JMAP
REGENTS BY COMMON CORE STATE STANDARD: TOPIC

NY Geometry Regents Exam Questions
from Spring 2014 to August 2017 Sorted by CCSS:Topic

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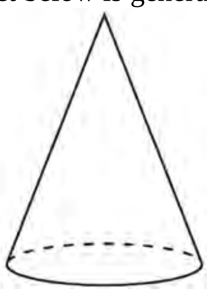
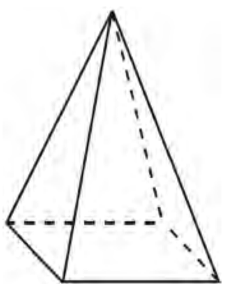
Geometry Regents Exam Questions by Common Core State Standard: Topic

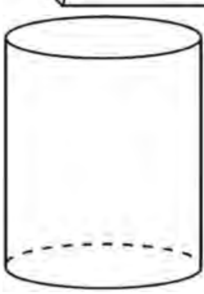
TOOLS OF GEOMETRY

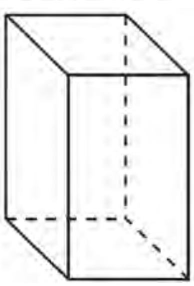
G.GMD.B.4: ROTATIONS OF TWO-DIMENSIONAL OBJECTS

1 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?

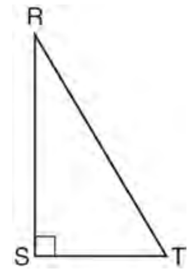
1) 

2) 

3) 

4) 

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

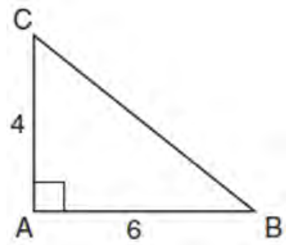


1) a pyramid with a square base
2) an isosceles triangle
3) a right triangle
4) a cone

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

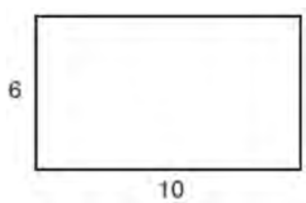
1) pyramid
2) rectangular prism
3) cone
4) cylinder

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.

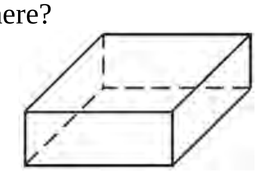


Which line could the rectangle be rotated around?
1) a long side
2) a short side
3) the vertical line of symmetry
4) the horizontal line of symmetry

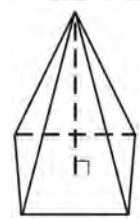
6 If an equilateral triangle is continuously rotated around one of its medians, which 3-dimensional object is generated?
1) cone
2) pyramid
3) prism
4) sphere

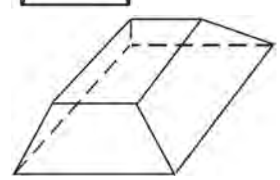
G.GMD.B.4: CROSS-SECTIONS OF THREE-DIMENSIONAL OBJECTS

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

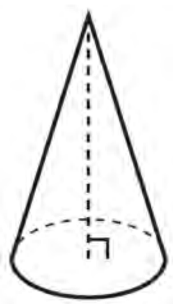
1) 

2) 

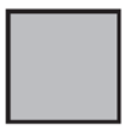
3) 

4) 

8 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) 

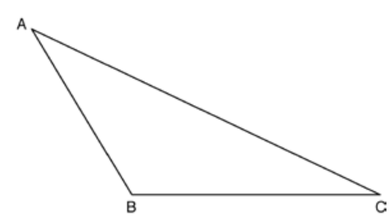
9 The cross section of a regular pyramid contains the altitude of the pyramid. The shape of this cross section is a
1) circle
2) square
3) triangle
4) rectangle

10 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

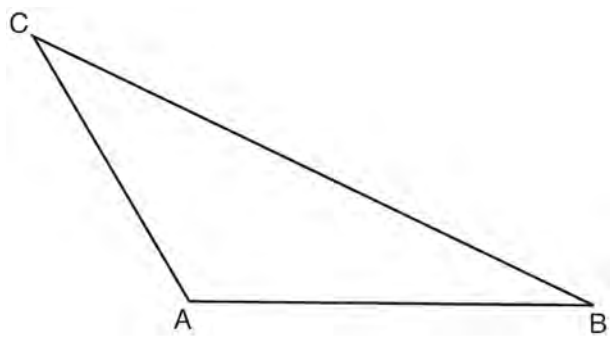
11 A two-dimensional cross section is taken of a three-dimensional object. If this cross section is a triangle, what can *not* be the three-dimensional object?
1) cone
2) cylinder
3) pyramid
4) rectangular prism

G.CO.D.12-13: CONSTRUCTIONS

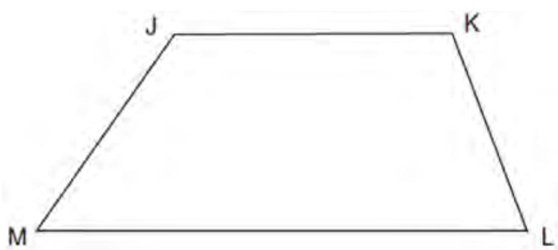
12 Using a compass and straightedge, construct an altitude of triangle *ABC* below. [Leave all construction marks.]



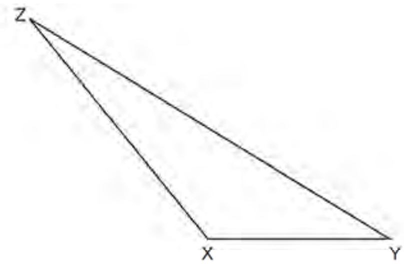
13 In the diagram of $\triangle ABC$ shown below, use a compass and straightedge to construct the median to $\overline{AB}$. [Leave all construction marks.]



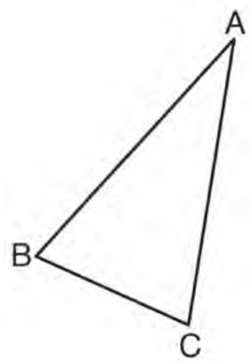
14 Given: Trapezoid $JKLM$ with $\overline{JK} \parallel \overline{ML}$
Using a compass and straightedge, construct the altitude from vertex J to $\overline{ML}$. [Leave all construction marks.]



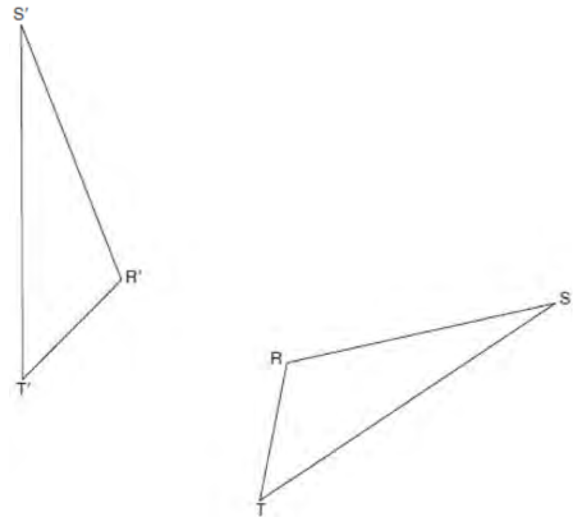
15 Triangle XYZ is shown below. Using a compass and straightedge, on the line below, construct and label $\triangle ABC$, such that $\triangle ABC \cong \triangle XYZ$. [Leave all construction marks.] Based on your construction, state the theorem that justifies why $\triangle ABC$ is congruent to $\triangle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



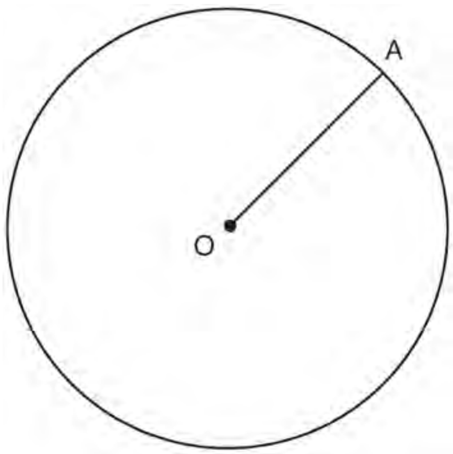
16 Using a compass and straightedge, construct and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation with a scale factor of 2 and centered at B. [Leave all construction marks.] Describe the relationship between the lengths of $\overline{AC}$ and $\overline{A'C'}$.



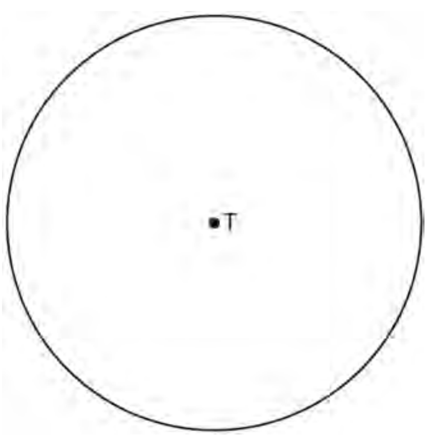
17 Using a compass and straightedge, construct the line of reflection over which triangle RST reflects onto triangle R'S'T'. [Leave all construction marks.]



