline{AT}} = \frac{6}{10} = \frac{3}{5}, m_{\overline{MA}} = -\frac{5}{3}, m_{\overline{HT}} = -\frac{5}{3}; \ \overline{MH} \parallel \overline{AT} \text{ and } \overline{MA} \parallel \overline{HT}.$$

MATH is a parallelogram since both sides of opposite sides are parallel. $m_{\overline{MA}} = -\frac{5}{3}, m_{\overline{AT}} = \frac{3}{5}.$ Since the slopes

are negative reciprocals, $\overline{MA} \perp \overline{AT}$ and $\angle A$ is a right angle. *MATH* is a rectangle because it is a parallelogram with a right angle.

PTS: 6   REF: 081835geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

165 ANS:
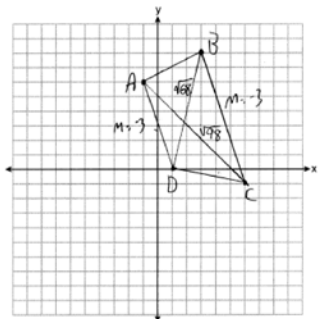
$$m_{\overline{AD}} = \frac{0-6}{1--1} = -3 \ \overline{AD} \parallel \overline{BC} \text{ because their slopes are equal. } ABCD \text{ is a trapezoid}$$

$$m_{\overline{BC}} = \frac{-1-8}{6-3} = -3$$

because it has a pair of parallel sides. $AC = \sqrt{(-1-6)^2 + (6--1)^2} = \sqrt{98}$ *ABCD* is not an isosceles trapezoid

$$BD = \sqrt{(8-0)^2 + (3-1)^2} = \sqrt{68}$$

because its diagonals are not congruent.

PTS: 4   REF: 061932geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

27

166 ANS:

$AB = \sqrt{(-5-1)^2 + (3-2)^2} = \sqrt{37}$, $BC = \sqrt{(-5--6)^2 + (3--3)^2} = \sqrt{37}$ (because $AB = BC$, $\triangle ABC$ is isosceles). $(0,-4)$. $AD = \sqrt{(1-0)^2 + (2--4)^2} = \sqrt{37}$, $CD = \sqrt{(-6-0)^2 + (-3--4)^2} = \sqrt{37}$,

$m\overline{AB} = \dfrac{3-2}{-5-1} = -\dfrac{1}{6}$, $m\overline{CB} = \dfrac{3--3}{-5--6} = 6$ ($ABCD$ is a square because all four sides are congruent, consecutive sides
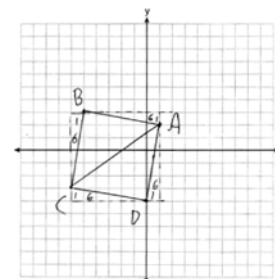
are perpendicular since slopes are opposite reciprocals and so $\angle B$ is a right angle).

PTS: 6　　　REF: 081935geo　　NAT: G.GPE.B.4　　TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

167 ANS:
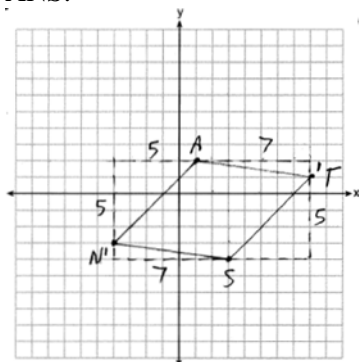
$$\overline{AN} \cong \overline{AT} \cong \overline{TS} \cong \overline{SN}$$ 　　Quadrilateral *NATS* is a rhombus

$$\sqrt{5^2 + 5^2} = \sqrt{7^2 + 1^2} = \sqrt{5^2 + 5^2} = \sqrt{7^2 + 1^2}$$
$$\sqrt{50} = \sqrt{50} = \sqrt{50} = \sqrt{50}$$

because all four sides are congruent.

PTS: 4　　　REF: 012032geo　　NAT: G.GPE.B.4　　TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

168 ANS: 3
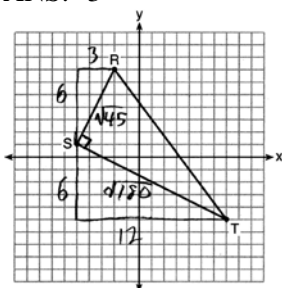
$$\sqrt{45} = 3\sqrt{5} \quad a = \frac{1}{2}\left(3\sqrt{5}\right)\left(6\sqrt{5}\right) = \frac{1}{2}(18)(5) = 45$$

$$\sqrt{180} = 6\sqrt{5}$$

PTS: 2   REF: 061622geo   NAT: G.GPE.B.7   TOP: Polygons in the Coordinate Plane

169 ANS: 3   PTS: 2   REF: 061702geo   NAT: G.GPE.B.7
TOP: Polygons in the Coordinate Plane

170 ANS: 1
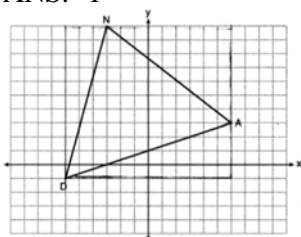
$$(12 \cdot 11) - \left(\frac{1}{2}(12 \cdot 4) + \frac{1}{2}(7 \cdot 9) + \frac{1}{2}(11 \cdot 3)\right) = 60$$

PTS: 2   REF: 061815geo   NAT: G.GPE.B.7   TOP: Polygons in the Coordinate Plane

171 ANS: 2

Create two congruent triangles by drawing $\overline{BD}$, which has a length of 8. Each triangle has an area of $\frac{1}{2}(8)(3) = 12$.

PTS: 2   REF: 012018geo   NAT: G.GPE.B.7   TOP: Polygons in the Coordinate Plane

172 ANS: 3

$$A = \frac{1}{2}ab \quad 3 - 6 = -3 = x$$

$$24 = \frac{1}{2}a(8) \quad \frac{4 + 12}{2} = 8 = y$$

$$a = 6$$

PTS: 2   REF: 081615geo   NAT: G.GPE.B.7   TOP: Polygons in the Coordinate Plane

173 ANS: 2

$$\sqrt{(-1 - 2)^2 + (4 - 3)^2} = \sqrt{10}$$

PTS: 2   REF: 011615geo   NAT: G.GPE.B.7   TOP: Polygons in the Coordinate Plane

174 ANS: 3

$$4\sqrt{(-1--3)^2 + (5-1)^2} = 4\sqrt{20}$$

PTS: 2   REF: 081703geo   NAT: G.GPE.B.7   TOP: Polygons in the Coordinate Plane

175 ANS: 4

$$4\sqrt{(-1-2)^2 + (2-3)^2} = 4\sqrt{10}$$

PTS: 2   REF: 081808geo   NAT: G.GPE.B.7   TOP: Polygons in the Coordinate Plane

176 ANS:
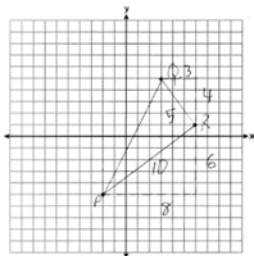
$$\frac{1}{2}(5)(10) = 25$$

PTS: 2   REF: 061926geo   NAT: G.GPE.B.7   TOP: Polygons in the Coordinate Plane

177 ANS:
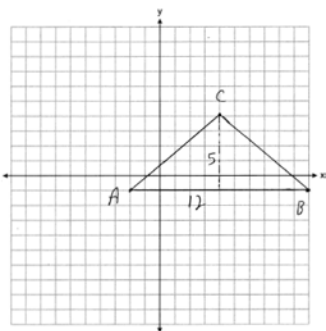
$$\frac{1}{2}(5)(12) = 30$$

PTS: 2   REF: 081928geo   NAT: G.GPE.B.7   TOP: Polygons in the Coordinate Plane

178 ANS: 1   PTS: 2   REF: 061508geo   NAT: G.C.A.2
TOP: Chords, Secants and Tangents   KEY: inscribed

179 ANS: 1   PTS: 2   REF: 061520geo   NAT: G.C.A.2
TOP: Chords, Secants and Tangents   KEY: mixed

180 ANS: 2   PTS: 2   REF: 061610geo   NAT: G.C.A.2
TOP: Chords, Secants and Tangents   KEY: inscribed

181 ANS: 1

The other statements are true only if $\overline{AD} \perp \overline{BC}$.

PTS: 2   REF: 081623geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: inscribed

182 ANS: 4   PTS: 2   REF: 011816geo   NAT: G.C.A.2
TOP: Chords, Secants and Tangents   KEY: inscribed

183 ANS: 4   PTS: 2   REF: 011905geo   NAT: G.C.A.2
    TOP: Chords, Secants and Tangents   KEY: inscribed

184 ANS: 3
$8 \cdot 15 = 16 \cdot 7.5$

    PTS: 2   REF: 061913geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
    KEY: intersecting chords, length

185 ANS: 4   PTS: 2   REF: 081922geo   NAT: G.C.A.2
    TOP: Chords, Secants and Tangents   KEY: intersecting chords, length

186 ANS: 3
$5 \cdot \dfrac{10}{4} = \dfrac{50}{4} = 12.5$

    PTS: 2   REF: 081512geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
    KEY: common tangents

187 ANS: 3   PTS: 2   REF: 011621geo   NAT: G.C.A.2
    TOP: Chords, Secants and Tangents   KEY: inscribed

188 ANS: 4
$\dfrac{1}{2}(360 - 268) = 46$

    PTS: 2   REF: 061704geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
    KEY: inscribed

189 ANS: 3
$\dfrac{x + 72}{2} = 58$

$x + 72 = 116$

$x = 44$

    PTS: 2   REF: 061817geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
    KEY: intersecting chords, angle

190 ANS: 2
$6 \cdot 6 = x(x - 5)$

$36 = x^2 - 5x$

$0 = x^2 - 5x - 36$

$0 = (x - 9)(x + 4)$

$x = 9$

    PTS: 2   REF: 061708geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
    KEY: intersecting chords, length

191 ANS: 1

Parallel chords intercept congruent arcs. $\dfrac{180 - 130}{2} = 25$

PTS: 2   REF: 081704geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: parallel lines

192 ANS: 2

$x^2 = 3 \cdot 18$

$x = \sqrt{3 \cdot 3 \cdot 6}$

$x = 3\sqrt{6}$

PTS: 2   REF: 081712geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: secant and tangent drawn from common point, length

193 ANS: 2
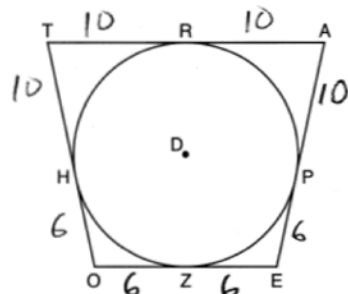
PTS: 2   REF: 081814geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: tangents drawn from common point, length

194 ANS: 2

$8(x + 8) = 6(x + 18)$

$8x + 64 = 6x + 108$

$2x = 44$

$x = 22$

PTS: 2   REF: 011715geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: secants drawn from common point, length

195 ANS: 1
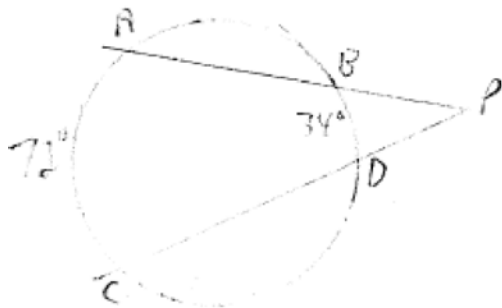
$$\frac{72 - 34}{2} = 19$$

PTS: 2   REF: 061918geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: secants drawn from common point, angle

196 ANS:
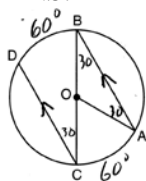
$180 - 2(30) = 120$

PTS: 2   REF: 011626geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: parallel lines

197 ANS:

$$\frac{3}{8} \cdot 56 = 21$$

PTS: 2   REF: 081625geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: common tangents

198 ANS:

$$\frac{152 - 56}{2} = 48$$

PTS: 2   REF: 011728geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: secant and tangent drawn from common point, angle

199 ANS:

$10 \cdot 6 = 15x$

$x = 4$

PTS: 2   REF: 061828geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: secants drawn from common point, length

200 ANS:

$$\frac{134 + 102}{2} = 118$$
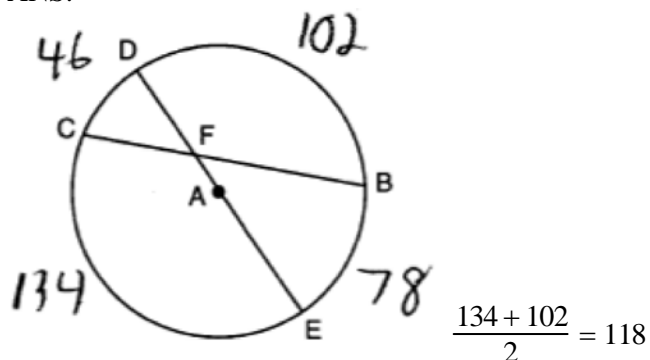
PTS: 2   REF: 081827geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: intersecting chords, angle

201 ANS:

$$\frac{121 - x}{2} = 35$$

$$121 - x = 70$$

$$x = 51$$

PTS: 2   REF: 011927geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: secants drawn from common point, angle

202 ANS:

$$\frac{124 - 56}{2} = 34$$

PTS: 2   REF: 081930geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: secant and tangent drawn from common point, angle

203 ANS:

$$x^2 = 8 \times 12.5$$

$$x = 10$$

PTS: 2   REF: 012028geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: secant and tangent drawn from common point, length

204 ANS: 4
Opposite angles of an inscribed quadrilateral are supplementary.

PTS: 2   REF: 011821geo   NAT: G.C.A.3   TOP: Inscribed Quadrilaterals

205 ANS: 3   PTS: 2   REF: 081515geo   NAT: G.C.A.3
TOP: Inscribed Quadrilaterals

206 ANS: 2

$s^2 + s^2 = 7^2$

$2s^2 = 49$

$s^2 = 24.5$

$s \approx 4.9$

PTS: 2   REF: 081511geo   NAT: G.C.A.3   TOP: Inscribed Quadrilaterals

207 ANS: 1
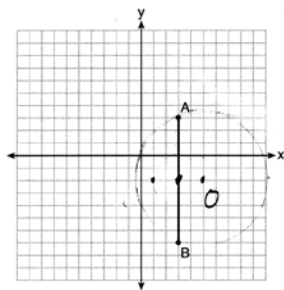
Since the midpoint of $\overline{AB}$ is $(3,-2)$, the center must be either $(5,-2)$ or $(1,-2)$.