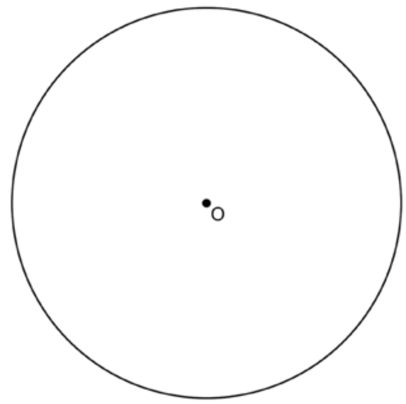
18 In the diagram below, radius $\overline{OA}$ is drawn in circle O. Using a compass and a straightedge, construct a line tangent to circle O at point A. [Leave all construction marks.]



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

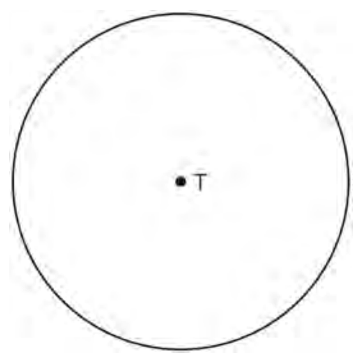


20 Using a straightedge and compass, construct a square inscribed in circle O below. [Leave all construction marks.]

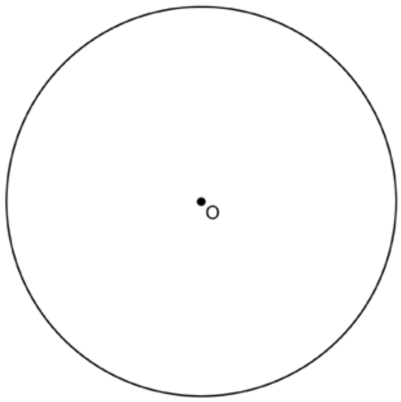


Determine the measure of the arc intercepted by two adjacent sides of the constructed square. Explain your reasoning.

21 Construct an equilateral triangle inscribed in circle T shown below. [Leave all construction marks.]

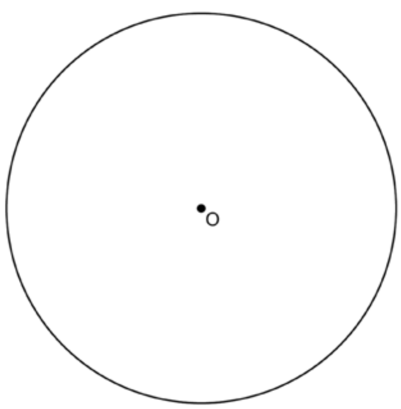


22 Using a compass and straightedge, construct a regular hexagon inscribed in circle O below. Label it $ABCDEF$. [Leave all construction marks.]



If chords $\overline{FB}$ and $\overline{FC}$ are drawn, which type of triangle, according to its angles, would $\triangle FBC$ be? Explain your answer.

23 Using a compass and straightedge, construct a regular hexagon inscribed in circle O. [Leave all construction marks.]



LINES AND ANGLES

G.GPE.B.6: DIRECTED LINE SEGMENTS

24 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) $(6.4,2.8)$

25 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) $(1,-1)$

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

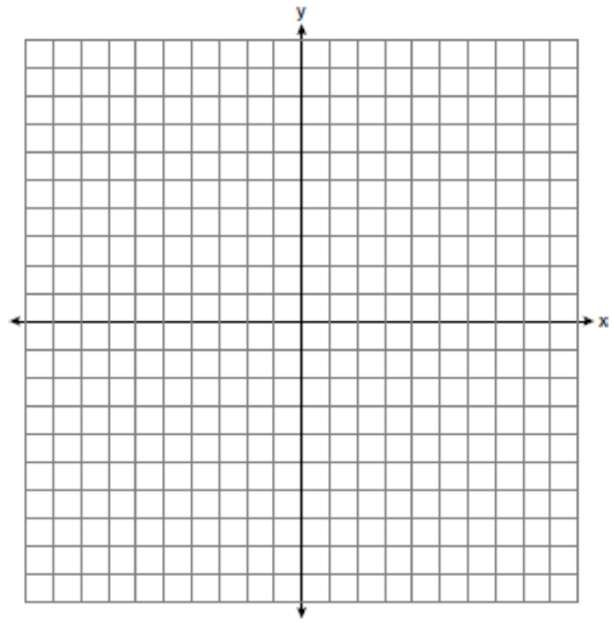
27 Point Q is on $\overline{MN}$ such that $MQ:QN = 2:3$. If M has coordinates $(3,5)$ and N has coordinates $(8,-5)$, the coordinates of Q are
1) $(5,1)$
2) $(5,0)$
3) $(6,-1)$
4) $(6,0)$

28 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) $(10,2)$

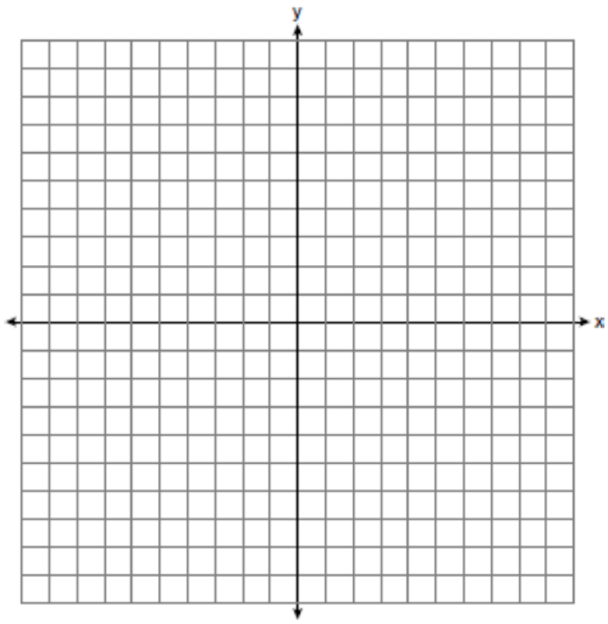
29 The endpoints of $\overline{DEF}$ are $D(1,4)$ and $F(16,14)$. Determine and state the coordinates of point E, if $DE:EF = 2:3$.

30 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.

31 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.]

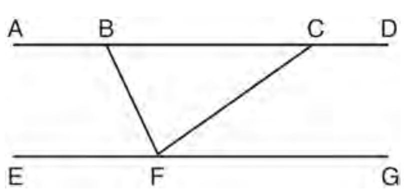


32 Directed line segment PT has endpoints whose coordinates are $P(-2,1)$ and $T(4,7)$. Determine the coordinates of point J that divides the segment in the ratio 2 to 1. [The use of the set of axes below is optional.]



G.CO.C.9: LINES & ANGLES

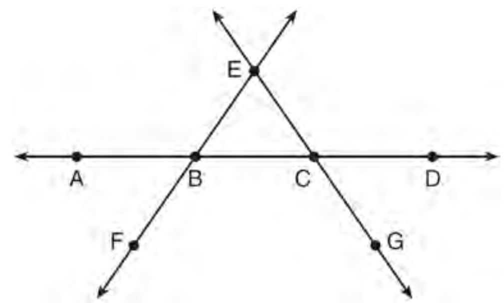
33 Steve drew line segments $ABCD$, EFG, BF, and CF as shown in the diagram below. Scalene $\triangle BFC$ is formed.



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) $\angle CBF \cong \angle GFC$

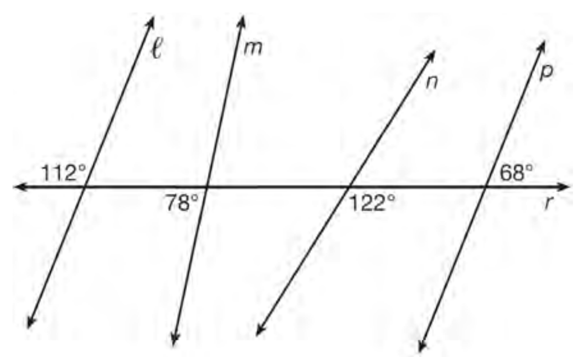
34 In the diagram below, $\overleftrightarrow{FE}$ bisects $\overline{AC}$ at B, and $\overleftrightarrow{GE}$ bisects $\overline{BD}$ at C.



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.

35 In the diagram below, lines ℓ, m, n, and p intersect line r.



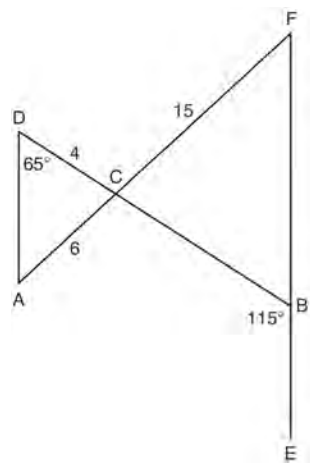
Which statement is true?

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

36 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) $\overline{DE}, \overline{CE}$

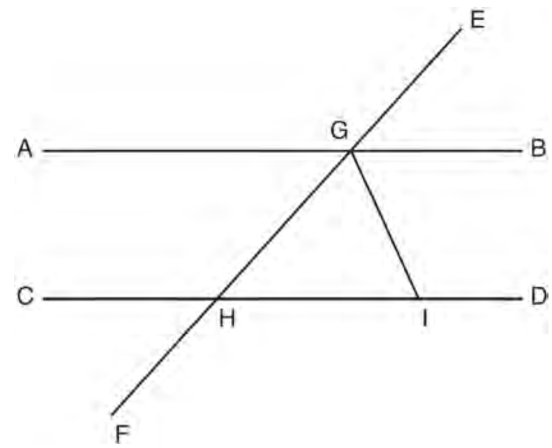
37 In the diagram below, $\overline{DB}$ and $\overline{AF}$ intersect at point C, and $\overline{AD}$ and $\overline{FBE}$ are drawn.



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

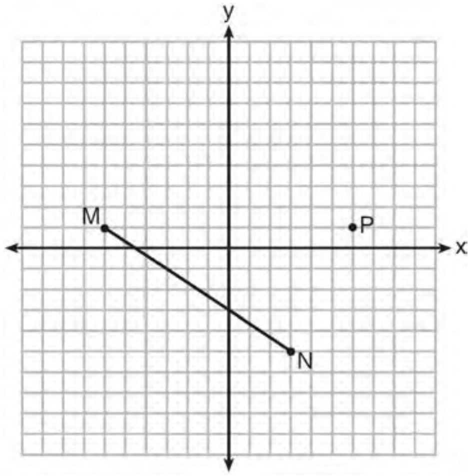
38 In the diagram below, $\overline{EF}$ intersects $\overline{AB}$ and $\overline{CD}$ at G and H, respectively, and $\overline{GI}$ is drawn such that $\overline{GH} \cong \overline{IH}$.



If $m\angle EGB = 50°$ and $m\angle DIG = 115°$, explain why $\overline{AB} \parallel \overline{CD}$.

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

39 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 $\overline{MN}$?



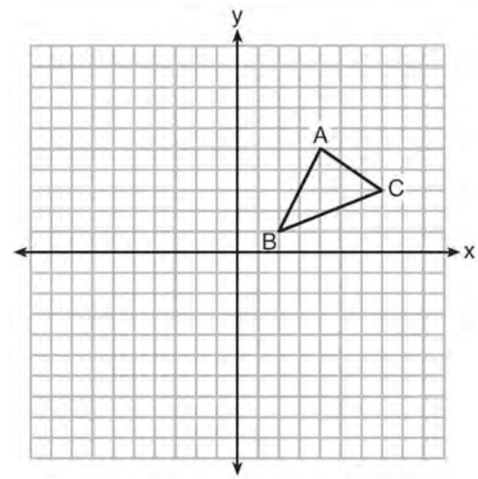
1) $y=-\frac{2}{3}x+5$

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

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

4) $y=\frac{3}{2}x-8$

40 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 $\overline{BC}$?

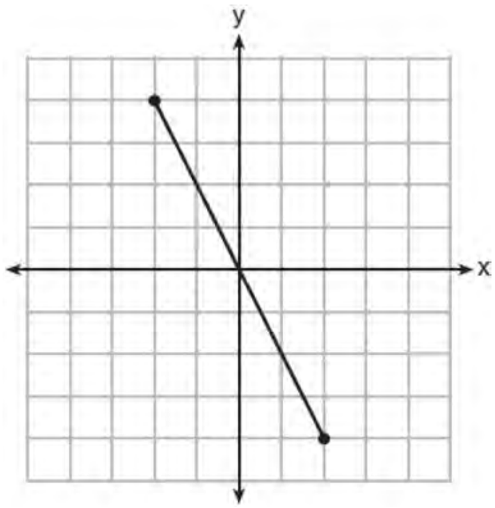
1) $\frac{2}{5}$

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

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

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

41 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) $2y - x = 0$

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

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

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

1) $y = -\frac{1}{2}x + 6$
2) $y = \frac{1}{2}x + 6$
3) $y = -2x + 6$
4) $y = 2x + 6$

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

1) $y = -\frac{1}{2}x + 4$
2) $y = -\frac{1}{2}x - 1$
3) $y = 2x + 14$
4) $y = 2x - 16$

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

1) $y + 1 = \frac{4}{3}(x + 3)$
2) $y + 1 = -\frac{3}{4}(x + 3)$
3) $y - 6 = \frac{4}{3}(x - 8)$
4) $y - 6 = -\frac{3}{4}(x - 8)$

46 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) $y = -\frac{2}{3}x - 5$
2) $y = -\frac{2}{3}x - 3$
3) $y = \frac{2}{3}x + 1$
4) $y = \frac{2}{3}x + 10$

TRIANGLES

G.SRT.C.8: PYTHAGOREAN THEOREM, 30-60-90 TRIANGLES

47 An equilateral triangle has sides of length 20. To the *nearest tenth*, what is the height of the equilateral triangle?

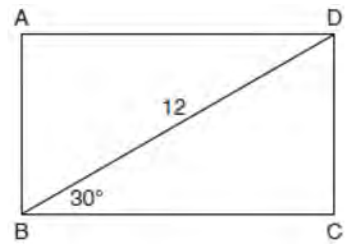
1) 10.0
2) 11.5
3) 17.3
4) 23.1

48 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

49 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.

50 The diagram shows rectangle *ABCD*, with diagonal $\overline{BD}$.



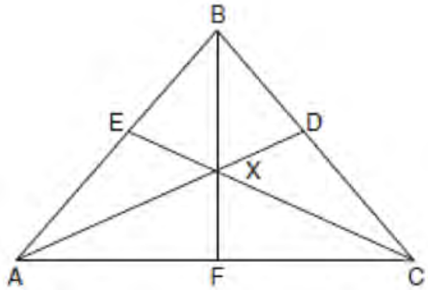
What is the perimeter of rectangle *ABCD*, to the *nearest tenth*?

1) 28.4
2) 32.8
3) 48.0
4) 62.4

G.SRT.B.5: ISOSCELES TRIANGLE THEOREM

51 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.

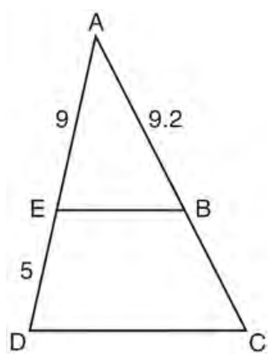
52 In the diagram below of isosceles triangle ABC, $\overline{AB} \cong \overline{CB}$ and angle bisectors $\overline{AD}$, $\overline{BF}$, and $\overline{CE}$ are drawn and intersect at X.



If $m\angle BAC = 50°$, find $m\angle AXC$.

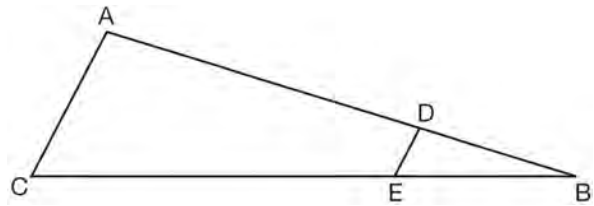
G.SRT.B.5: SIDE SPLITTER THEOREM

53 In the diagram of $\triangle ADC$ below, $\overline{EB} \parallel \overline{DC}$, $AE = 9$, $ED = 5$, and $AB = 9.2$.



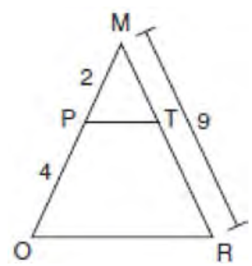
What is the length of $\overline{AC}$, to the *nearest tenth*?
1) 5.1
2) 5.2
3) 14.3
4) 14.4

54 In the diagram of $\triangle ABC$, points D and E are on $\overline{AB}$ and $\overline{CB}$, respectively, such that $\overline{AC} \parallel \overline{DE}$.



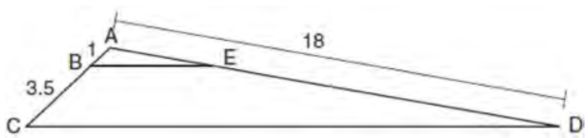
If $AD = 24$, $DB = 12$, and $DE = 4$, what is the length of $\overline{AC}$?
1) 8
2) 12
3) 16
4) 72

55 Given $\triangle MRO$ shown below, with trapezoid $PTRO$, $MR = 9$, $MP = 2$, and $PO = 4$.



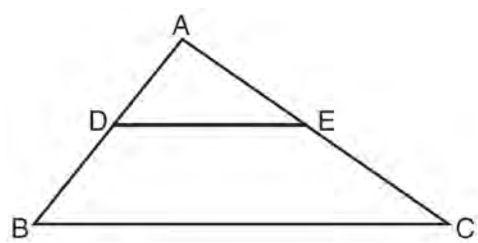
What is the length of $\overline{TR}$?
1) 4.5
2) 5
3) 3
4) 6

56 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 $AD = 18$.



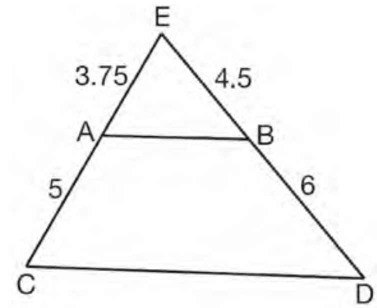
What is the length of $\overline{AE}$, to the *nearest tenth*?
1) 14.0
2) 5.1
3) 3.3
4) 4.0

57 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 $AC = 15$

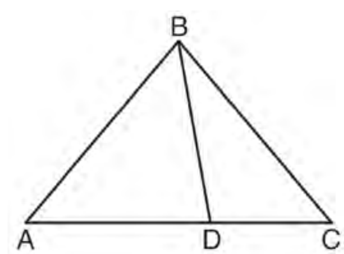
58 In $\triangle CED$ as shown below, points A and B are located on sides $\overline{CE}$ and $\overline{ED}$, respectively. Line segment AB is drawn such that $AE = 3.75$, $AC = 5$, $EB = 4.5$, and $BD = 6$.