$r = \sqrt{2^2 + 5^2} = \sqrt{29}$

PTS: 2   REF: 061623geo   NAT: G.GPE.A.1   TOP: Equations of Circles
KEY: other

208 ANS: 2

$$(x-5)^2 + (y-2)^2 = 16$$

$$x^2 - 10x + 25 + y^2 - 4y + 4 = 16$$

$$x^2 - 10x + y^2 - 4y = -13$$

PTS: 2   REF: 061820geo   NAT: G.GPE.A.1   TOP: Equations of Circles
KEY: write equation, given graph

209 ANS: 3

$$x^2 + 4x + 4 + y^2 - 6y + 9 = 12 + 4 + 9$$

$$(x+2)^2 + (y-3)^2 = 25$$

PTS: 2   REF: 081509geo   NAT: G.GPE.A.1   TOP: Equations of Circles
KEY: completing the square

210 ANS: 4

$$x^2 + 4x + 4 + y^2 - 8y + 16 = -16 + 4 + 16$$

$$(x+2)^2 + (y-4)^2 = 4$$

PTS: 2   REF: 081821geo   NAT: G.GPE.A.1   TOP: Equations of Circles
KEY: completing the square

211 ANS: 2

$x^2 + y^2 + 6y + 9 = 7 + 9$

$x^2 + (y + 3)^2 = 16$

PTS: 2 REF: 061514geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

212 ANS: 4

$x^2 + 6x + 9 + y^2 - 4y + 4 = 23 + 9 + 4$

$(x + 3)^2 + (y - 2)^2 = 36$

PTS: 2 REF: 011617geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

213 ANS: 1

$x^2 - 4x + 4 + y^2 + 8y + 16 = -11 + 4 + 16$

$(x - 2)^2 + (y + 4)^2 = 9$

PTS: 2 REF: 081616geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

214 ANS: 1

$x^2 + y^2 - 6y + 9 = -1 + 9$

$x^2 + (y - 3)^2 = 8$

PTS: 2 REF: 011718geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

215 ANS: 1

$x^2 + y^2 - 12y + 36 = -20 + 36$

$x^2 + (y - 6)^2 = 16$

PTS: 2 REF: 061712geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

216 ANS: 2

$x^2 + y^2 - 6x + 2y = 6$

$x^2 - 6x + 9 + y^2 + 2y + 1 = 6 + 9 + 1$

$(x - 3)^2 + (y + 1)^2 = 16$

PTS: 2 REF: 011812geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

217 ANS: 1

$$(x-1)^2 + (y-4)^2 = \left(\frac{10}{2}\right)^2$$

$$x^2 - 2x + 1 + y^2 - 8y + 16 = 25$$

$$x^2 - 2x + y^2 - 8y = 8$$

PTS: 2   REF: 011920geo   NAT: G.GPE.A.1   TOP: Equations of Circles
KEY: write equation, given center and radius

218 ANS: 4

$$x^2 + 8x + 16 + y^2 - 12y + 36 = 144 + 16 + 36$$

$$(x+4)^2 + (y-6)^2 = 196$$

PTS: 2   REF: 061920geo   NAT: G.GPE.A.1   TOP: Equations of Circles
KEY: completing the square

219 ANS: 4

$$x^2 - 8x + y^2 + 6y = 39$$

$$x^2 - 8x + 16 + y^2 + 6y + 9 = 39 + 16 + 9$$

$$(x-4)^2 + (y+3)^2 = 64$$

PTS: 2   REF: 081906geo   NAT: G.GPE.A.1   TOP: Equations of Circles
KEY: completing the square

220 ANS: 2
The line $x = -2$ will be tangent to the circle at $(-2,-4)$. A segment connecting this point and $(2,-4)$ is a radius of the circle with length 4.

PTS: 2   REF: 012020geo   NAT: G.GPE.A.1   TOP: Equations of Circles
KEY: other

221 ANS: 2   PTS: 2   REF: 061603geo   NAT: G.GPE.A.1
TOP: Equations of Circles   KEY: find center and radius | completing the square

222 ANS:

$$x^2 - 6x + 9 + y^2 + 8y + 16 = 56 + 9 + 16 \quad (3,-4); r = 9$$

$$(x-3)^2 + (y+4)^2 = 81$$

PTS: 2   REF: 081731geo   NAT: G.GPE.A.1   TOP: Equations of Circles
KEY: completing the square

223 ANS: 3

$$\sqrt{(-5)^2 + 12^2} = \sqrt{169} \quad \sqrt{11^2 + (2\sqrt{12})^2} = \sqrt{121 + 48} = \sqrt{169}$$

PTS: 2   REF: 011722geo   NAT: G.GPE.B.4   TOP: Circles in the Coordinate Plane

224 ANS: 3

$r = \sqrt{(7-3)^2 + (1--2)^2} = \sqrt{16+9} = 5$

PTS: 2 REF: 061503geo NAT: G.GPE.B.4 TOP: Circles in the Coordinate Plane

225 ANS:

Yes. $(x-1)^2 + (y+2)^2 = 4^2$

$(3.4-1)^2 + (1.2+2)^2 = 16$

$5.76 + 10.24 = 16$

$16 = 16$

PTS: 2 REF: 081630geo NAT: G.GPE.B.4 TOP: Circles in the Coordinate Plane

226 ANS: 1

$\frac{64}{4} = 16$ $\quad 16^2 = 256$ $\quad 2w + 2(w+2) = 64$ $\quad 15 \times 17 = 255$ $\quad 2w + 2(w+4) = 64$ $\quad 14 \times 18 = 252$ $\quad 2w + 2(w+6) = 64$

$w = 15$ $\qquad w = 14$ $\qquad w = 13$

$13 \times 19 = 247$

PTS: 2 REF: 011708geo NAT: G.MG.A.3 TOP: Area of Polygons

227 ANS:

$x^2 + x^2 = 58^2$ $\qquad A = (\sqrt{1682} + 8)^2 \approx 2402.2$

$2x^2 = 3364$

$x = \sqrt{1682}$

PTS: 4 REF: 081734geo NAT: G.MG.A.3 TOP: Area of Polygons

228 ANS: 2

$SA = 6 \cdot 12^2 = 864$

$\frac{864}{450} = 1.92$

PTS: 2 REF: 061519geo NAT: G.MG.A.3 TOP: Surface Area

229 ANS: 2

x is $\frac{1}{2}$ the circumference. $\frac{C}{2} = \frac{10\pi}{2} \approx 16$

PTS: 2 REF: 061523geo NAT: G.GMD.A.1 TOP: Circumference

230 ANS: 1

$\frac{1000}{20\pi} \approx 15.9$

PTS: 2 REF: 011623geo NAT: G.GMD.A.1 TOP: Circumference

231 ANS: 4

$(8 \times 2) + (3 \times 2) - \left(\dfrac{18}{12} \times \dfrac{21}{12} \right) \approx 19$

PTS: 2　　　　REF: 081917geo　　NAT: G.MG.A.3　　TOP: Compositions of Polygons and Circles
KEY: area

232 ANS: 1　　　　PTS: 2　　　　REF: 011918geo　　NAT: G.MG.A.3
TOP: Compositions of Polygons and Circles　　　　KEY: area

233 ANS:

$2 \times (90 \times 10) + (\pi)(30^2) - (\pi)(20^2) \approx 3371$

PTS: 2　　　　REF: 011931geo　　NAT: G.MG.A.3　　TOP: Compositions of Polygons and Circles
KEY: area

234 ANS: 3

$\theta = \dfrac{s}{r} = \dfrac{2\pi}{10} = \dfrac{\pi}{5}$

PTS: 2　　　　REF: fall1404geo　　NAT: G.C.B.5　　TOP: Arc Length
KEY: angle

235 ANS: 4

$C = 12\pi \quad \dfrac{120}{360}(12\pi) = \dfrac{1}{3}(12\pi)$

PTS: 2　　　　REF: 061822geo　　NAT: G.C.B.5　　TOP: Arc Length
KEY: arc length

236 ANS: 3

$\dfrac{s_L}{s_S} = \dfrac{6\theta}{4\theta} = 1.5$

PTS: 2　　　　REF: 011824geo　　NAT: G.C.B.5　　TOP: Arc Length
KEY: arc length

237 ANS:

$s = \theta \cdot r \qquad s = \theta \cdot r \qquad$ Yes, both angles are equal.

$\pi = A \cdot 4 \quad \dfrac{13\pi}{8} = B \cdot 6.5$

$\dfrac{\pi}{4} = A$

$\qquad \dfrac{\pi}{4} = B$

PTS: 2　　　　REF: 061629geo　　NAT: G.C.B.5　　TOP: Arc Length
KEY: arc length

Geometry Regents Exam Questions by State Standard: Topic
Answer Section

238 ANS: 3

$$\frac{60}{360} \cdot 6^2 \pi = 6\pi$$

PTS: 2   REF: 081518geo   NAT: G.C.B.5   TOP: Sectors

239 ANS: 3

$$\frac{x}{360} \cdot 3^2 \pi = 2\pi \quad 180 - 80 = 100$$
$$x = 80 \quad \frac{180 - 100}{2} = 40$$

PTS: 2   REF: 011612geo   NAT: G.C.B.5   TOP: Sectors

240 ANS: 4

$$\frac{300}{360} \cdot 8^2 \pi = \frac{160\pi}{3}$$

PTS: 2   REF: 011721geo   NAT: G.C.B.5   TOP: Sectors

241 ANS: 2

$$\frac{30}{360} (5)^2 (\pi) \approx 6.5$$

PTS: 2   REF: 081818geo   NAT: G.C.B.5   TOP: Sectors

242 ANS: 4

$$\left(\frac{360 - 120}{360} \right)(\pi)\left(9^2 \right) = 54\pi$$

PTS: 2   REF: 081912geo   NAT: G.C.B.5   TOP: Sectors

243 ANS: 3

$$\frac{150}{360} \cdot 9^2 \pi = 33.75\pi$$

PTS: 2   REF: 012013geo   NAT: G.C.B.5   TOP: Sectors

244 ANS: 2   PTS: 2   REF: 081619geo   NAT: G.C.B.5
TOP: Sectors

245 ANS: 3

$$\frac{60}{360} \cdot 8^2 \pi = \frac{1}{6} \cdot 64\pi = \frac{32\pi}{3}$$

PTS: 2   REF: 061624geo   NAT: G.C.B.5   TOP: Sectors

246 ANS: 2

$$\frac{\dfrac{512\pi}{3}}{\left(\dfrac{32}{2}\right)^2 \pi} \cdot 2\pi = \frac{4\pi}{3}$$

PTS: 2   REF: 081723geo   NAT: G.C.B.5   TOP: Sectors

247 ANS: 2

$$\frac{x}{360}(15)^2 \pi = 75\pi$$
$$x = 120$$

PTS: 2   REF: 011914geo   NAT: G.C.B.5   TOP: Sectors

248 ANS:

$$\frac{\left(\dfrac{180-20}{2}\right)}{360} \times \pi(6)^2 = \frac{80}{360} \times 36\pi = 8\pi$$

PTS: 4   REF: spr1410geo   NAT: G.C.B.5   TOP: Sectors

249 ANS:

$$A = 6^2\pi = 36\pi \quad 36\pi \cdot \frac{x}{360} = 12\pi$$
$$x = 360 \cdot \frac{12}{36}$$
$$x = 120$$

PTS: 2   REF: 061529geo   NAT: G.C.B.5   TOP: Sectors

250 ANS:

$$\frac{40}{360} \cdot \pi(4.5)^2 = 2.25\pi$$

PTS: 2   REF: 061726geo   NAT: G.C.B.5   TOP: Sectors

251 ANS:

$$\frac{Q}{360}(\pi)\left(25^2\right) = (\pi)\left(25^2\right) - 500\pi$$
$$Q = \frac{125\pi(360)}{625\pi}$$
$$Q = 72$$

PTS: 2   REF: 011828geo   NAT: G.C.B.5   TOP: Sectors

252 ANS:

$$\frac{72}{360}(\pi)\left(10^2\right) = 20\pi$$

PTS: 2   REF: 061928geo   NAT: G.C.B.5   TOP: Sectors

253 ANS:

Each triangular prism has the same base area. Therefore, each corresponding cross-section of the prisms will have the same area. Since the two prisms have the same height of 14, the two volumes must be the same.

PTS: 2   REF: 061727geo   NAT: G.GMD.A.1   TOP: Volume

254 ANS:

Each quarter in both stacks has the same base area. Therefore, each corresponding cross-section of the stacks will have the same area. Since the two stacks of quarters have the same height of 23 quarters, the two volumes must be the same.

PTS: 2   REF: spr1405geo   NAT: G.GMD.A.1   TOP: Volume

255 ANS:

Yes. The bases of the cylinders have the same area and the cylinders have the same height.

PTS: 2   REF: 081725geo   NAT: G.GMD.A.1   TOP: Volume

256 ANS: 2

$$V = \frac{1}{3} \cdot 6^2 \cdot 12 = 144$$

PTS: 2   REF: 011607geo   NAT: G.GMD.A.3   TOP: Volume
KEY: pyramids

257 ANS: 2

$$4 \times 4 \times 6 - \pi(1)^2(6) \approx 77$$

PTS: 2   REF: 011711geo   NAT: G.GMD.A.3   TOP: Volume
KEY: compositions

258 ANS: 1

$$84 = \frac{1}{3} \cdot s^2 \cdot 7$$

$$6 = s$$

PTS: 2   REF: 061716geo   NAT: G.GMD.A.3   TOP: Volume
KEY: pyramids

259 ANS: 1

$$h = \sqrt{6.5^2 - 2.5^2} = 6, V = \frac{1}{3} \pi(2.5)^2 6 = 12.5\pi$$

PTS: 2   REF: 011923geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cones

260 ANS: 3

$$2.5 \times 1.25 \times (27 \times 12) + \frac{1}{2} \pi (1.25)^2 (27 \times 12) \approx 1808$$

PTS: 2　　　REF: 061723geo　　NAT: G.GMD.A.3　TOP: Volume
KEY: compositions

261 ANS: 1

$$20 \cdot 12 \cdot 45 + \frac{1}{2} \pi (10)^2 (45) \approx 17869$$

PTS: 2　　　REF: 061807geo　　NAT: G.GMD.A.3　TOP: Volume
KEY: compositions

262 ANS: 2

$$8 \times 8 \times 9 + \frac{1}{3} (8 \times 8 \times 3) = 640$$

PTS: 2　　　REF: 011909geo　　NAT: G.GMD.A.3　TOP: Volume
KEY: compositions

263 ANS: 4

$$2592276 = \frac{1}{3} \cdot s^2 \cdot 146.5$$

$$230 \approx s$$

PTS: 2　　　REF: 081521geo　　NAT: G.GMD.A.3　TOP: Volume
KEY: pyramids

264 ANS: 2

$$14 \times 16 \times 10 = 2240 \quad \frac{2240 - 1680}{2240} = 0.25$$

PTS: 2　　　REF: 011604geo　　NAT: G.GMD.A.3　TOP: Volume
KEY: prisms

265 ANS: 3

$$\frac{\frac{4}{3} \pi \left(\frac{9.5}{2} \right)^3}{\frac{4}{3} \pi \left(\frac{2.5}{2} \right)^3} \approx 55$$

PTS: 2　　　REF: 011614geo　　NAT: G.GMD.A.3　TOP: Volume
KEY: spheres

266 ANS: 4　　　PTS: 2　　　REF: 061606geo　　NAT: G.GMD.A.3
TOP: Volume　　KEY: compositions

267 ANS: 4

$$V = \pi \left(\frac{6.7}{2} \right)^2 (4 \cdot 6.7) \approx 945$$

PTS: 2   REF: 081620geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cylinders

268 ANS: 2

$$108\pi = \frac{6^2 \pi h}{3}$$

$$\frac{324\pi}{36\pi} = h$$

$$9 = h$$

PTS: 2   REF: 012002geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cones

269 ANS: 1

$$82.8 = \frac{1}{3} (4.6)(9)h$$

$$h = 6$$

PTS: 2   REF: 061810geo   NAT: G.GMD.A.3   TOP: Volume
KEY: pyramids

270 ANS: 1

$$V = \frac{1}{3} \pi \left(\frac{1.5}{2} \right)^2 \left(\frac{4}{2} \right) \approx 1.2$$

PTS: 2   REF: 011724geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cones

271 ANS: 3

$$V = \frac{1}{3} \pi r^2 h$$

$$54.45\pi = \frac{1}{3} \pi (3.3)^2 h$$

$$h = 15$$

PTS: 2   REF: 011807geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cones

272 ANS: 2

$$V = \frac{1}{3} \left(\frac{36}{4} \right)^2 \cdot 15 = 405$$

PTS: 2   REF: 011822geo   NAT: G.GMD.A.3   TOP: Volume
KEY: pyramids

273 ANS: 2

$$V = \frac{1}{3} \left(\frac{60}{12} \right)^2 \left(\frac{84}{12} \right) \approx 58$$

PTS: 2   REF: 081819geo   NAT: G.GMD.A.3   TOP: Volume
KEY: pyramids

274 ANS: 2

$$V = \frac{1}{3} (8)^2 \cdot 6 = 128$$

PTS: 2   REF: 061906geo   NAT: G.GMD.A.3   TOP: Volume
KEY: pyramids

275 ANS: 1

$$V = \frac{1}{2} \times \frac{4}{3} \pi r^3 = \frac{1}{2} \times \frac{4}{3} \pi \cdot \left(\frac{12.6}{2} \right)^3 \approx 523.7$$

PTS: 2   REF: 061910geo   NAT: G.GMD.A.3   TOP: Volume
KEY: spheres

276 ANS: 3

$$\sqrt{40^2 - \left(\frac{64}{2} \right)^2} = 24 \quad V = \frac{1}{3} (64)^2 \cdot 24 = 32768$$

PTS: 2   REF: 081921geo   NAT: G.GMD.A.3   TOP: Volume
KEY: pyramids

277 ANS: 1

$$\frac{\frac{1}{3} \pi (2)^2 \left(\frac{1}{2} \right)}{\frac{1}{3} \pi (1)^2 (1)} = 2$$

PTS: 2   REF: 012010geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cones

278 ANS:

Similar triangles are required to model and solve a proportion. $\frac{x+5}{1.5} = \frac{x}{1}$ $\frac{1}{3} \pi (1.5)^2 (15) - \frac{1}{3} \pi (1)^2 (10) \approx 24.9$

$$x + 5 = 1.5x$$
$$5 = .5x$$
$$10 = x$$
$$10 + 5 = 15$$

PTS: 6   REF: 061636geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cones

279 ANS:

$$\tan 16.5 = \frac{x}{13.5} \qquad 9 \times 16 \times 4.5 = 648 \quad 3752 - (35 \times 16 \times .5) = 3472$$

$$x \approx 4 \qquad 13.5 \times 16 \times 4.5 = 972 \quad 3472 \times 7.48 \approx 25971$$

$$4 + 4.5 = 8.5 \quad \frac{1}{2} \times 13.5 \times 16 \times 4 = 432 \quad \frac{25971}{10.5} \approx 2473.4$$

$$12.5 \times 16 \times 8.5 = \underline{1700} \quad \frac{2473.4}{60} \approx 41$$

$$3752$$

PTS: 6   REF: 081736geo   NAT: G.GMD.A.3   TOP: Volume
KEY: compositions

280 ANS:

$$C = 2\pi r \quad V = \frac{1}{3}\pi \cdot 5^2 \cdot 13 \approx 340$$

$$31.416 = 2\pi r$$

$$5 \approx r$$

PTS: 4   REF: 011734geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cones

281 ANS:

$$20000\,\text{g}\left(\frac{1\,\text{ft}^3}{7.48\,\text{g}}\right) = 2673.8\,\text{ft}^3 \quad 2673.8 = \pi r^2 (34.5) \quad 9.9 + 1 = 10.9$$

$$r \approx 4.967$$

$$d \approx 9.9$$

PTS: 4   REF: 061734geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cylinders

282 ANS:

$$V = (\pi)(4^2)(9) + \left(\frac{1}{2}\right)\left(\frac{4}{3}\right)(\pi)\left(4^3\right) \approx 586$$

PTS: 4   REF: 011833geo   NAT: G.GMD.A.3   TOP: Volume
KEY: compositions

283 ANS:

$$2\left(\frac{36}{12} \times \frac{36}{12} \times \frac{4}{12}\right) \times 3.25 = 19.50$$

PTS: 2   REF: 081831geo   NAT: G.GMD.A.3   TOP: Volume
KEY: prisms

284 ANS:

$$\left((10 \times 6) + \sqrt{7(7-6)(7-4)(7-4)}\,\right)(6.5) \approx 442$$

PTS: 4   REF: 081934geo   NAT: G.GMD.A.3   TOP: Volume
KEY: compositions

285 ANS:

$$(7^2)18\pi = 16x^2 \quad \frac{80}{13.2} \approx 6.1 \quad \frac{60}{13.2} \approx 4.5 \quad 6 \times 4 = 24$$
$$13.2 \approx x$$

PTS: 4   REF: 012034geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cylinders

286 ANS:

$$29.5 = 2\pi r \quad V = \frac{4}{3}\pi \cdot \left(\frac{29.5}{2\pi}\right)^3 \approx 434$$
$$r = \frac{29.5}{2\pi}$$

PTS: 2   REF: 061831geo   NAT: G.GMD.A.3   TOP: Volume
KEY: spheres

287 ANS:

$$\sqrt[3]{\frac{3V_f}{4\pi}} - \sqrt[3]{\frac{3V_p}{4\pi}} = \sqrt[3]{\frac{3(294)}{4\pi}} - \sqrt[3]{\frac{3(180)}{4\pi}} \approx 0.6$$

PTS: 2   REF: 061728geo   NAT: G.GMD.A.3   TOP: Volume
KEY: spheres

288 ANS:

Theresa. $(30 \times 15 \times (4 - 0.5))\,\text{ft}^3 \times \dfrac{7.48\,\text{g}}{1\,\text{ft}^3} \times \dfrac{\$3.95}{100\,\text{g}} = \$465.35,\ (\pi \times 12^2 \times (4 - 0.5))\,\text{ft}^3 \times \dfrac{7.48\,\text{g}}{1\,\text{ft}^3} \times \dfrac{\$200}{6000\,\text{g}} = \$394.79$

PTS: 4   REF: 011933geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cylinders

289 ANS:

$$V = \frac{2}{3}\pi\left(\frac{6.5}{2}\right)^2(1) \approx 22 \quad 22 \cdot 7.48 \approx 165$$

PTS: 4   REF: 061933geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cylinders

290 ANS:

$$\left(\frac{2.5}{3}\right)(\pi)\left(\frac{8.25}{2}\right)^2(3) \approx 134$$

PTS: 2   REF: 081931geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cylinders

291 ANS:

$$\frac{\pi \cdot 11.25^2 \cdot 33.5}{231} \approx 57.7$$

PTS: 4   REF: 061632geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cylinders

292 ANS: 3
$V = 12 \cdot 8.5 \cdot 4 = 408$

$W = 408 \cdot 0.25 = 102$

PTS: 2   REF: 061507geo   NAT: G.MG.A.2   TOP: Density

293 ANS: 1

$$V = \frac{\frac{4}{3}\pi\left(\frac{10}{2}\right)^3}{2} \approx 261.8 \cdot 62.4 = 16,336$$

PTS: 2   REF: 081516geo   NAT: G.MG.A.2   TOP: Density

294 ANS: 2
$$\frac{4}{3}\pi \cdot 4^3 + 0.075 \approx 20$$

PTS: 2   REF: 011619geo   NAT: G.MG.A.2   TOP: Density

295 ANS: 2

$$\frac{11}{1.2\,\text{oz}}\left(\frac{16\,\text{oz}}{1\,\text{lb}}\right) = \frac{13.\overline{3}1}{\text{lb}}\quad \frac{13.\overline{3}1}{\text{lb}}\left(\frac{1\,\text{g}}{3.785\,\text{l}}\right) \approx \frac{3.5\,\text{g}}{1\,\text{lb}}$$

PTS: 2   REF: 061618geo   NAT: G.MG.A.2   TOP: Density

296 ANS: 1
$$\frac{1}{2}\left(\frac{4}{3}\right)\pi \cdot 5^3 \cdot 62.4 \approx 16,336$$

PTS: 2   REF: 061620geo   NAT: G.MG.A.2   TOP: Density

297 ANS: 2

$$C = \pi d \quad V = \pi\left(\frac{2.25}{\pi}\right)^2 \cdot 8 \approx 12.8916 \quad W = 12.8916 \cdot 752 \approx 9694$$

$$4.5 = \pi d$$

$$\frac{4.5}{\pi} = d$$

$$\frac{2.25}{\pi} = r$$

PTS: 2   REF: 081617geo   NAT: G.MG.A.2   TOP: Density

298 ANS: 2

$$\frac{4}{3}\pi \times \left(\frac{1.68}{2}\right)^3 \times 0.6523 \approx 1.62$$

PTS: 2   REF: 081914geo   NAT: G.MG.A.2   TOP: Density

299 ANS: 1

$8 \times 3.5 \times 2.25 \times 1.055 = 66.465$

PTS: 2   REF: 012014geo   NAT: G.MG.A.2   TOP: Density

300 ANS: 1

Illinois: $\frac{12830632}{231.1} \approx 55520$ Florida: $\frac{18801310}{350.6} \approx 53626$ New York: $\frac{19378102}{411.2} \approx 47126$ Pennsylvania:

$\frac{12702379}{283.9} \approx 44742$

PTS: 2   REF: 081720geo   NAT: G.MG.A.2   TOP: Density

301 ANS: 3

Broome: $\frac{200536}{706.82} \approx 284$ Dutchess: $\frac{280150}{801.59} \approx 349$ Niagara: $\frac{219846}{522.95} \approx 420$ Saratoga: $\frac{200635}{811.84} \approx 247$

PTS: 2   REF: 061902geo   NAT: G.MG.A.2   TOP: Density

302 ANS:

$\frac{137.8}{6^3} \approx 0.638$ Ash

PTS: 2   REF: 081525geo   NAT: G.MG.A.2   TOP: Density

303 ANS:

$\tan 47 = \frac{x}{8.5}$ Cone: $V = \frac{1}{3}\pi(8.5)^2(9.115) \approx 689.6$ Cylinder: $V = \pi(8.5)^2(25) \approx 5674.5$ Hemisphere:

$x \approx 9.115$

$V = \frac{1}{2}\left(\frac{4}{3}\pi(8.5)^3\right) \approx 1286.3$ $689.6 + 5674.5 + 1286.3 \approx 7650$ No, because $7650 \cdot 62.4 = 477,360$

$477,360 \cdot .85 = 405,756$, which is greater than 400,000.