Explain why $\overline{AB}$ is parallel to $\overline{CD}$.

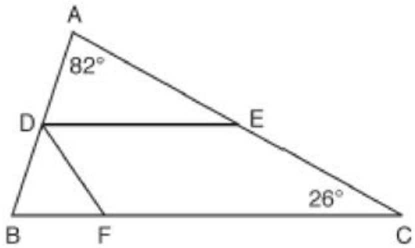
G.CO.C.10: INTERIOR AND EXTERIOR ANGLES OF TRIANGLES

59 In the diagram below, $m\angle BDC = 100°$, $m\angle A = 50°$, and $m\angle DBC = 30°$.



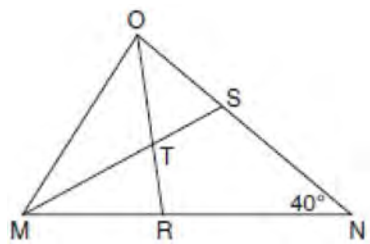
Which statement is true?
1) $\triangle ABD$ is obtuse.
2) $\triangle ABC$ is isosceles.
3) $m\angle ABD = 80°$
4) $\triangle ABD$ is scalene.

60 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°

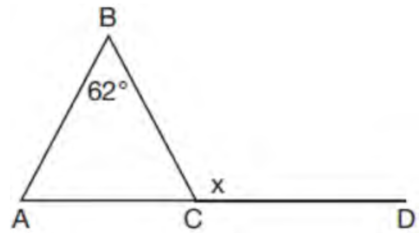
61 In the diagram below of triangle *MNO*, $\angle M$ and $\angle O$ are bisected by $\overline{MS}$ and $\overline{OR}$, respectively. Segments *MS* and *OR* intersect at *T*, and $m\angle N = 40°$.



If $m\angle TMR = 28°$, the measure of angle *OTS* is
1) 40º
2) 50º
3) 60º
4) 70º

G.CO.C.10: EXTERIOR ANGLE THEOREM

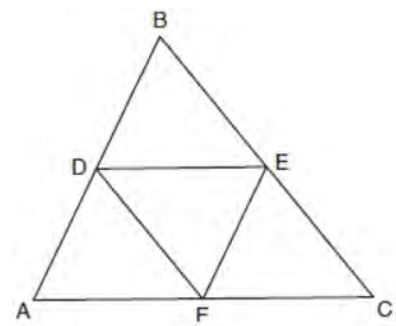
62 Given $\triangle ABC$ with $m\angle B = 62°$ and side $\overline{AC}$ extended to *D*, as shown below.



Which value of *x* makes $\overline{AB} \cong \overline{CB}$?
1) 59º
2) 62º
3) 118º
4) 121º

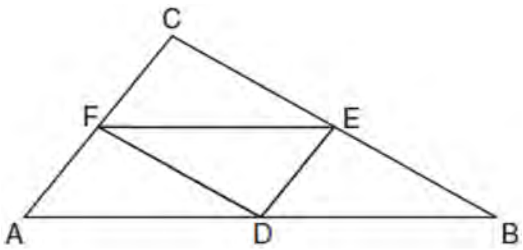
G.CO.C.10: MIDSEGMENTS

63 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) $AB + AC$

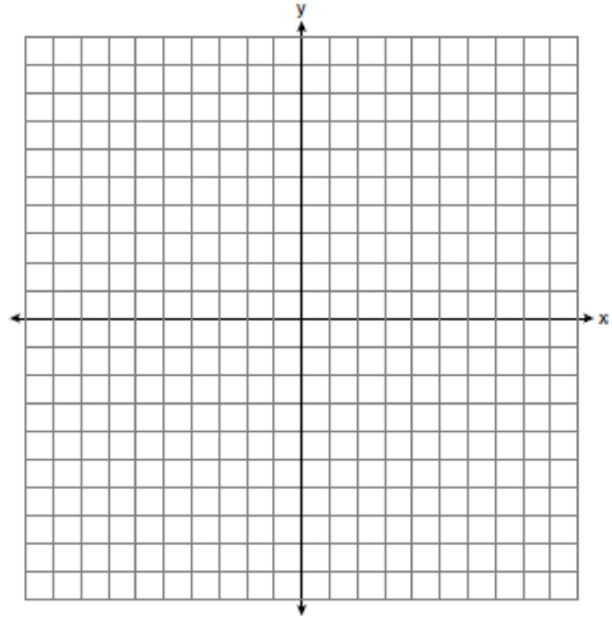
64 In the diagram below of $\triangle ABC$, D, E, and F are the midpoints of $\overline{AB}$, $\overline{BC}$, and $\overline{CA}$, respectively.



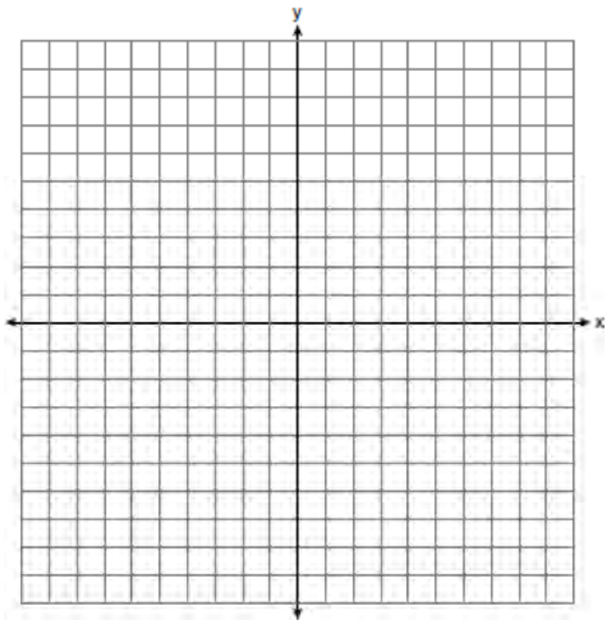
What is the ratio of the area of $\triangle CFE$ to the area of $\triangle CAB$?
1) 1:1
2) 1:2
3) 1:3
4) 1:4

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

65 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.]



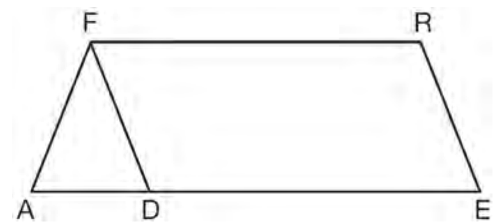
66 Triangle PQR has vertices $P(-3,-1)$, $Q(-1,7)$, and $R(3,3)$, and points A and B are midpoints of $\overline{PQ}$ and $\overline{RQ}$, respectively. Use coordinate geometry to prove that $\overline{AB}$ is parallel to $\overline{PR}$ and is half the length of $\overline{PR}$. [The use of the set of axes below is optional.]



67 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

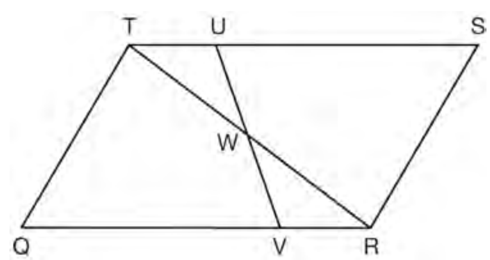
POLYGONS
G.CO.C.11: INTERIOR AND EXTERIOR ANGLES OF POLYGONS

68 In the diagram of parallelogram $FRED$ shown below, $\overline{ED}$ is extended to A, and $\overline{AF}$ is drawn such that $\overline{AF} \cong \overline{DF}$.



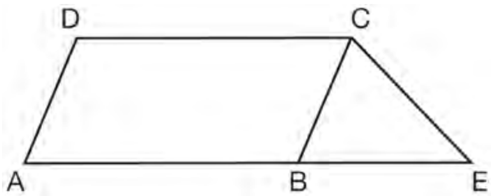
If $m\angle R = 124°$, what is $m\angle AFD$?
1) 124°
2) 112°
3) 68°
4) 56°

69 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.



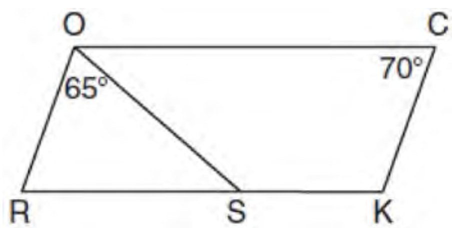
If $m\angle S = 60°$, $m\angle SRT = 83°$, and $m\angle TWU = 35°$, what is $m\angle WVQ$?
1) 37º
2) 60º
3) 72º
4) 83º

70 In the diagram below, $ABCD$ is a parallelogram, $\overline{AB}$ is extended through B to E, and $\overline{CE}$ is drawn.



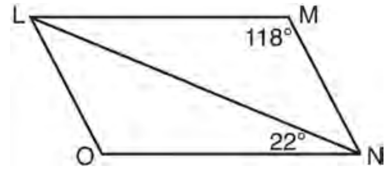
If $\overline{CE} \cong \overline{BE}$ and $m\angle D = 112°$, what is $m\angle E$?
1) 44°
2) 56°
3) 68°
4) 112°

71 In the diagram below of parallelogram $ROCK$, $m\angle C$ is 70° and $m\angle ROS$ is 65°.



What is $m\angle KSO$?
1) 45º
2) 110º
3) 115º
4) 135º

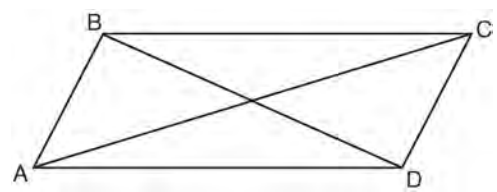
72 The diagram below shows parallelogram $LMNO$ with diagonal $\overline{LN}$, $m\angle M = 118°$, and $m\angle LNO = 22°$.