PTS: 6   REF: 061535geo   NAT: G.MG.A.2   TOP: Density

304 ANS:

$V = \frac{1}{3}\pi\left(\frac{3}{2}\right)^2 \cdot 8 \approx 18.85 \cdot 100 = 1885$ $1885 \cdot 0.52 \cdot 0.10 = 98.02$ $1.95(100) - (37.83 + 98.02) = 59.15$

PTS: 6   REF: 081536geo   NAT: G.MG.A.2   TOP: Density

305 ANS:

$$\dfrac{40000}{\pi\left(\dfrac{51}{2}\right)^2} \approx 19.6 \quad \dfrac{72000}{\pi\left(\dfrac{75}{2}\right)^2} \approx 16.3 \quad \text{Dish } A$$

PTS: 2   REF: 011630geo   NAT: G.MG.A.2   TOP: Density

306 ANS:

$$V = \dfrac{1}{3}\,\pi\left(\dfrac{8.3}{2}\right)^2 (10.2) + \dfrac{1}{2}\cdot\dfrac{4}{3}\,\pi\left(\dfrac{8.3}{2}\right)^3 \approx 183.961 + 149.693 \approx 333.65\ \text{cm}^3 \quad 333.65 \times 50 = 16682.7\ \text{cm}^3$$

$16682.7 \times 0.697 = 11627.8$ g $\quad 11.6278 \times 3.83 = \$44.53$

PTS: 6   REF: 081636geo   NAT: G.MG.A.2   TOP: Density

307 ANS:

$$V = \pi(10)^2(18) = 1800\pi\ \text{in}^3 \quad 1800\pi\ \text{in}^3\left(\dfrac{1\ \text{ft}^3}{12^3\ \text{in}^3}\right) = \dfrac{25}{24}\,\pi\ \text{ft}^3 \quad \dfrac{25}{24}\,\pi(95.46)(0.85) \approx 266 \quad 266 + 270 = 536$$

PTS: 4   REF: 061834geo   NAT: G.MG.A.2   TOP: Density

308 ANS:

$$r = 25\ \text{cm}\left(\dfrac{1\ \text{m}}{100\ \text{cm}}\right) = 0.25\ \text{m} \quad V = \pi(0.25\ \text{m})^2(10\ \text{m}) = 0.625\pi\ \text{m}^3 \quad W = 0.625\pi\ \text{m}^3\left(\dfrac{380\ \text{K}}{1\ \text{m}^3}\right) \approx 746.1\ K$$

$$n = \dfrac{\$50{,}000}{\left(\dfrac{\$4.75}{\text{K}}\right)(746.1\ \text{K})} = 14.1 \quad 15\ \text{trees}$$

PTS: 4   REF: spr1412geo   NAT: G.MG.A.2   TOP: Density

309 ANS:

No, the weight of the bricks is greater than 900 kg. $500 \times (5.1\ \text{cm} \times 10.2\ \text{cm} \times 20.3\ \text{cm}) = 528{,}003\ \text{cm}^3$.

$$528{,}003\ \text{cm}^3 \times \dfrac{1\ \text{m}^3}{1000000\ \text{cm}^3} = 0.528003\ \text{m}^3. \quad \dfrac{1920\ \text{kg}}{\text{m}^3} \times 0.528003\ \text{m}^3 \approx 1013\ \text{kg}.$$

PTS: 2   REF: fall1406geo   NAT: G.MG.A.2   TOP: Density

310 ANS:

C: $V = \pi(26.7)^2(750) - \pi(24.2)^2(750) = 95{,}437.5\pi$

$$95{,}437.5\pi\ \text{cm}^3\left(\dfrac{2.7\ \text{g}}{\text{cm}^3}\right)\left(\dfrac{1\ \text{kg}}{1000\ \text{g}}\right)\left(\dfrac{\$0.38}{\text{kg}}\right) = \$307.62$$

P: $V = 40^2(750) - 35^2(750) = 281{,}250$ $\$307.62 - 288.56 = \$19.06$

$$281{,}250\ \text{cm}^3\left(\dfrac{2.7\ \text{g}}{\text{cm}^3}\right)\left(\dfrac{1\ \text{kg}}{1000\ \text{g}}\right)\left(\dfrac{\$0.38}{\text{kg}}\right) = \$288.56$$

PTS: 6   REF: 011736geo   NAT: G.MG.A.2   TOP: Density

311 ANS:

$$500 \times 1015 \text{ cc} \times \frac{\$0.29}{\text{kg}} \times \frac{7.95 \text{ g}}{\text{cc}} \times \frac{1 \text{ kg}}{1000 \text{ g}} = \$1170$$

PTS: 2 REF: 011829geo NAT: G.MG.A.2 TOP: Density

312 ANS:

$$\frac{4\pi}{3}(2^3 - 1.5^3) \approx 19.4 \quad 19.4 \cdot 1.308 \cdot 8 \approx 203$$

PTS: 4 REF: 081834geo NAT: G.MG.A.2 TOP: Density

313 ANS:

$$8 \times 3 \times \frac{1}{12} \times 43 = 86$$

PTS: 2 REF: 012027geo NAT: G.MG.A.2 TOP: Density

314 ANS: 1 PTS: 2 REF: 061518geo NAT: G.SRT.A.1
TOP: Line Dilations

315 ANS: 4

$$\frac{18}{4.5} = 4$$

PTS: 2 REF: 011901geo NAT: G.SRT.A.1 TOP: Line Dilations

316 ANS: 1

$$\frac{9}{6} = \frac{3}{2}$$

PTS: 2 REF: 061905geo NAT: G.SRT.A.1 TOP: Line Dilations

317 ANS: 1

$$y = \frac{1}{2}x + 4 \quad \frac{2}{4} = \frac{1}{2}$$

$$y = \frac{1}{2}x + 2$$

PTS: 2 REF: 012008geo NAT: G.SRT.A.1 TOP: Line Dilations

318 ANS: 2 PTS: 2 REF: 081901geo NAT: G.SRT.A.1
TOP: Line Dilations

319 ANS: 1

B: $(4 - 3, 3 - 4) \rightarrow (1, -1) \rightarrow (2, -2) \rightarrow (2 + 3, -2 + 4)$

C: $(2 - 3, 1 - 4) \rightarrow (-1, -3) \rightarrow (-2, -6) \rightarrow (-2 + 3, -6 + 4)$

PTS: 2 REF: 011713geo NAT: G.SRT.A.1 TOP: Line Dilations

320 ANS: 2 PTS: 2 REF: 011610geo NAT: G.SRT.A.1
TOP: Line Dilations

321 ANS: 3 PTS: 2 REF: 061706geo NAT: G.SRT.A.1
TOP: Line Dilations

322 ANS: 1   PTS: 2   REF: 011814geo   NAT: G.SRT.A.1
     TOP: Line Dilations

323 ANS: 1
     A dilation by a scale factor of 4 centered at the origin preserves parallelism and $(0,-2) \rightarrow (0,-8)$.

     PTS: 2   REF: 081910geo   NAT: G.SRT.A.1   TOP: Line Dilations

324 ANS: 1
     The line $3y = -2x + 8$ does not pass through the center of dilation, so the dilated line will be distinct from
     $3y = -2x + 8$. Since a dilation preserves parallelism, the line $3y = -2x + 8$ and its image $2x + 3y = 5$ are parallel,
     with slopes of $-\frac{2}{3}$.

     PTS: 2   REF: 061522geo   NAT: G.SRT.A.1   TOP: Line Dilations

325 ANS: 1
     Since a dilation preserves parallelism, the line $4y = 3x + 7$ and its image $3x - 4y = 9$ are parallel, with slopes of $\frac{3}{4}$.

     PTS: 2   REF: 081710geo   NAT: G.SRT.A.1   TOP: Line Dilations

326 ANS: 2
     The slope of $-3x + 4y = 8$ is $\frac{3}{4}$.

     PTS: 2   REF: 061907geo   NAT: G.SRT.A.1   TOP: Line Dilations

327 ANS: 2
     The given line h, $2x + y = 1$, does not pass through the center of dilation, the origin, because the y-intercept is at
     $(0,1)$. The slope of the dilated line, m, will remain the same as the slope of line h, -2. All points on line h, such as
     $(0,1)$, the y-intercept, are dilated by a scale factor of 4; therefore, the y-intercept of the dilated line is $(0,4)$ because
     the center of dilation is the origin, resulting in the dilated line represented by the equation $y = -2x + 4$.

     PTS: 2   REF: spr1403geo   NAT: G.SRT.A.1   TOP: Line Dilations

328 ANS: 2
     The line $y = 2x - 4$ does not pass through the center of dilation, so the dilated line will be distinct from $y = 2x - 4$.
     Since a dilation preserves parallelism, the line $y = 2x - 4$ and its image will be parallel, with slopes of 2. To
     obtain the y-intercept of the dilated line, the scale factor of the dilation, $\frac{3}{2}$, can be applied to the y-intercept,
     $(0,-4)$. Therefore, $\left(0 \cdot \frac{3}{2}, -4 \cdot \frac{3}{2} \right) \rightarrow (0,-6)$. So the equation of the dilated line is $y = 2x - 6$.

     PTS: 2   REF: fall1403geo   NAT: G.SRT.A.1   TOP: Line Dilations

329 ANS: 4
     The line $y = 3x - 1$ passes through the center of dilation, so the dilated line is not distinct.

     PTS: 2   REF: 081524geo   NAT: G.SRT.A.1   TOP: Line Dilations

330 ANS: 2
The line $y = -3x + 6$ passes through the center of dilation, so the dilated line is not distinct.

PTS: 2   REF: 061824geo   NAT: G.SRT.A.1   TOP: Line Dilations

331 ANS: 4
The line $y = \dfrac{3}{2}x - 4$ does not pass through the center of dilation, so the dilated line will be distinct from

$y = \dfrac{3}{2}x - 4$. Since a dilation preserves parallelism, the line $y = \dfrac{3}{2}x - 4$ and its image will be parallel, with slopes

of $\dfrac{3}{2}$. To obtain the y-intercept of the dilated line, the scale factor of the dilation, $\dfrac{3}{4}$, can be applied to the

y-intercept, $(0, -4)$. Therefore, $\left(0 \cdot \dfrac{3}{4}, -4 \cdot \dfrac{3}{4}\right) \rightarrow (0, -3)$. So the equation of the dilated line is $y = \dfrac{3}{2}x - 3$.

PTS: 2   REF: 011924geo   NAT: G.SRT.A.1   TOP: Line Dilations

332 ANS: 4
$3 \times 6 = 18$

PTS: 2   REF: 061602geo   NAT: G.SRT.A.1   TOP: Line Dilations

333 ANS: 4
$\sqrt{(32-8)^2 + (28--4)^2} = \sqrt{576 + 1024} = \sqrt{1600} = 40$

PTS: 2   REF: 081621geo   NAT: G.SRT.A.1   TOP: Line Dilations

334 ANS:
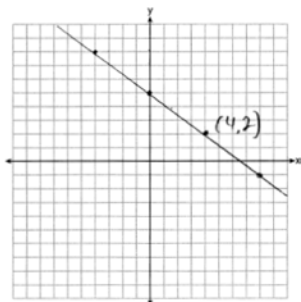
The line is on the center of dilation, so the line does not change. $p: 3x + 4y = 20$

PTS: 2   REF: 061731geo   NAT: G.SRT.A.1   TOP: Line Dilations

335 ANS:
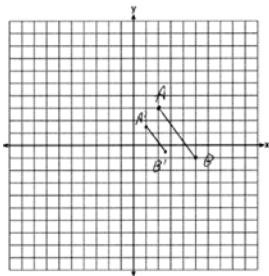
$\sqrt{(2.5-1)^2 + (-.5-1.5)^2} = \sqrt{2.25 + 4} = 2.5$

PTS: 2   REF: 081729geo   NAT: G.SRT.A.1   TOP: Line Dilations

336 ANS:
No, The line $4x + 3y = 24$ passes through the center of dilation, so the dilated line is not distinct.
$4x + 3y = 24$

$3y = -4x + 24$

$y = -\dfrac{4}{3}x + 8$

PTS: 2   REF: 081830geo   NAT: G.SRT.A.1   TOP: Line Dilations

337 ANS:
$\ell: y = 3x - 4$

$m: y = 3x - 8$

PTS: 2   REF: 011631geo   NAT: G.SRT.A.1   TOP: Line Dilations

338 ANS: 1   PTS: 2   REF: 081605geo   NAT: G.CO.A.5
TOP: Rotations   KEY: grids

339 ANS:
$ABC -$ point of reflection $\rightarrow (-y,x) +$ point of reflection $\triangle DEF \cong \triangle A'B'C'$ because $\triangle DEF$ is a reflection of

$A(2,-3) - (2,-3) = (0,0) \rightarrow (0,0) + (2,-3) = A'(2,-3)$

$B(6,-8) - (2,-3) = (4,-5) \rightarrow (5,4) + (2,-3) = B'(7,1)$

$C(2,-9) - (2,-3) = (0,-6) \rightarrow (6,0) + (2,-3) = C'(8,-3)$
$\triangle A'B'C'$ and reflections preserve distance.

PTS: 4   REF: 081633geo   NAT: G.CO.A.5   TOP: Rotations
KEY: grids

340 ANS:
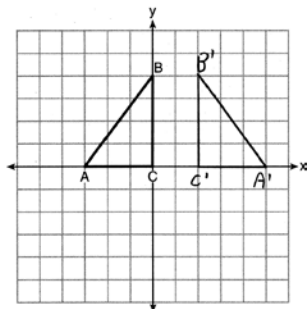
PTS: 2   REF: 011625geo   NAT: G.CO.A.5   TOP: Reflections
KEY: grids

341 ANS: 4   PTS: 2   REF: 081506geo   NAT: G.SRT.A.2
TOP: Dilations

342 ANS: 1
$\dfrac{4}{6} = \dfrac{3}{4.5} = \dfrac{2}{3}$

PTS: 2   REF: 081523geo   NAT: G.SRT.A.2   TOP: Dilations

343 ANS: 2   PTS: 2   REF: 061516geo   NAT: G.SRT.A.2
     TOP: Dilations
344 ANS: 1
     $3^2 = 9$

     PTS: 2   REF: 081520geo   NAT: G.SRT.A.2   TOP: Dilations
345 ANS: 1   PTS: 2   REF: 011811geo   NAT: G.SRT.A.2
     TOP: Dilations
346 ANS: 4
     $9 \cdot 3 = 27$, $27 \cdot 4 = 108$

     PTS: 2   REF: 061805geo   NAT: G.SRT.A.2   TOP: Dilations
347 ANS: 3
     $6 \cdot 3^2 = 54$ $12 \cdot 3 = 36$

     PTS: 2   REF: 081823geo   NAT: G.SRT.A.2   TOP: Dilations
348 ANS:
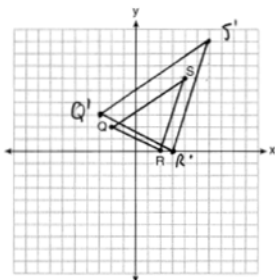
A dilation preserves slope, so the slopes of $\overline{QR}$ and $\overline{Q'R'}$ are equal. Because the slopes
     are equal, $Q'R' \parallel QR$.

     PTS: 4   REF: 011732geo   NAT: G.SRT.A.2   TOP: Dilations
     KEY: grids
349 ANS:
     A dilation of 3 centered at A. A dilation preserves angle measure, so the triangles are similar.

     PTS: 4   REF: 011832geo   NAT: G.SRT.A.2   TOP: Dilations
350 ANS:
     $A(-2,1) \rightarrow (-3,-1) \rightarrow (-6,-2) \rightarrow (-5,0)$, $B(0,5) \rightarrow (-1,3) \rightarrow (-2,6) \rightarrow (-1,8)$,
     $C(4,-1) \rightarrow (3,-3) \rightarrow (6,-6) \rightarrow (7,-4)$

     PTS: 2   REF: 061826geo   NAT: G.SRT.A.2   TOP: Dilations
351 ANS:
     No, because dilations do not preserve distance.

     PTS: 2   REF: 061925geo   NAT: G.SRT.A.2   TOP: Dilations
352 ANS: 1   PTS: 2   REF: 081505geo   NAT: G.CO.A.3
     TOP: Mapping a Polygon onto Itself
353 ANS: 3   PTS: 2   REF: 011904geo   NAT: G.CO.A.3
     TOP: Mapping a Polygon onto Itself

354 ANS: 3
The *x*-axis and line $x = 4$ are lines of symmetry and $(4,0)$ is a point of symmetry.

PTS: 2　　　　REF: 081706geo　NAT: G.CO.A.3　TOP: Mapping a Polygon onto Itself
355 ANS: 3　　　　PTS: 2　　　　REF: 081817geo　NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself
356 ANS: 4　　　　PTS: 2　　　　REF: 061904geo　NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself
357 ANS: 4　　　　PTS: 2　　　　REF: 081923geo　NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself
358 ANS: 3
$\frac{360°}{5} = 72°$　$216°$ is a multiple of $72°$

PTS: 2　　　　REF: 061819geo　NAT: G.CO.A.3　TOP: Mapping a Polygon onto Itself
359 ANS: 2
Segments drawn from the center of the regular pentagon bisect each angle of the pentagon, and create five isosceles triangles as shown in the diagram below. Since each exterior angle equals the angles formed by the segments drawn from the center of the regular pentagon, the minimum degrees necessary to carry a regular polygon onto itself are equal to the measure of an exterior angle of the regular polygon.
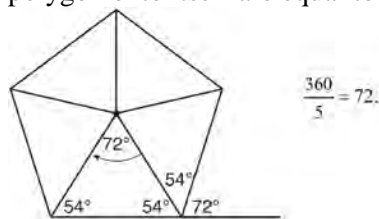
PTS: 2　　　　REF: spr1402geo　NAT: G.CO.A.3　TOP: Mapping a Polygon onto Itself
360 ANS: 4
$\frac{360°}{10} = 36°$　$252°$ is a multiple of $36°$

PTS: 2　　　　REF: 011717geo　NAT: G.CO.A.3　TOP: Mapping a Polygon onto Itself
361 ANS: 1　　　　PTS: 2　　　　REF: 061707geo　NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself
362 ANS: 4
$\frac{360°}{10} = 36°$　$252°$ is a multiple of $36°$

PTS: 2　　　　REF: 081722geo　NAT: G.CO.A.3　TOP: Mapping a Polygon onto Itself
363 ANS: 3　　　　PTS: 2　　　　REF: 011815geo　NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself
364 ANS: 3
$(6-2)180 = 720$　$\frac{720}{6} = 120$

PTS: 2　　　　REF: 012011geo　NAT: G.CO.A.3　TOP: Mapping a Polygon onto Itself

365 ANS: 1
$$\frac{360°}{45°} = 8$$

PTS: 2 REF: 061510geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself
366 ANS:
$$\frac{360}{6} = 60$$

PTS: 2 REF: 081627geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself
367 ANS: 3 PTS: 2 REF: 011710geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify
368 ANS: 2 PTS: 2 REF: 061701geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify
369 ANS: 4 PTS: 2 REF: 061504geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify
370 ANS: 1 PTS: 2 REF: 081507geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify
371 ANS: 1 PTS: 2 REF: 011608geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify
372 ANS: 3 PTS: 2 REF: 011903geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify
373 ANS: 4 PTS: 2 REF: 061901geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify
374 ANS: 2 PTS: 2 REF: 081909geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify
375 ANS: 2 PTS: 1 REF: 012017geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify
376 ANS:

Rotate $\triangle ABC$ clockwise about point C until $\overline{DF} \parallel \overline{AC}$. Translate $\triangle ABC$ along $\overline{CF}$ so that C maps onto F.

PTS: 2 REF: 061730geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify
377 ANS:
$T_{6,0} \circ r_{x\text{-axis}}$

PTS: 2 REF: 061625geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify

378 ANS:
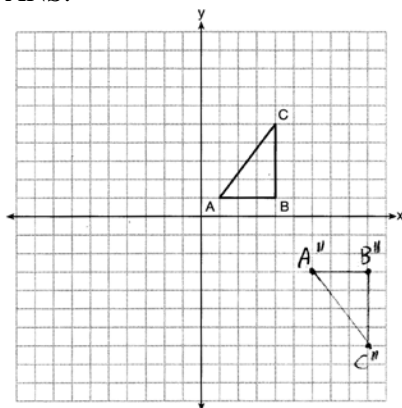
PTS: 2   REF: 081626geo   NAT: G.CO.A.5   TOP: Compositions of Transformations
KEY: grids

379 ANS:

$T_{0,-2} \circ r_{y\text{-axis}}$

PTS: 2   REF: 011726geo   NAT: G.CO.A.5   TOP: Compositions of Transformations
KEY: identify

380 ANS:

$R_{180°}$ about $\left(-\dfrac{1}{2}, \dfrac{1}{2}\right)$

PTS: 2   REF: 081727geo   NAT: G.CO.A.5   TOP: Compositions of Transformations
KEY: identify

381 ANS:
Reflection across the *y*-axis, then translation up 5.

PTS: 2   REF: 061827geo   NAT: G.CO.A.5   TOP: Compositions of Transformations
KEY: identify

382 ANS:
rotation 180º about the origin, translation 2 units down; rotation 180º about *B*, translation 6 units down and 6 units left; or reflection over *x*-axis, translation 2 units down, reflection over *y*-axis

PTS: 2   REF: 081828geo   NAT: G.CO.A.5   TOP: Compositions of Transformations
KEY: identify

383 ANS:

$R_{(-5,2),90°} \circ T_{-3,1} \circ r_{x\text{-axis}}$

PTS: 2   REF: 011928geo   NAT: G.CO.A.5   TOP: Compositions of Transformations
KEY: identify

384 ANS:
$R_{90°}$ or $T_{2,-6} \circ R_{(-4,2),90°}$ or $R_{270°} \circ r_{\text{x-axis}} \circ r_{\text{y-axis}}$

PTS: 2 REF: 061929geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify

385 ANS:
$r_{y=2} \circ r_{\text{y-axis}}$

PTS: 2 REF: 081927geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify

386 ANS: 4 PTS: 2 REF: 061608geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids

387 ANS: 4 PTS: 2 REF: 081609geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids

388 ANS: 1 PTS: 2 REF: 081804geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids

389 ANS: 4 PTS: 2 REF: 081514geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids

390 ANS: 2 PTS: 2 REF: 011702geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids

391 ANS: 1 PTS: 2 REF: 012022geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids

392 ANS: 1
NYSED accepts either (1) or (3) as a correct answer. Statement III is not true if *A, B, A'* and *B'* are collinear.

PTS: 2 REF: 061714geo NAT: G.SRT.A.2 TOP: Compositions of Transformations
KEY: basic

393 ANS:
Triangle *X′Y′Z′* is the image of $\triangle XYZ$ after a rotation about point *Z* such that $\overline{ZX}$ coincides with $\overline{ZU}$. Since rotations preserve angle measure, $\overline{ZY}$ coincides with $\overline{ZV}$, and corresponding angles *X* and *Y*, after the rotation, remain congruent, so $\overline{XY} \parallel \overline{UV}$. Then, dilate $\triangle X′Y′Z′$ by a scale factor of $\dfrac{ZU}{ZX}$ with its center at point *Z*. Since dilations preserve parallelism, $\overline{XY}$ maps onto $\overline{UV}$. Therefore, $\triangle XYZ \sim \triangle UVZ$.

PTS: 2 REF: spr1406geo NAT: G.SRT.A.2 TOP: Compositions of Transformations
KEY: grids

394 ANS: 4
The measures of the angles of a triangle remain the same after all rotations because rotations are rigid motions which preserve angle measure.

PTS: 2 REF: fall1402geo NAT: G.CO.B.6 TOP: Properties of Transformations
KEY: graphics

395 ANS: 4 PTS: 2 REF: 011611geo NAT: G.CO.B.6
TOP: Properties of Transformations KEY: graphics

396 ANS: 1 PTS: 2 REF: 061801geo NAT: G.CO.B.6
TOP: Properties of Transformations KEY: graphics

397 ANS: 1
$360 - (82 + 104 + 121) = 53$

PTS: 2   REF: 011801geo   NAT: G.CO.B.6   TOP: Properties of Transformations
KEY: graph

398 ANS: 4
$2x - 1 = 16$

$x = 8.5$

PTS: 2   REF: 011902geo   NAT: G.CO.B.6   TOP: Properties of Transformations
KEY: graphics

399 ANS: 4
$90 - 35 = 55 \ \ 55 \times 2 = 110$

PTS: 2   REF: 012015geo   NAT: G.CO.B.6   TOP: Properties of Transformations
KEY: basic

400 ANS: 1
Distance and angle measure are preserved after a reflection and translation.

PTS: 2   REF: 081802geo   NAT: G.CO.B.6   TOP: Properties of Transformations
KEY: basic

401 ANS:
$M = 180 - (47 + 57) = 76$ Rotations do not change angle measurements.

PTS: 2   REF: 081629geo   NAT: G.CO.B.6   TOP: Properties of Transformations

402 ANS:
Yes, as translations do not change angle measurements.

PTS: 2   REF: 061825geo   NAT: G.CO.B.6   TOP: Properties of Transformations
KEY: basic

403 ANS: 1   PTS: 2   REF: 061604geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: graphics

404 ANS: 2   PTS: 2   REF: 081513geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: graphics

405 ANS: 3   PTS: 2   REF: 061616geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: graphics

406 ANS: 4   PTS: 2   REF: 011803geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: graphics

407 ANS: 4   PTS: 2   REF: 061803geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: graphics

408 ANS: 4   PTS: 2   REF: 061502geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: basic

409 ANS: 3   PTS: 2   REF: 081502geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: basic

410 ANS: 4   PTS: 2   REF: 011706geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: basic

411 ANS: 4   PTS: 2   REF: 081702geo   NAT: G.CO.A.2
      TOP: Identifying Transformations   KEY: basic

412 ANS: 2   PTS: 2   REF: 081602geo   NAT: G.CO.A.2
      TOP: Identifying Transformations   KEY: basic

413 ANS:
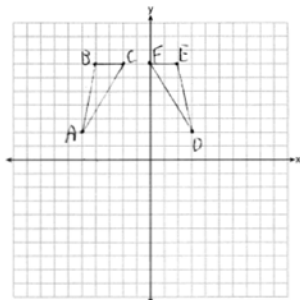
$r_{x=-1}$ Reflections are rigid motions that preserve distance, so $\triangle ABC \cong \triangle DEF$.

      PTS: 4   REF: 061732geo   NAT: G.CO.A.2   TOP: Identifying Transformations
      KEY: graphics

414 ANS: 3   PTS: 2   REF: 011605geo   NAT: G.CO.A.2
      TOP: Analytical Representations of Transformations   KEY: basic

415 ANS: 4   PTS: 2   REF: 011808geo   NAT: G.CO.A.2
      TOP: Analytical Representations of Transformations   KEY: basic

416 ANS: 3

$$\frac{AB}{BC} = \frac{DE}{EF}$$

$$\frac{9}{15} = \frac{6}{10}$$

$$90 = 90$$

      PTS: 2   REF: 061515geo   NAT: G.SRT.B.5   TOP: Similarity
      KEY: basic

417 ANS: 1

$$\frac{6}{8} = \frac{9}{12}$$

      PTS: 2   REF: 011613geo   NAT: G.SRT.B.5   TOP: Similarity
      KEY: basic

418 ANS: 2   PTS: 2   REF: 081519geo   NAT: G.SRT.B.5
      TOP: Similarity   KEY: basic

419 ANS: 3

1) $\frac{12}{9} = \frac{4}{3}$ 2) AA   3) $\frac{32}{16} \ne \frac{8}{2}$ 4) SAS

      PTS: 2   REF: 061605geo   NAT: G.SRT.B.5   TOP: Similarity
      KEY: basic

420 ANS: 2

(1) AA; (3) SAS; (4) SSS. NYSED has stated that all students should be awarded credit regardless of their answer to this question.