Explain why $m\angle NLO$ is 40 degrees.

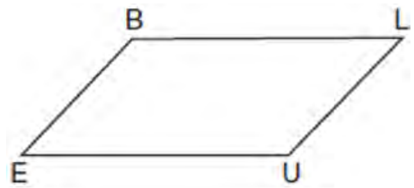
G.CO.C.11: PARALLELOGRAMS

73 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 $\overline{BC} \parallel \overline{AD}$

74 In quadrilateral *BLUE* shown below, $\overline{BE} \cong \overline{UL}$.



Which information would be sufficient to prove quadrilateral *BLUE* is a parallelogram?

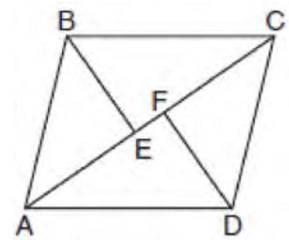
1) $\overline{BL} \parallel \overline{EU}$
2) $\overline{LU} \parallel \overline{BE}$
3) $\overline{BE} \cong \overline{BL}$
4) $\overline{LU} \cong \overline{EU}$

75 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 $\overline{BC} \parallel \overline{AD}$

G.CO.C.11: SPECIAL QUADRILATERALS

76 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

77 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

78 A parallelogram must be a rectangle when its

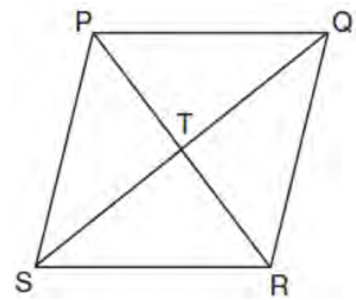
1) diagonals are perpendicular
2) diagonals are congruent
3) opposite sides are parallel
4) opposite sides are congruent

79 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

80 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 $\angle DCB$

81 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) $\overline{AB} \perp \overline{CD}$

82 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

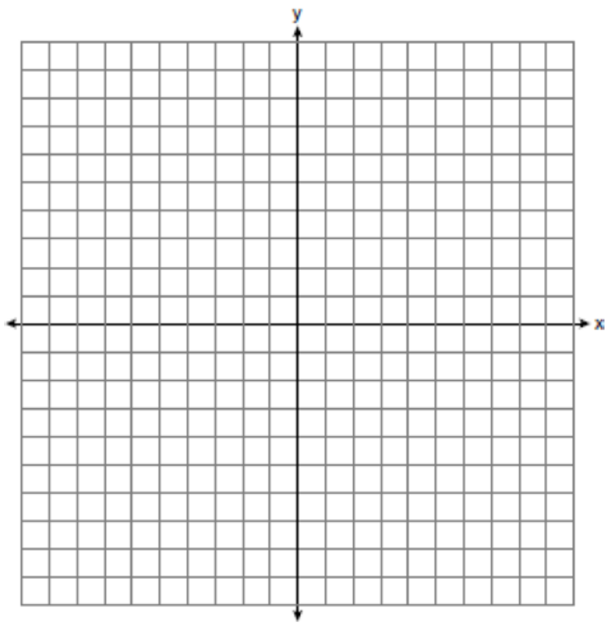
83 The diagonals of rhombus $TEAM$ intersect at $P(2,1)$. If the equation of the line that contains diagonal $\overline{TA}$ is $y = -x + 3$, what is the equation of a line that contains diagonal EM?
1) $y = x - 1$
2) $y = x - 3$
3) $y = -x - 1$
4) $y = -x - 3$

84 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 $\frac{1}{3}$.
4) The slope of $\overline{AB}$ is $\frac{1}{3}$.

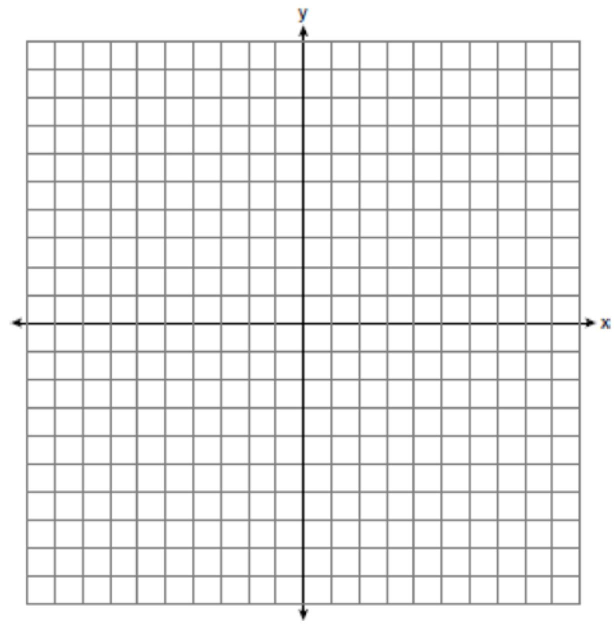
85 A quadrilateral has vertices with coordinates $(-3,1)$, $(0,3)$, $(5,2)$, and $(-1,-2)$. Which type of quadrilateral is this?

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

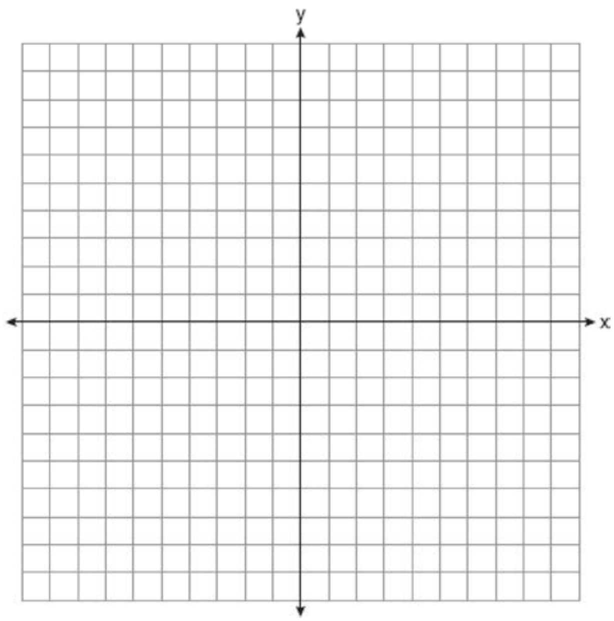
86 In rhombus *MATH*, the coordinates of the endpoints of the diagonal $\overline{MT}$ are $M(0,-1)$ and $T(4,6)$. Write an equation of the line that contains diagonal $\overline{AH}$. [Use of the set of axes below is optional.] Using the given information, explain how you know that your line contains diagonal $\overline{AH}$.



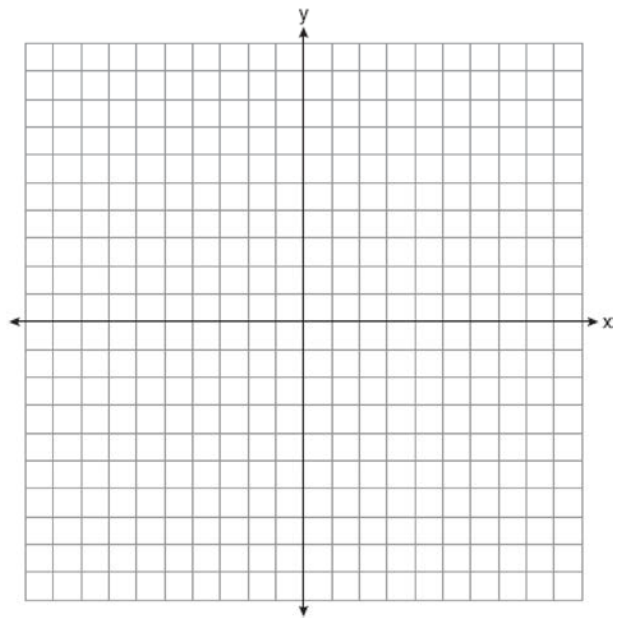
87 In the coordinate plane, the vertices of $\triangle RST$ are $R(6,-1)$, $S(1,-4)$, and $T(-5,6)$. Prove that $\triangle RST$ is a right triangle. State the coordinates of point *P* such that quadrilateral *RSTP* is a rectangle. Prove that your quadrilateral *RSTP* is a rectangle. [The use of the set of axes below is optional.]



88 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.]

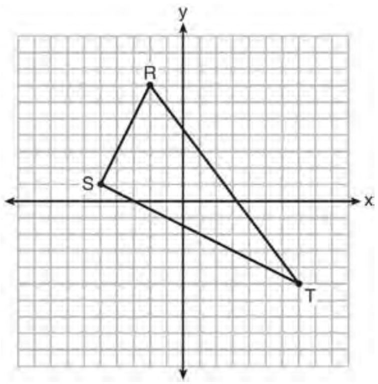


89 Quadrilateral *PQRS* has vertices $P(-2,3)$, $Q(3,8)$, $R(4,1)$, and $S(-1,-4)$. Prove that *PQRS* is a rhombus. Prove that *PQRS* is *not* a square. [The use of the set of axes below is optional.]