PTS: 2   REF: 061724geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

421 ANS: 4   PTS: 2   REF: 011817geo   NAT: G.SRT.B.5
TOP: Similarity   KEY: basic

422 ANS: 2

$\triangle ACB \sim \triangle AED$

PTS: 2   REF: 061811geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

423 ANS: 1

$\triangle ABC \sim \triangle RST$

PTS: 2   REF: 011908geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

424 ANS: 4

$\dfrac{7}{12} \cdot 30 = 17.5$

PTS: 2   REF: 061521geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: perimeter and area

425 ANS: 3

$\dfrac{12}{4} = \dfrac{x}{5}$ $15 - 4 = 11$

$x = 15$

PTS: 2   REF: 011624geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

426 ANS: 3

$\dfrac{x}{10} = \dfrac{6}{4}$ $\overline{CD} = 15 - 4 = 11$

$x = 15$

PTS: 2   REF: 081612geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

427 ANS: 4

$\dfrac{6.6}{x} = \dfrac{4.2}{5.25}$

$4.2x = 34.65$

$x = 8.25$

PTS: 2   REF: 081705geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

428 ANS: 3

$\triangle CFB \sim \triangle CAD$ $\dfrac{CB}{CF} = \dfrac{CD}{CA}$

$$\dfrac{x}{21.6} = \dfrac{7.2}{9.6}$$

$$x = 16.2$$

PTS: 2   REF: 061804geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

429 ANS: 2

$\dfrac{4}{x} = \dfrac{6}{9}$

$x = 6$

PTS: 2   REF: 061915geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

430 ANS: 3

$\dfrac{10}{x} = \dfrac{15}{12}$

$x = 8$

PTS: 2   REF: 081918geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

431 ANS: 2   PTS: 2   REF: 012003geo   NAT: G.SRT.B.5
TOP: Similarity   KEY: basic

432 ANS: 4

$\dfrac{1}{2} = \dfrac{x+3}{3x-1}$ $GR = 3(7) - 1 = 20$

$3x - 1 = 2x + 6$

$x = 7$

PTS: 2   REF: 011620geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

433 ANS: 2

$\sqrt{3 \cdot 21} = \sqrt{63} = 3\sqrt{7}$

PTS: 2   REF: 011622geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: altitude

434 ANS: 2

$12^2 = 9 \cdot 16$

$144 = 144$

PTS: 2   REF: 081718geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: leg

435 ANS: 2
$\overline{AB} = 10$ since $\triangle ABC$ is a 6-8-10 triangle. $6^2 = 10x$

$$3.6 = x$$

PTS: 2   REF: 081820geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: leg

436 ANS: 1   PTS: 2   REF: 081916geo   NAT: G.SRT.B.5
TOP: Similarity   KEY: leg

437 ANS: 2
$h^2 = 30 \cdot 12$

$h^2 = 360$

$h = 6\sqrt{10}$

PTS: 2   REF: 061613geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: altitude

438 ANS: 2
$x^2 = 4 \cdot 10$

$x = \sqrt{40}$

$x = 2\sqrt{10}$

PTS: 2   REF: 081610geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: leg

439 ANS: 2
$x^2 = 12(12 - 8)$

$x^2 = 48$

$x = 4\sqrt{3}$

PTS: 2   REF: 011823geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: leg

440 ANS: 3
$x(x - 6) = 4^2$

$x^2 - 6x - 16 = 0$

$(x - 8)(x + 2) = 0$

$x = 8$

PTS: 2   REF: 081807geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: altitude

441 ANS: 3

$12^2 = 9 \cdot GM$ $IM^2 = 16 \cdot 25$

$GM = 16$ $IM = 20$

PTS: 2   REF: 011910geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: leg

442 ANS: 4

$x^2 = 10.2 \times 14.3$

$x \approx 12.1$

PTS: 2   REF: 012016geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: leg

443 ANS: 1

$24x = 10^2$

$24x = 100$

$x \approx 4.2$

PTS: 2   REF: 061823geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: leg

444 ANS: 2

$18^2 = 12(x + 12)$

$324 = 12(x + 12)$

$27 = x + 12$

$x = 15$

PTS: 2   REF: 081920geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: leg

445 ANS:

$\dfrac{120}{230} = \dfrac{x}{315}$

$x = 164$

PTS: 2   REF: 081527geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

446 ANS:

$\dfrac{6}{14} = \dfrac{9}{21}$ SAS

$126 = 126$

PTS: 2   REF: 081529geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

447 ANS:
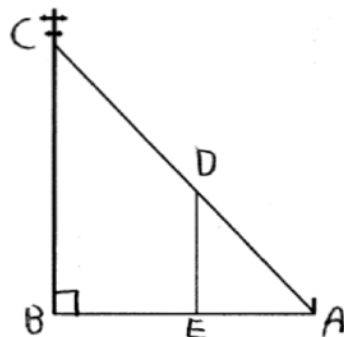
$\triangle ABC \sim \triangle AED$ by AA. $\angle DAE \cong \angle CAB$ because they are the same $\angle$. $\angle DEA \cong \angle CBA$ because they are both right $\angle$s.

PTS: 2   REF: 081829geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

448 ANS:
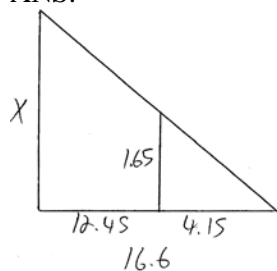
$$\frac{1.65}{4.15} = \frac{x}{16.6}$$

$$4.15x = 27.39$$

$$x = 6.6$$

PTS: 2   REF: 061531geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

449 ANS:

$\dfrac{16}{9} = \dfrac{x}{20.6}$ $D = \sqrt{36.6^2 + 20.6^2} \approx 42$

$x \approx 36.6$

PTS: 4   REF: 011632geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

450 ANS:

If an altitude is drawn to the hypotenuse of a triangle, it divides the triangle into two right triangles similar to each other and the original triangle.

PTS: 2   REF: 061729geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: altitude

451 ANS:

$17x = 15^2$

$17x = 225$

$x \approx 13.2$

PTS: 2　　　　REF: 061930geo　　NAT: G.SRT.B.5　TOP: Similarity
KEY: leg

452 ANS:

$x = \sqrt{.55^2 - .25^2} \cong 0.49$　No,　$.49^2 = .25y$　$.9604 + .25 < 1.5$

$.9604 = y$

PTS: 4　　　　REF: 061534geo　　NAT: G.SRT.B.5　TOP: Similarity
KEY: leg

453 ANS: 4　　　PTS: 2　　　　REF: 061615geo　　NAT: G.SRT.C.6
TOP: Trigonometric Ratios

454 ANS: 3　　　PTS: 2　　　　REF: 011714geo　　NAT: G.SRT.C.6
TOP: Trigonometric Ratios

455 ANS: 2

$\triangle ABC \sim \triangle BDC$

$\cos A = \dfrac{AB}{AC} = \dfrac{BD}{BC}$

PTS: 2　　　　REF: 012023geo　　NAT: G.SRT.C.6　TOP: Trigonometric Ratios

456 ANS: 4　　　PTS: 2　　　　REF: 061512geo　　NAT: G.SRT.C.7
TOP: Cofunctions

457 ANS: 1　　　PTS: 2　　　　REF: 081919geo　　NAT: G.SRT.C.7
TOP: Cofunctions

458 ANS: 1　　　PTS: 2　　　　REF: 081504geo　　NAT: G.SRT.C.7
TOP: Cofunctions

459 ANS: 4　　　PTS: 2　　　　REF: 011609geo　　NAT: G.SRT.C.7
TOP: Cofunctions

460 ANS: 3　　　PTS: 2　　　　REF: 061703geo　　NAT: G.SRT.C.7
TOP: Cofunctions

461 ANS: 1　　　PTS: 2　　　　REF: 011922geo　　NAT: G.SRT.C.7
TOP: Cofunctions

462 ANS: 2

$90 - 57 = 33$

PTS: 2　　　　REF: 061909geo　　NAT: G.SRT.C.7　TOP: Cofunctions

463 ANS: 1　　　PTS: 2　　　　REF: 081606geo　　NAT: G.SRT.C.7
TOP: Cofunctions

464 ANS: 4
$40 - x + 3x = 90$

$2x = 50$

$x = 25$

    PTS: 2   REF: 081721geo   NAT: G.SRT.C.7   TOP: Cofunctions

465 ANS: 1
$2x + 4 + 46 = 90$

$2x = 40$

$x = 20$

    PTS: 2   REF: 061808geo   NAT: G.SRT.C.7   TOP: Cofunctions

466 ANS: 2
$2x + 7 + 4x - 7 = 90$

$6x = 90$

$x = 15$

    PTS: 2   REF: 081824geo   NAT: G.SRT.C.7   TOP: Cofunctions

467 ANS: 3
$4x + 3x + 13 = 90$ $4(11) < 3(11) + 13$

$7x = 77$ $44 < 46$

$x = 11$

    PTS: 2   REF: 012021geo   NAT: G.SRT.C.7   TOP: Cofunctions

468 ANS:
Yes, because 28º and 62º angles are complementary. The sine of an angle equals the cosine of its complement.

    PTS: 2   REF: 011727geo   NAT: G.SRT.C.7   TOP: Cofunctions

469 ANS:
The acute angles in a right triangle are always complementary. The sine of any acute angle is equal to the cosine of its complement.

    PTS: 2   REF: spr1407geo   NAT: G.SRT.C.7   TOP: Cofunctions

470 ANS:
$4x - .07 = 2x + .01$ $\text{Sin} A$ is the ratio of the opposite side and the hypotenuse while $\cos B$ is the ratio of the adjacent

$2x = 0.8$

$x = 0.4$

side and the hypotenuse. The side opposite angle A is the same side as the side adjacent to angle B. Therefore, $\sin A = \cos B$.

    PTS: 2   REF: fall1407geo   NAT: G.SRT.C.7   TOP: Cofunctions

471 ANS:

$73 + R = 90$ Equal cofunctions are complementary.

$R = 17$

PTS: 2   REF: 061628geo   NAT: G.SRT.C.7   TOP: Cofunctions

472 ANS:

$\cos B$ increases because $\angle A$ and $\angle B$ are complementary and $\sin A = \cos B$.

PTS: 2   REF: 011827geo   NAT: G.SRT.C.7   TOP: Cofunctions

473 ANS: 3

$\cos 40 = \dfrac{14}{x}$

$x \approx 18$

PTS: 2   REF: 011712geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

Geometry Regents Exam Questions by State Standard: Topic
Answer Section

474   ANS: 3

$\tan 34 = \dfrac{T}{20}$

$\quad T \approx 13.5$

PTS: 2   REF: 061505geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: graphics

475   ANS: 1

$\sin 32 = \dfrac{O}{129.5}$

$\quad O \approx 68.6$

PTS: 2   REF: 011804geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

476   ANS: 4

$\sin 16.5 = \dfrac{8}{x}$

$\quad x \approx 28.2$

PTS: 2   REF: 081806ai   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

477   ANS: 2

$\tan \theta = \dfrac{2.4}{x}$

$\dfrac{3}{7} = \dfrac{2.4}{x}$

$\quad x = 5.6$

PTS: 2   REF: 011707geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

478   ANS: 4

$\sin 70 = \dfrac{x}{20}$

$\quad x \approx 18.8$

PTS: 2   REF: 061611geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: without graphics

479   ANS: 4

$\sin 71 = \dfrac{x}{20}$

$\quad x = 20 \sin 71 \approx 19$

PTS: 2   REF: 061721geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: without graphics

480 ANS: 1

$$\sin 32 = \frac{x}{6.2}$$

$$x \approx 3.3$$

PTS: 2   REF: 081719geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

481 ANS: 2

$$\tan 11.87 = \frac{x}{0.5(5280)}$$

$$x \approx 555$$

PTS: 2   REF: 011913geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

482 ANS: 2

$$\tan 36 = \frac{x}{8} \quad 5.8 + 1.5 \approx 7$$

$$x \approx 5.8$$

PTS: 2   REF: 081915geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

483 ANS: 1

$$\cos 65 = \frac{x}{15}$$

$$x \approx 6.3$$

PTS: 2   REF: 081924geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

484 ANS:

$$\sin 70 = \frac{30}{L}$$

$$L \approx 32$$

PTS: 2   REF: 011629geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: graphics

485 ANS:

$$\sin 75 = \frac{15}{x}$$

$$x = \frac{15}{\sin 75}$$

$$x \approx 15.5$$

PTS: 2   REF: 081631geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: graphics

486 ANS:

$$\sin 38 = \frac{24.5}{x}$$

$$x \approx 40$$

PTS: 2   REF: 012026geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: graphics

487 ANS:

$$\cos 54 = \frac{4.5}{m} \quad \tan 54 = \frac{h}{4.5}$$

$$m \approx 7.7 \qquad h \approx 6.2$$

PTS: 4   REF: 011834geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

488 ANS:

$$\tan 36 = \frac{x}{10} \quad \cos 36 = \frac{10}{y} \quad 12.3607 \times 3 \approx 37$$

$$x \approx 7.3 \quad y \approx 12.3607$$

PTS: 4   REF: 081833geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

489 ANS:

$$\sin 4.76 = \frac{1.5}{x} \quad \tan 4.76 = \frac{1.5}{x} \quad 18 - \frac{16}{12} \approx 16.7$$

$$x \approx 18.1 \qquad x \approx 18$$

PTS: 4   REF: 011934geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

490 ANS:

$$\tan 56 = \frac{x}{1.3} \qquad \sqrt{(1.3 \tan 56)^2 + 1.5^2} \approx 3.7$$

$$x = 1.3 \tan 56$$

PTS: 4   REF: 012033geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: advanced

491 ANS:

x represents the distance between the lighthouse and the canoe at 5:00; y represents the distance between the lighthouse and the canoe at 5:05. $\tan 6 = \frac{112 - 1.5}{x}$ $\tan(49 + 6) = \frac{112 - 1.5}{y}$ $\frac{1051.3 - 77.4}{5} \approx 195$

$$x \approx 1051.3 \qquad\qquad y \approx 77.4$$

PTS: 4   REF: spr1409geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: advanced

492   ANS:
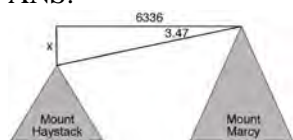
$$\tan 3.47 = \frac{M}{6336}$$

$$M \approx 384$$

$$4960 + 384 = 5344$$
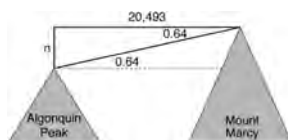
$$\tan 0.64 = \frac{A}{20,493}$$

$$A \approx 229$$

$$5344 - 229 = 5115$$

PTS: 6   REF: fall1413geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: advanced

493   ANS:

$$\tan 7 = \frac{125}{x} \quad \tan 16 = \frac{125}{y} \quad 1018 - 436 \approx 582$$

$$x \approx 1018 \qquad y \approx 436$$

PTS: 4   REF: 081532geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: advanced

494   ANS:

$$\tan 52.8 = \frac{h}{x}$$

$$h = x \tan 52.8$$

$$\tan 34.9 = \frac{h}{x+8}$$

$$h = (x+8)\tan 34.9$$

$$x \tan 52.8 = x \tan 34.9 + 8 \tan 34.9$$
$$x \tan 52.8 - x \tan 34.9 = 8 \tan 34.9$$
$$x(\tan 52.8 - \tan 34.9) = 8 \tan 34.9$$
$$x = \frac{8 \tan 34.9}{\tan 52.8 - \tan 34.9}$$
$$x \approx 9$$

$$\tan 52.8 \approx \frac{h}{9} \qquad 11.86 + 1.7 \approx 13.6$$
$$x \approx 11.86$$

PTS: 6   REF: 011636geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: advanced

495   ANS:

$$\tan 72 = \frac{x}{400} \qquad \sin 55 = \frac{400 \tan 72}{y}$$

$$x = 400 \tan 72 \qquad y = \frac{400 \tan 72}{\sin 55} \approx 1503$$

PTS: 4   REF: 061833geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: advanced

496   ANS:

$$\tan 30 = \frac{y}{440} \quad \tan 38.8 = \frac{h}{440} \quad 353.8 - 254 \approx 100$$

$$y \approx 254 \qquad h \approx 353.8$$

PTS: 4   REF: 061934geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: advanced

497 ANS:

$$\tan 15 = \frac{6250}{x} \quad \tan 52 = \frac{6250}{y} \quad 23325.3 - 4883 = 18442 \quad \frac{18442 \text{ ft}}{1 \text{ min}} \left(\frac{1 \text{ mi}}{5280 \text{ ft}} \right) \left(\frac{60 \text{ min}}{1 \text{ h}} \right) \approx 210$$

$$x \approx 23325.3 \qquad y \approx 4883$$

PTS: 6　　REF: 061736geo　NAT: G.SRT.C.8　TOP: Using Trigonometry to Find a Side
KEY: advanced

498 ANS:

$$\cos 68 = \frac{10}{x}$$

$$x \approx 27$$

PTS: 2　　REF: 061927geo　NAT: G.SRT.C.8　TOP: Using Trigonometry to Find a Side

499 ANS: 4

$$\tan A = \frac{\text{opposite}}{\text{adjacent}} = \frac{15}{8}$$

PTS: 2　　REF: 011917geo　NAT: G.SRT.C.8　TOP: Using Trigonometry to Find an Angle

500 ANS: 3

$$\cos A = \frac{9}{14}$$

$$A \approx 50°$$

PTS: 2　　REF: 011616geo　NAT: G.SRT.C.8　TOP: Using Trigonometry to Find an Angle

501 ANS: 1

$$\cos S = \frac{60}{65}$$

$$S \approx 23$$

PTS: 2　　REF: 061713geo　NAT: G.SRT.C.8　TOP: Using Trigonometry to Find an Angle

502 ANS: 1

$$\tan x = \frac{1}{12}$$

$$x \approx 4.76$$

PTS: 2　　REF: 081715geo　NAT: G.SRT.C.8　TOP: Using Trigonometry to Find an Angle

503 ANS: 1

$$\cos x = \frac{12}{13}$$

$$x \approx 23$$

PTS: 2　　REF: 081809ai　NAT: G.SRT.C.8　TOP: Using Trigonometry to Find an Angle

504 ANS: 1

$$\cos C = \frac{15}{17}$$

$$C \approx 28$$

PTS: 2   REF: 012007geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

505 ANS: 1

The man's height, 69 inches, is opposite to the angle of elevation, and the shadow length, 102 inches, is adjacent to the angle of elevation. Therefore, tangent must be used to find the angle of elevation. $\tan x = \frac{69}{102}$

$$x \approx 34.1$$

PTS: 2   REF: fall1401geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

506 ANS: 2

$$\cos B = \frac{17.6}{26}$$

$$B \approx 47$$

PTS: 2   REF: 061806geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

507 ANS: 4

$$\sin x = \frac{10}{12}$$

$$x \approx 56$$

PTS: 2   REF: 061922geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

508 ANS:

$$\sin x = \frac{4.5}{11.75}$$

$$x \approx 23$$

PTS: 2   REF: 061528geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

509 ANS:

$\tan x = \frac{12}{75}$ $\tan y = \frac{72}{75}$ $43.83 - 9.09 \approx 34.7$

$x \approx 9.09$ $y \approx 43.83$

PTS: 4   REF: 081634geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

510 ANS:

$$\sin^{-1}\left(\frac{5}{25}\right) \approx 11.5$$

PTS: 2   REF: 081926geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

511 ANS:

$$\tan x = \frac{10}{4}$$

$$x \approx 68$$

PTS: 2   REF: 061630geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

512 ANS:

$$\cos W = \frac{6}{18}$$

$$W \approx 71$$

PTS: 2   REF: 011831geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

513 ANS: 3   PTS: 2   REF: 061524geo   NAT: G.CO.B.7
TOP: Triangle Congruency

514 ANS: 3
NYSED has stated that all students should be awarded credit regardless of their answer to this question.

PTS: 2   REF: 061722geo   NAT: G.CO.B.7   TOP: Triangle Congruency

515 ANS: 4
d) is SSA

PTS: 2   REF: 061914geo   NAT: G.CO.B.7   TOP: Triangle Congruency

516 ANS:

Translate $\triangle ABC$ along $\overline{CF}$ such that point C maps onto point F, resulting in image $\triangle A'B'C'$. Then reflect $\triangle A'B'C'$ over $\overline{DF}$ such that $\triangle A'B'C'$ maps onto $\triangle DEF$.
or
Reflect $\triangle ABC$ over the perpendicular bisector of $\overline{EB}$ such that $\triangle ABC$ maps onto $\triangle DEF$.

PTS: 2   REF: fall1408geo   NAT: G.CO.B.7   TOP: Triangle Congruency

517 ANS:
The transformation is a rotation, which is a rigid motion.

PTS: 2   REF: 081530geo   NAT: G.CO.B.7   TOP: Triangle Congruency

518 ANS:
$\angle Q \cong \angle M$ $\angle P \cong \angle N$ $\overline{QP} \cong \overline{MN}$

PTS: 2   REF: 012025geo   NAT: G.CO.B.7   TOP: Triangle Congruency

519 ANS:
Yes. $\angle A \cong \angle X$, $\angle C \cong \angle Z$, $\overline{AC} \cong \overline{XZ}$ after a sequence of rigid motions which preserve distance and angle measure, so $\triangle ABC \cong \triangle XYZ$ by ASA. $\overline{BC} \cong \overline{YZ}$ by CPCTC.

PTS: 2   REF: 081730geo   NAT: G.CO.B.7   TOP: Triangle Congruency

520 ANS:

Translations preserve distance. If point *D* is mapped onto point *A*, point *F* would map onto point *C*. $\triangle DEF \cong \triangle ABC$ as $\overline{AC} \cong \overline{DF}$ and points are collinear on line ℓ and a reflection preserves distance.

PTS: 4   REF: 081534geo   NAT: G.CO.B.7   TOP: Triangle Congruency

521 ANS:

Yes. The sequence of transformations consists of a reflection and a translation, which are isometries which preserve distance and congruency.

PTS: 2   REF: 011628geo   NAT: G.CO.B.7   TOP: Triangle Congruency

522 ANS:

No. Since $\overline{BC} = 5$ and $\overline{ST} = \sqrt{18}$ are not congruent, the two triangles are not congruent. Since rigid motions preserve distance, there is no rigid motion that maps $\triangle ABC$ onto $\triangle RST$.

PTS: 2   REF: 011830geo   NAT: G.CO.B.7   TOP: Triangle Congruency

523 ANS:

It is given that point *D* is the image of point *A* after a reflection in line *CH*. It is given that $\overleftrightarrow{CH}$ is the perpendicular bisector of $\overline{BCE}$ at point *C*. Since a bisector divides a segment into two congruent segments at its midpoint, $\overline{BC} \cong \overline{EC}$. Point *E* is the image of point *B* after a reflection over the line *CH*, since points *B* and *E* are equidistant from point *C* and it is given that $\overleftrightarrow{CH}$ is perpendicular to $\overline{BE}$. Point *C* is on $\overleftrightarrow{CH}$, and therefore, point *C* maps to itself after the reflection over $\overleftrightarrow{CH}$. Since all three vertices of triangle *ABC* map to all three vertices of triangle *DEC* under the same line reflection, then $\triangle ABC \cong \triangle DEC$ because a line reflection is a rigid motion and triangles are congruent when one can be mapped onto the other using a sequence of rigid motions.

PTS: 6   REF: spr1414geo   NAT: G.CO.B.7   TOP: Triangle Congruency

524 ANS:

Reflections are rigid motions that preserve distance.

PTS: 2   REF: 061530geo   NAT: G.CO.B.7   TOP: Triangle Congruency

525 ANS:

$\overline{LA} \cong \overline{DN}$, $\overline{CA} \cong \overline{CN}$, and $\overline{DAC} \perp \overline{LCN}$ (Given). $\angle LCA$ and $\angle DCN$ are right angles (Definition of perpendicular lines). $\triangle LAC$ and $\triangle DNC$ are right triangles (Definition of a right triangle). $\triangle LAC \cong \triangle DNC$ (HL). $\triangle LAC$ will map onto $\triangle DNC$ after rotating $\triangle LAC$ counterclockwise 90º about point *C* such that point *L* maps onto point *D*.

PTS: 4   REF: spr1408geo   NAT: G.CO.B.8   TOP: Triangle Congruency

526 ANS: 1   PTS: 2   REF: 011703geo   NAT: G.SRT.B.5
TOP: Triangle Congruency

527 ANS:

Yes. The triangles are congruent because of SSS $\left(5^2 + 12^2 = 13^2\right)$. All congruent triangles are similar.

PTS: 2   REF: 061830geo   NAT: G.SRT.B.5   TOP: Triangle Congruency

528 ANS: 2
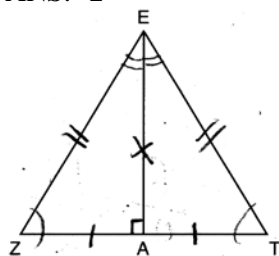
PTS: 2   REF: 061619geo   NAT: G.CO.C.10   TOP: Triangle Proofs

529 ANS:
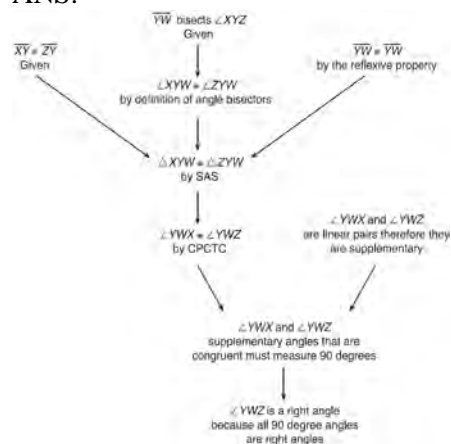
$\triangle XYZ$, $\overline{XY} \cong \overline{ZY}$, and $\overline{YW}$ bisects $\angle XYZ$ (Given). $\triangle XYZ$ is isosceles (Definition of isosceles triangle). $\overline{YW}$ is an altitude of $\triangle XYZ$ (The angle bisector of the vertex of an isosceles triangle is also the altitude of that triangle). $\overline{YW} \perp \overline{XZ}$ (Definition of altitude). $\angle YWZ$ is a right angle (Definition of perpendicular lines).

PTS: 4   REF: spr1411geo   NAT: G.CO.C.10   TOP: Triangle Proofs

530 ANS:
As the sum of the measures of the angles of a triangle is 180°, m$\angle ABC$ + m$\angle BCA$ + m$\angle CAB$ = 180°. Each interior angle of the triangle and its exterior angle form a linear pair. Linear pairs are supplementary, so m$\angle ABC$ + m$\angle FBC$ = 180°, m$\angle BCA$ + m$\angle DCA$ = 180°, and m$\angle CAB$ + m$\angle EAB$ = 180°. By addition, the sum of these linear pairs is 540°. When the angle measures of the triangle are subtracted from this sum, the result is 360°, the sum of the exterior angles of the triangle.

PTS: 4   REF: fall1410geo   NAT: G.CO.C.10   TOP: Triangle Proofs

531 ANS:
(2) Euclid's Parallel Postulate; (3) Alternate interior angles formed by parallel lines and a transversal are congruent; (4) Angles forming a line are supplementary; (5) Substitution

PTS: 4   REF: 011633geo   NAT: G.CO.C.10   TOP: Triangle Proofs

532 ANS: 3
1) only proves AA; 2) need congruent legs for HL; 3) SAS; 4) only proves product of altitude and base is equal

PTS: 2   REF: 061607geo   NAT: G.SRT.B.5   TOP: Triangle Proofs
KEY: statements

533 ANS: 2   PTS: 2   REF: 061709geo   NAT: G.SRT.B.5
    TOP: Triangle Proofs   KEY: statements

534 ANS: 4
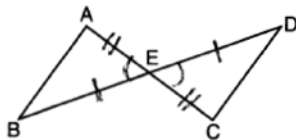
    PTS: 2   REF: 061908geo   NAT: G.SRT.B.5   TOP: Triangle Proofs
    KEY: statements

535 ANS: 3   PTS: 2   REF: 081622geo   NAT: G.SRT.B.5
    TOP: Triangle Proofs   KEY: statements

536 ANS: 4   PTS: 2   REF: 081810geo   NAT: G.SRT.B.5
    TOP: Triangle Proofs   KEY: statements

537 ANS:

$\overline{RS}$ and $\overline{TV}$ bisect each other at point *X;* $\overline{TR}$ and $\overline{SV}$ are drawn (given); $\overline{TX} \cong \overline{XV}$ and $\overline{RX} \cong \overline{XS}$ (segment bisectors create two congruent segments); $\angle TXR \cong \angle VXS$ (vertical angles are congruent); $\triangle TXR \cong \triangle VXS$ (SAS); $\angle T \cong \angle V$ (CPCTC); $\overline{TR} \parallel \overline{SV}$ (a transversal that creates congruent alternate interior angles cuts parallel lines).

    PTS: 4   REF: 061733geo   NAT: G.SRT.B.5   TOP: Triangle Proofs
    KEY: proof

538 ANS:

2 Reflexive; 4 $\angle BDA \cong \angle BDC$; 6 CPCTC; 7 If points *B* and *D* are equidistant from the endpoints of $\overline{AC}$, then *B* and *D* are on the perpendicular bisector of $\overline{AC}$.

    PTS: 4   REF: 081832geo   NAT: G.SRT.B.5   TOP: Triangle Proofs
    KEY: proof

539 ANS:

$\triangle ABE \cong \triangle CBD$ (given); $\angle A \cong \angle C$ (CPCTC); $\angle AFD \cong \angle CFE$ (vertical angles are congruent); $\overline{AB} \cong \overline{CB}$, $\overline{DB} \cong \overline{EB}$ (CPCTC); $\overline{AD} \cong \overline{CE}$ (segment subtraction); $\triangle AFD \cong \triangle CFE$ (AAS)

    PTS: 4   REF: 081933geo   NAT: G.SRT.B.5   TOP: Triangle Proofs
    KEY: proof

540 ANS:

Parallelogram *ABCD*, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at *E* (given). $\overline{DC} \parallel \overline{AB}$; $\overline{DA} \parallel \overline{CB}$ (opposite sides of a parallelogram are parallel). $\angle ACD \cong \angle CAB$ (alternate interior angles formed by parallel lines and a transversal are congruent).