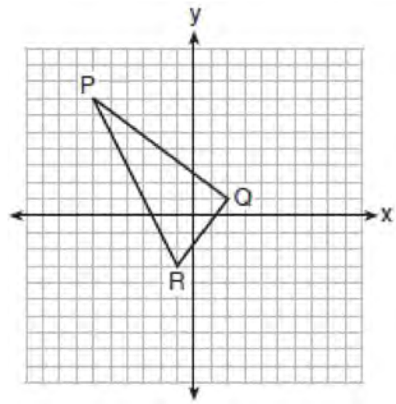
G.GPE.B.7: POLYGONS IN THE COORDINATE PLANE

90 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

91 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

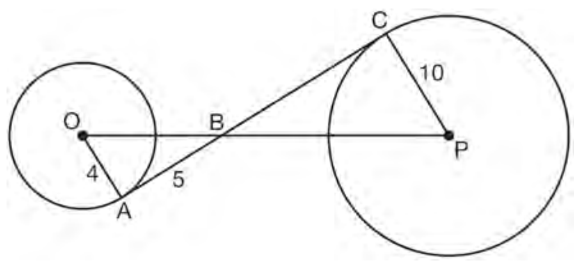
92 The coordinates of vertices A and B of $\triangle ABC$ are $A(3,4)$ and $B(3,12)$. If the area of $\triangle ABC$ is 24 square units, what could be the coordinates of point C?
1) $(3,6)$
2) $(8,-3)$
3) $(-3,8)$
4) $(6,3)$

93 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) $4\sqrt{40}$

94 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) $25\sqrt{2}$

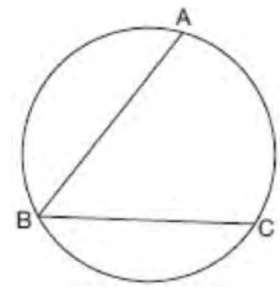
CONICS
G.C.A.2: CHORDS, SECANTS AND TANGENTS

95 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 $PC = 10$.



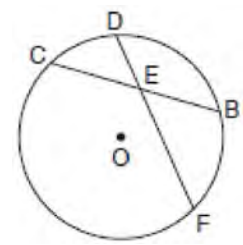
What is the length of $\overline{BC}$?
1) 6.4
2) 8
3) 12.5
4) 16

96 In the diagram below, $m\overset{\frown}{ABC} = 268°$.



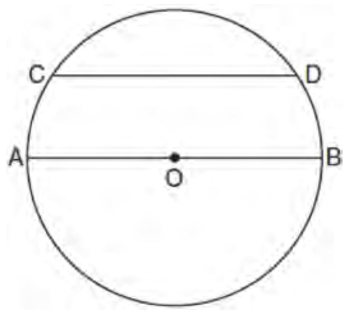
What is the number of degrees in the measure of $\angle ABC$?
1) 134º
2) 92º
3) 68º
4) 46º

97 In the diagram below of circle O, chord $\overline{DF}$ bisects chord $\overline{BC}$ at E.



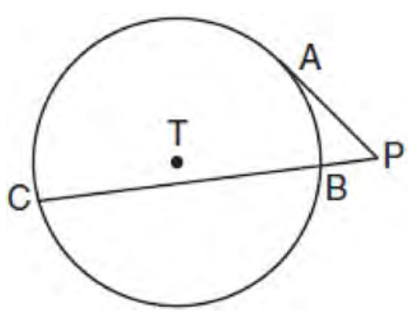
If $BC = 12$ and FE is 5 more than DE, then FE is
1) 13
2) 9
3) 6
4) 4

98 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

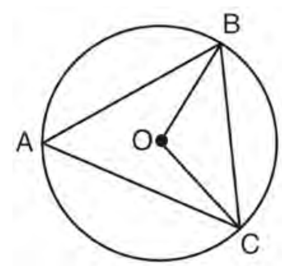
99 In the diagram shown below, $\overline{PA}$ is tangent to circle T at A, and secant $\overline{PBC}$ is drawn where point B is on circle T.



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

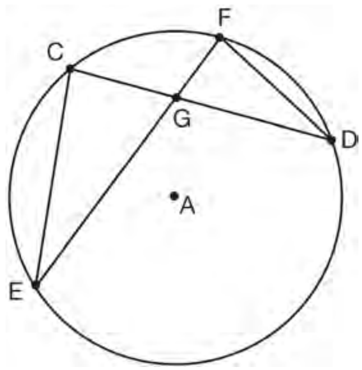
100 In circle O, secants $\overline{ADB}$ and $\overline{AEC}$ are drawn from external point A such that points D, B, E, and C are on circle O. If $AD = 8$, $AE = 6$, and EC is 12 more than BD, the length of $\overline{BD}$ is
1) 6
2) 22
3) 36
4) 48

101 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.



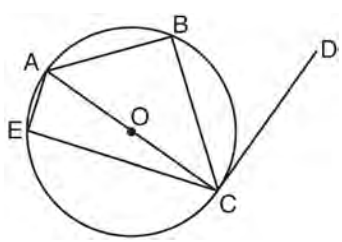
Which statement must always be true?
1) $\angle BAC \cong \angle BOC$
2) $m\angle BAC = \frac{1}{2} m\angle BOC$
3) $\triangle BAC$ and $\triangle BOC$ are isosceles.
4) The area of $\triangle BAC$ is twice the area of $\triangle BOC$.

102 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.



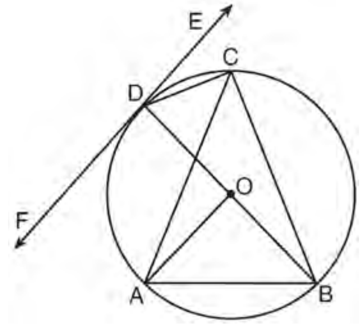
Which statement is *not* always true?
1) $\overline{CG} \cong \overline{FG}$
2) $\angle CEG \cong \angle FDG$
3) $\dfrac{CE}{EG} = \dfrac{FD}{DG}$
4) $\triangle CEG \sim \triangle FDG$

103 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.



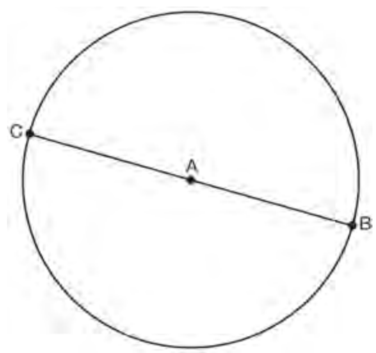
Which statement is *not* always true?
1) $\angle ACB \cong \angle BCD$
2) $\angle ABC \cong \angle ACD$
3) $\angle BAC \cong \angle DCB$
4) $\angle CBA \cong \angle AEC$

104 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) $\angle FDB$

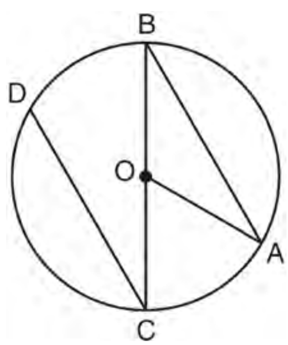
105 In the diagram below, $\overline{BC}$ is the diameter of circle A.



Point D, which is unique from points B and C, is plotted on circle A. Which statement must always be true?

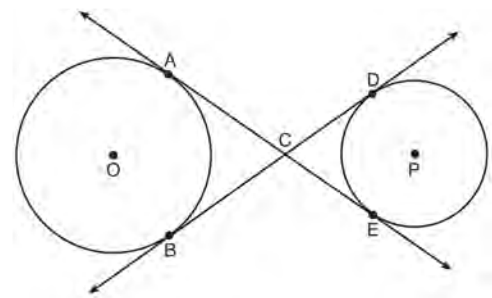
1) $\triangle BCD$ is a right triangle.
2) $\triangle BCD$ is an isosceles triangle.
3) $\triangle BAD$ and $\triangle CBD$ are similar triangles.
4) $\triangle BAD$ and $\triangle CAD$ are congruent triangles.

106 In the diagram below of circle O with diameter $\overline{BC}$ and radius $\overline{OA}$, chord $\overline{DC}$ is parallel to chord $\overline{BA}$.

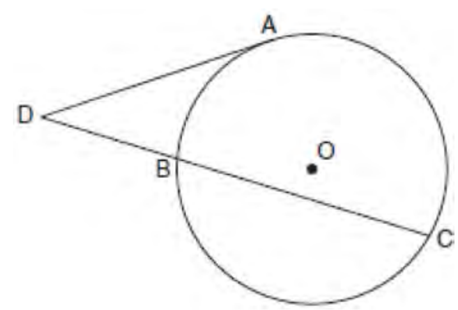


If $m\angle BCD = 30°$, determine and state $m\angle AOB$.

107 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 $\overline{CD}$.



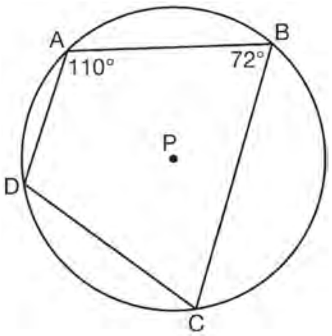
108 In the diagram below, tangent $\overline{DA}$ and secant $\overline{DBC}$ are drawn to circle O from external point D, such that $\overset{\frown}{AC} \cong \overset{\frown}{BC}$.



If $m\overset{\frown}{BC} = 152°$, determine and state $m\angle D$.