    PTS: 2   REF: 081528geo   NAT: G.CO.C.11   TOP: Quadrilateral Proofs

541 ANS:

Quadrilateral *ABCD* with diagonals $\overline{AC}$ and $\overline{BD}$ that bisect each other, and $\angle 1 \cong \angle 2$ (given); quadrilateral *ABCD* is a parallelogram (the diagonals of a parallelogram bisect each other); $\overline{AB} \parallel \overline{CD}$ (opposite sides of a parallelogram are parallel); $\angle 1 \cong \angle 3$ and $\angle 2 \cong \angle 4$ (alternate interior angles are congruent); $\angle 2 \cong \angle 3$ and $\angle 3 \cong \angle 4$ (substitution); $\triangle ACD$ is an isosceles triangle (the base angles of an isosceles triangle are congruent); $\overline{AD} \cong \overline{DC}$ (the sides of an isosceles triangle are congruent); quadrilateral *ABCD* is a rhombus (a rhombus has consecutive congruent sides); $\overline{AE} \perp \overline{BE}$ (the diagonals of a rhombus are perpendicular); $\angle BEA$ is a right angle (perpendicular lines form a right angle); $\triangle AEB$ is a right triangle (a right triangle has a right angle).

PTS: 6   REF: 061635geo   NAT: G.CO.C.11   TOP: Quadrilateral Proofs

542 ANS:

Parallelogram *ABCD*, $\overline{BF} \perp \overline{AFD}$, and $\overline{DE} \perp \overline{BEC}$ (given); $\overline{BC} \parallel \overline{AD}$ (opposite sides of a $\square$ are $\parallel$); $\overline{BE} \parallel \overline{FD}$ (parts of $\parallel$ lines are $\parallel$); $\overline{BF} \parallel \overline{DE}$ (two lines $\perp$ to the same line are $\parallel$); *BEDF* is $\square$ (a quadrilateral with both pairs of opposite sides $\parallel$ is a $\square$); $\angle DEB$ is a right $\angle$ ($\perp$ lines form right $\angle$s); *BEDF* is a rectangle (a $\square$ with one right $\angle$ is a rectangle).

PTS: 6   REF: 061835geo   NAT: G.CO.C.11   TOP: Quadrilateral Proofs

543 ANS:

Quadrilateral *ABCD* is a parallelogram with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at *E* (Given). $\overline{AD} \cong \overline{BC}$ (Opposite sides of a parallelogram are congruent). $\angle AED \cong \angle CEB$ (Vertical angles are congruent). $\overline{BC} \parallel \overline{DA}$ (Definition of parallelogram). $\angle DBC \cong \angle BDA$ (Alternate interior angles are congruent). $\triangle AED \cong \triangle CEB$ (AAS). 180° rotation of $\triangle AED$ around point *E*.

PTS: 4   REF: 061533geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

544 ANS:

Parallelogram *ABCD* with diagonal $\overline{AC}$ drawn (given). $\overline{AC} \cong \overline{AC}$ (reflexive property). $\overline{AD} \cong \overline{CB}$ and $\overline{BA} \cong \overline{DC}$ (opposite sides of a parallelogram are congruent). $\triangle ABC \cong \triangle CDA$ (SSS).

PTS: 2   REF: 011825geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

545 ANS:

Parallelogram *ABCD*, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$ (given). $\angle BEC \cong \angle DFC$ (perpendicular lines form right angles, which are congruent). $\angle FCD \cong \angle BCE$ (reflexive property). $\triangle BEC \cong \triangle DFC$ (ASA). $\overline{BC} \cong \overline{CD}$ (CPCTC). *ABCD* is a rhombus (a parallelogram with consecutive congruent sides is a rhombus).

PTS: 6   REF: 081535geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

546 ANS:

Parallelogram *ANDR* with $\overline{AW}$ and $\overline{DE}$ bisecting $\overline{NWD}$ and $\overline{REA}$ at points *W* and *E* (Given). $\overline{AN} \cong \overline{RD}$, $\overline{AR} \cong \overline{DN}$ (Opposite sides of a parallelogram are congruent). $AE = \frac{1}{2}AR$, $WD = \frac{1}{2}DN$, so $\overline{AE} \cong \overline{WD}$ (Definition of bisect and division property of equality). $\overline{AR} \parallel \overline{DN}$ (Opposite sides of a parallelogram are parallel). *AWDE* is a parallelogram (Definition of parallelogram). $RE = \frac{1}{2}AR$, $NW = \frac{1}{2}DN$, so $\overline{RE} \cong \overline{NW}$ (Definition of bisect and division property of equality). $\overline{ED} \cong \overline{AW}$ (Opposite sides of a parallelogram are congruent). $\triangle ANW \cong \triangle DRE$ (SSS).

PTS: 6   REF: 011635geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

547 ANS:

Quadrilateral *ABCD*, $\overline{AB} \cong \overline{CD}$, $\overline{AB} \parallel \overline{CD}$, and $\overline{BF}$ and $\overline{DE}$ are perpendicular to diagonal $\overline{AC}$ at points *F* and *E* (given). $\angle AED$ and $\angle CFB$ are right angles (perpendicular lines form right angles). $\angle AED \cong \angle CFB$ (All right angles are congruent). *ABCD* is a parallelogram (A quadrilateral with one pair of sides congruent and parallel is a parallelogram). $\overline{AD} \parallel \overline{BC}$ (Opposite sides of a parallelogram are parallel). $\angle DAE \cong \angle BCF$ (Parallel lines cut by a transversal form congruent alternate interior angles). $\overline{DA} \cong \overline{BC}$ (Opposite sides of a parallelogram are congruent). $\triangle ADE \cong \triangle CBF$ (AAS). $\overline{AE} \cong \overline{CF}$ (CPCTC).

PTS: 6   REF: 011735geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

548 ANS:

Quadrilateral *MATH*, $\overline{HM} \cong \overline{AT}$, $\overline{HT} \cong \overline{AM}$, $\overline{HE} \perp \overline{MEA}$, and $\overline{HA} \perp \overline{AT}$ (given); $\angle HEA$ and $\angle TAH$ are right angles (perpendicular lines form right angles); $\angle HEA \cong \angle TAH$ (all right angles are congruent); *MATH* is a parallelogram (a quadrilateral with two pairs of congruent opposite sides is a parallelogram); $\overline{MA} \parallel \overline{TH}$ (opposite sides of a parallelogram are parallel); $\angle THA \cong \angle EAH$ (alternate interior angles of parallel lines and a transversal are congruent); $\triangle HEA \sim \triangle TAH$ (AA); $\frac{HA}{TH} = \frac{HE}{TA}$ (corresponding sides of similar triangles are in proportion); $TA \bullet HA = HE \bullet TH$ (product of means equals product of extremes).

PTS: 6   REF: 061935geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

549 ANS:

Isosceles trapezoid *ABCD*, $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$ (given); $\overline{AD} \cong \overline{BC}$ (congruent legs of isosceles trapezoid); $\angle DEA$ and $\angle CEB$ are right angles (perpendicular lines form right angles); $\angle DEA \cong \angle CEB$ (all right angles are congruent); $\angle CDA \cong \angle DCB$ (base angles of an isosceles trapezoid are congruent); $\angle CDA - \angle CDE \cong \angle DCB - \angle DCE$ (subtraction postulate); $\triangle ADE \cong \triangle BCE$ (AAS); $\overline{EA} \cong \overline{EB}$ (CPCTC);

        $\angle EDA \cong \angle ECB$

$\triangle AEB$ is an isosceles triangle (an isosceles triangle has two congruent sides).

PTS: 6   REF: 081735geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

550 ANS:

Quadrilateral $ABCD$ with diagonal $\overline{AC}$, segments GH and EF, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$ (given); $\overline{HF} \cong \overline{HF}$, $\overline{AC} \cong \overline{AC}$ (reflexive property); $\overline{AH} + \overline{HF} \cong \overline{CF} + \overline{HF}$, $\overline{AE} + \overline{BE} \cong \overline{CG} + \overline{DG}$ (segment

$$\overline{AF} \cong \overline{CH} \qquad \overline{AB} \cong \overline{CD}$$

addition); $\triangle ABC \cong \triangle CDA$ (SSS); $\angle EAF \cong \angle GCH$ (CPCTC); $\triangle AEF \cong \triangle CGH$ (SAS); $\overline{EF} \cong \overline{GH}$ (CPCTC).

PTS: 6   REF: 011935geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

551 ANS:

Quadrilateral $ABCD$, E and F are points on $\overline{BC}$ and $\overline{AD}$, respectively, and $\overline{BGD}$ and $\overline{EGF}$ are drawn such that $\angle ABG \cong \angle CDG$, $\overline{AB} \cong \overline{CD}$, and $\overline{CE} \cong \overline{AF}$ (given); $\overline{BD} \cong \overline{BD}$ (reflexive); $\triangle ABD \cong \triangle CDB$ (SAS); $\overline{BC} \cong \overline{DA}$ (CPCTC); $\overline{BE} + \overline{CE} \cong \overline{AF} + \overline{DF}$ (segment addition); $\overline{BE} \cong \overline{DF}$ (segment subtraction); $\angle BGE \cong \angle DGF$ (vertical angles are congruent); $\angle CBD \cong \angle ADB$ (CPCTC); $\triangle EBG \cong \triangle FDG$ (AAS); $\overline{FG} \cong \overline{EG}$ (CPCTC).

PTS: 6   REF: 012035geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

552 ANS:

Circle O, secant $\overline{ACD}$, tangent $\overline{AB}$ (Given). Chords $\overline{BC}$ and $\overline{BD}$ are drawn (Auxiliary lines). $\angle A \cong \angle A$, $\overparen{BC} \cong \overparen{BC}$ (Reflexive property). $m\angle BDC = \frac{1}{2} m\overparen{BC}$ (The measure of an inscribed angle is half the measure of the intercepted arc). $m\angle CBA = \frac{1}{2} m\overparen{BC}$ (The measure of an angle formed by a tangent and a chord is half the measure of the intercepted arc). $\angle BDC \cong \angle CBA$ (Angles equal to half of the same arc are congruent). $\triangle ABC \sim \triangle ADB$ (AA). $\frac{AB}{AC} = \frac{AD}{AB}$ (Corresponding sides of similar triangles are proportional). $AC \cdot AD = AB^2$ (In a proportion, the product of the means equals the product of the extremes).

PTS: 6   REF: spr1413geo   NAT: G.SRT.B.5   TOP: Circle Proofs

553 ANS:

Circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E (Given); Chords $\overline{CB}$ and $\overline{AD}$ are drawn (auxiliary lines drawn); $\angle CEB \cong \angle AED$ (vertical angles); $\angle C \cong \angle A$ (Inscribed angles that intercept the same arc are congruent); $\triangle BCE \sim \triangle DAE$ (AA); $\frac{AE}{CE} = \frac{ED}{EB}$ (Corresponding sides of similar triangles are proportional); $AE \cdot EB = CE \cdot ED$ (The product of the means equals the product of the extremes).

PTS: 6   REF: 081635geo   NAT: G.SRT.B.5   TOP: Circle Proofs

554 ANS:

Circle O, tangent $\overline{EC}$ to diameter $\overline{AC}$, chord $\overline{BC} \parallel$ secant $\overline{ADE}$, and chord $\overline{AB}$ (given); $\angle B$ is a right angle (an angle inscribed in a semi-circle is a right angle); $\overleftrightarrow{EC} \perp \overline{OC}$ (a radius drawn to a point of tangency is perpendicular to the tangent); $\angle ECA$ is a right angle (perpendicular lines form right angles); $\angle B \cong \angle ECA$ (all right angles are congruent); $\angle BCA \cong \angle CAE$ (the transversal of parallel lines creates congruent alternate interior angles); $\triangle ABC \sim \triangle ECA$ (AA); $\frac{BC}{CA} = \frac{AB}{EC}$ (Corresponding sides of similar triangles are in proportion).

PTS: 4   REF: 081733geo   NAT: G.SRT.B.5   TOP: Circle Proofs

555 ANS: 4
AA

PTS: 2   REF: 061809geo   NAT: G.SRT.A.3   TOP: Similarity Proofs

556 ANS: 4

$$\frac{36}{45} \neq \frac{15}{18}$$

$$\frac{4}{5} \neq \frac{5}{6}$$

PTS: 2   REF: 081709geo   NAT: G.SRT.A.3   TOP: Similarity Proofs

557 ANS:

Parallelogram *ABCD*, $\overline{EFG}$, and diagonal $\overline{DFB}$ (given); $\angle DFE \cong \angle BFG$ (vertical angles); $\overline{AD} \parallel \overline{CB}$ (opposite sides of a parallelogram are parallel); $\angle EDF \cong \angle GBF$ (alternate interior angles are congruent); $\triangle DEF \sim \triangle BGF$ (AA).

PTS: 4   REF: 061633geo   NAT: G.SRT.A.3   TOP: Similarity Proofs

558 ANS:

A dilation of $\frac{5}{2}$ about the origin. Dilations preserve angle measure, so the triangles are similar by AA.

PTS: 4   REF: 061634geo   NAT: G.SRT.A.3   TOP: Similarity Proofs

559 ANS:

$\overline{GI}$ is parallel to $\overline{NT}$, and $\overline{IN}$ intersects at *A* (given); $\angle I \cong \angle N$, $\angle G \cong \angle T$ (paralleling lines cut by a transversal form congruent alternate interior angles); $\triangle GIA \sim \triangle TNA$ (AA).

PTS: 2   REF: 011729geo   NAT: G.SRT.A.3   TOP: Similarity Proofs

560 ANS:

Circle *A* can be mapped onto circle *B* by first translating circle *A* along vector $\overline{AB}$ such that *A* maps onto *B*, and then dilating circle *A*, centered at *A*, by a scale factor of $\frac{5}{3}$. Since there exists a sequence of transformations that maps circle *A* onto circle *B*, circle *A* is similar to circle *B*.

PTS: 2   REF: spr1404geo   NAT: G.C.A.1   TOP: Similarity Proofs