G.C.A.3: INSCRIBED QUADRILATERALS

109 In the diagram below, quadrilateral $ABCD$ is inscribed in circle P.



What is $m\angle ADC$?
1) 70°
2) 72°
3) 108°
4) 110°

G.GPE.A.1: EQUATIONS OF CIRCLES

110 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

111 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

112 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

113 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

114 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 = $\sqrt{35}$

115 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

116 Kevin's work for deriving the equation of a circle is shown below.

$$x^2+4x=-(y^2-20)$$

STEP 1 $x^2+4x=-y^2+20$

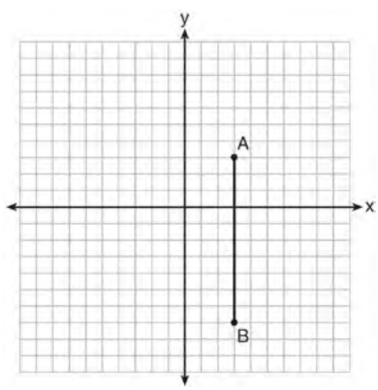
STEP 2 $x^2+4x+4=-y^2+20-4$

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

117 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) $(x-5)^2+(y+2)^2=25$

118 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

119 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

120 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) $(-8,5\sqrt{21})$

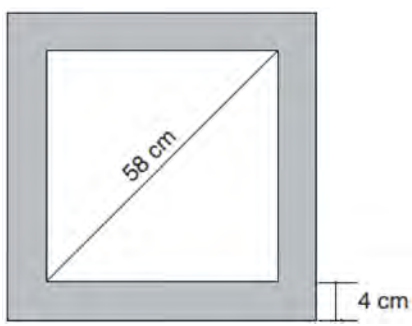
121 A circle has a center at $(1,-2)$ and radius of 4. Does the point $(3.4,1.2)$ lie on the circle? Justify your answer.

MEASURING IN THE PLANE AND SPACE

G.MG.A.3: AREA OF POLYGONS, SURFACE AREA AND LATERAL AREA

122 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

123 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.

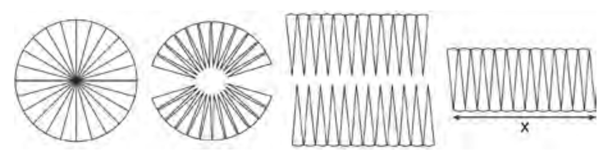


Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter*.

124 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

125 A circle with a radius of 5 was divided into 24 congruent sectors. The sectors were then rearranged, as shown in the diagram below.

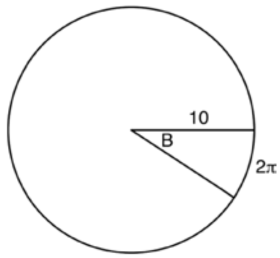


To the *nearest integer*, the value of *x* is
1) 31
2) 16
3) 12
4) 10

126 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

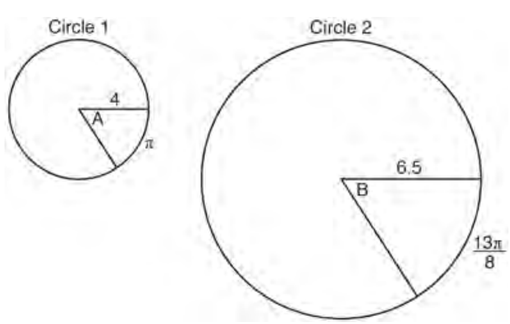
G.C.B.5: ARC LENGTH

127 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) $\frac{\pi}{5}$
4) $\frac{5}{\pi}$

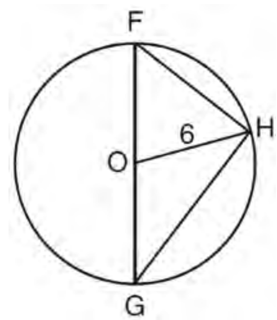
128 In the diagram below, Circle 1 has radius 4, while Circle 2 has radius 6.5. Angle A intercepts an arc of length π, and angle B intercepts an arc of length $\frac{13\pi}{8}$.



Dominic thinks that angles A and B have the same radian measure. State whether Dominic is correct or not. Explain why.

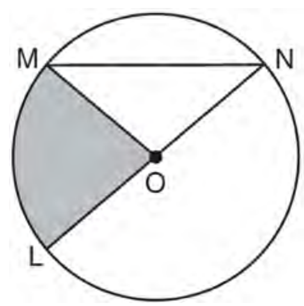
G.C.B.5: SECTORS

129 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

130 In the diagram below of circle O, the area of the shaded sector LOM is 2π cm^2.

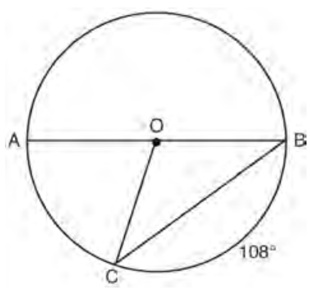


If the length of $\overline{NL}$ is 6 cm, what is m$\angle N$?
1) 10º
2) 20º
3) 40º
4) 80º

131 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) $\frac{8\pi}{3}$
2) $\frac{16\pi}{3}$
3) $\frac{32\pi}{3}$
4) $\frac{64\pi}{3}$

132 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 $\frac{3}{10} \cdot \pi \cdot (BC)^2$

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

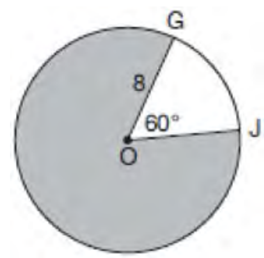
Carl $\frac{3}{10} \cdot \pi \cdot (\frac{1}{2}AB)^2$

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

Which students wrote correct formulas?

1) Amy and Dex
2) Beth and Carl
3) Carl and Amy
4) Dex and Beth

133 In the diagram below of circle O, $GO = 8$ and $m\angle GOJ = 60°$.



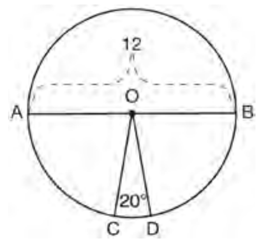
What is the area, in terms of π, of the shaded region?

1) $\frac{4\pi}{3}$
2) $\frac{20\pi}{3}$
3) $\frac{32\pi}{3}$
4) $\frac{160\pi}{3}$

134 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

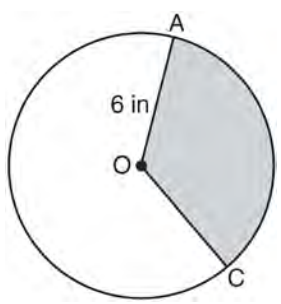
1) $\frac{\pi}{3}$
2) $\frac{4\pi}{3}$
3) $\frac{16\pi}{3}$
4) $\frac{64\pi}{3}$

135 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.

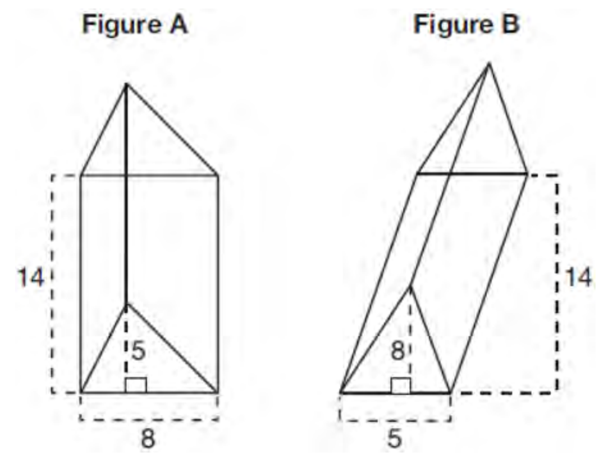
136 In the diagram below of circle O, the area of the shaded sector AOC is 12π in^2 and the length of $\overline{OA}$ is 6 inches. Determine and state $m\angle AOC$.



137 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.

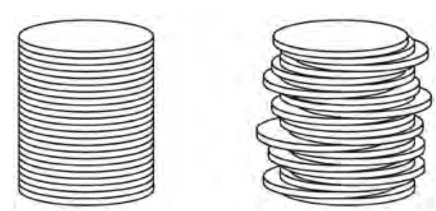
G.GMD.A.1, 3: VOLUME

138 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.



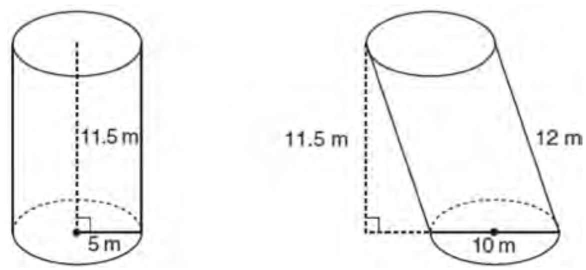
Use Cavalieri's Principle to explain why the volumes of these two triangular prisms are equal.

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



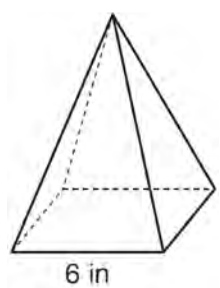
Use Cavelieri’s principle to explain why the volumes of these two stacks of quarters are equal.

140 Sue believes that the two cylinders shown in the diagram below have equal volumes.



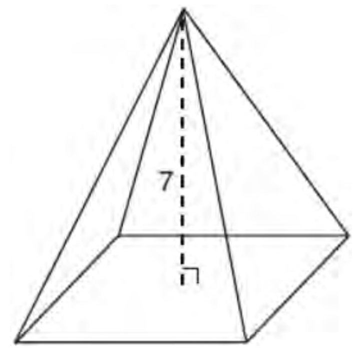
Is Sue correct? Explain why.

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



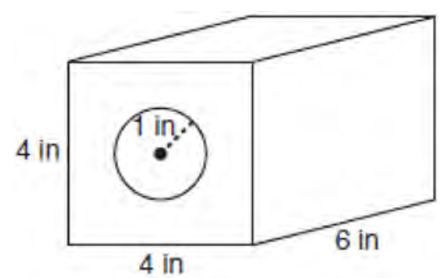
If the altitude of the pyramid measures 12 inches, its volume, in cubic inches, is
1) 72
2) 144
3) 288
4) 432

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



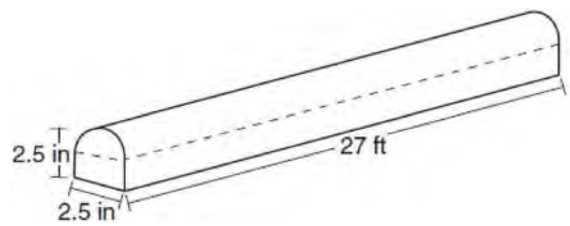
What is the length of the side of the base?
1) 6
2) 12
3) 18
4) 36

143 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.



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

144 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

145 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

146 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

147 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

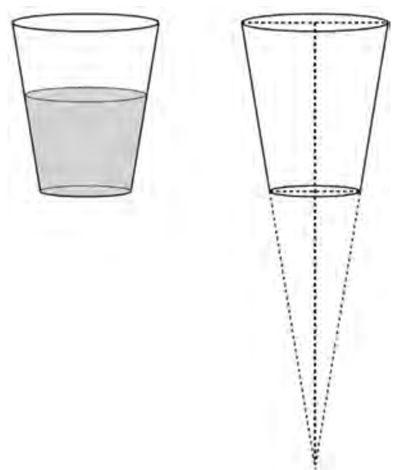
148 A company is creating an object from a wooden cube with an edge length of 8.5 cm. A right circular cone with a diameter of 8 cm and an altitude of 8 cm will be cut out of the cube. Which expression represents the volume of the remaining wood?
1) $(8.5)^3 - \pi(8)^2(8)$
2) $(8.5)^3 - \pi(4)^2(8)$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

149 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

150 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

151 A water glass can be modeled by a truncated right cone (a cone which is cut parallel to its base) as shown below.

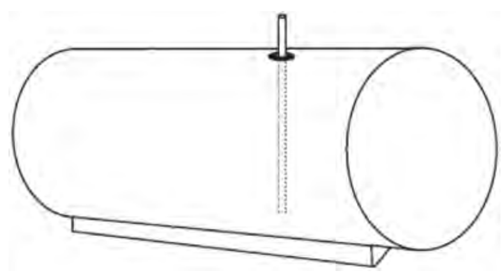


The diameter of the top of the glass is 3 inches, the diameter at the bottom of the glass is 2 inches, and the height of the glass is 5 inches. The base with a diameter of 2 inches must be parallel to the base with a diameter of 3 inches in order to find the height of the cone. Explain why. Determine 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.

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

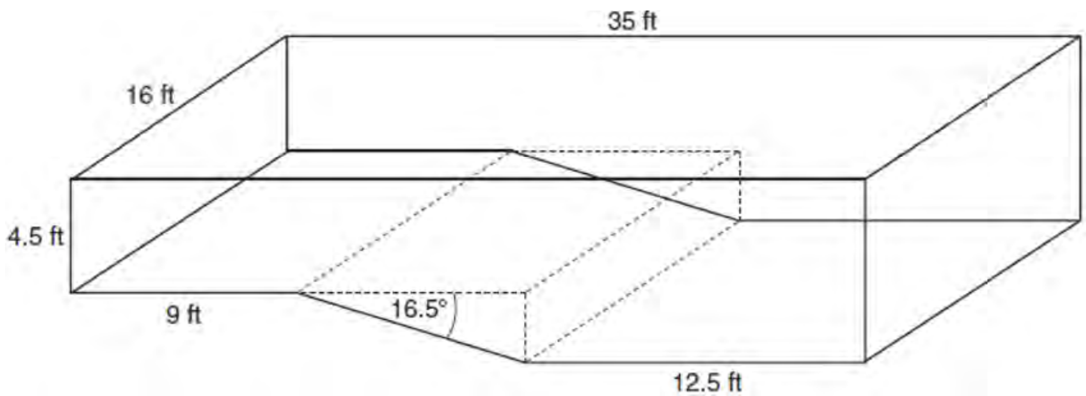
The height of the candle is 13 cm and the circumference of the candle at its widest measure is 31.416 cm. Use modeling to approximate how much wax, to the *nearest cubic centimeter*, is needed to make this candle. Justify your answer.

153 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 ft^3=7.48 gallons]

154 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 ft^3=7.48 gallons]

155 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.

156 When volleyballs are purchased, they are not fully inflated. A partially inflated volleyball can be modeled by a sphere whose volume is approximately 180 in^3. After being fully inflated, its volume is approximately 294 in^3. To the *nearest tenth of an inch*, how much does the radius increase when the volleyball is fully inflated?

G.MG.A.2: DENSITY

157 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

Geometry Regents Exam Questions by Common Core State Standard: Topic

158 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

159 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

160 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

161 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

162 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

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

State	**Population Density** $\left(\frac{\text{people}}{\text{mi}^2}\right)$	**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

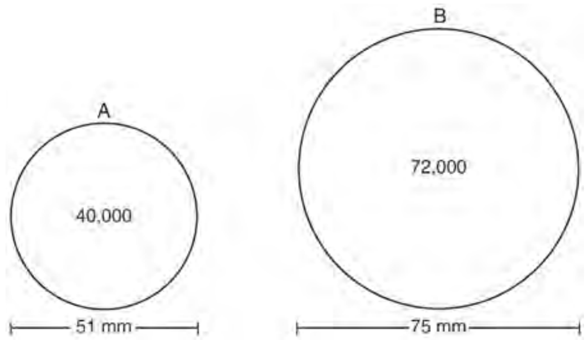
Based on the table above, which list has the states' areas, in square miles, in order from largest to smallest?

1) Illinois, Florida, New York, Pennsylvania
2) New York, Florida, Illinois, Pennsylvania
3) New York, Florida, Pennsylvania, Illinois
4) Pennsylvania, New York, Florida, Illinois

164 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.

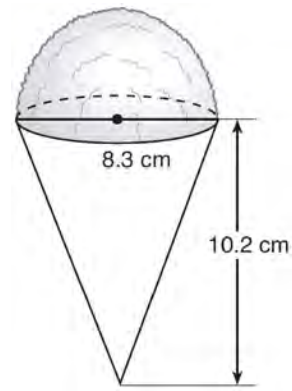
Type of Wood	**Density** (g/cm^3)
Pine	0.373
Hemlock	0.431
Elm	0.554
Birch	0.601
Ash	0.638
Maple	0.676
Oak	0.711

165 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.



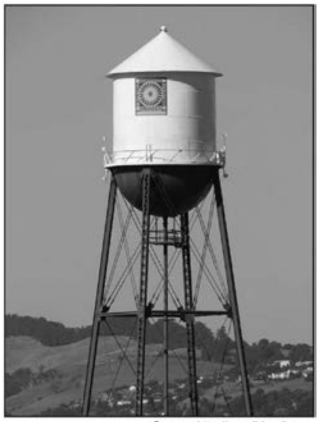
Determine and state which petri dish has the greater population density of bacteria at the end of the first hour.

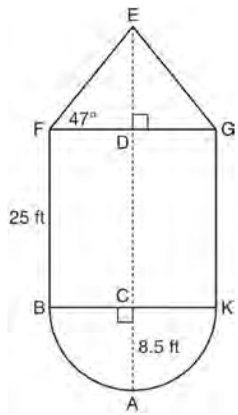
166 A snow cone consists of a paper cone completely filled with shaved ice and topped with a hemisphere of shaved ice, as shown in the diagram below. The inside diameter of both the cone and the hemisphere is 8.3 centimeters. The height of the cone is 10.2 centimeters.



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.

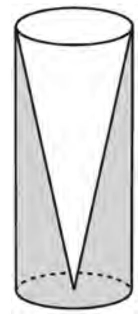
167 The water tower in the picture below is modeled by the two-dimensional figure beside it. The water tower is composed of a hemisphere, a cylinder, and a cone. Let C be the center of the hemisphere and let D be the center of the base of the cone.


Source: http://en.wikipedia.org



If $AC = 8.5$ feet, $BF = 25$ feet, and $m\angle EFD = 47°$, 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.

168 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?

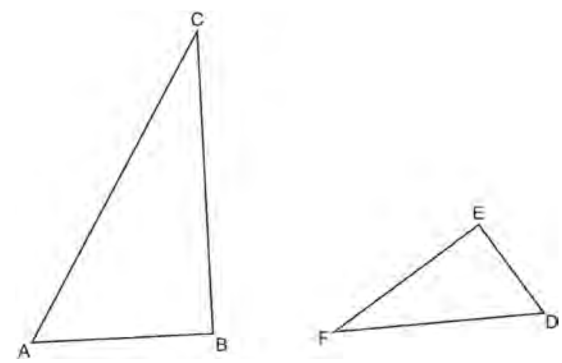
169 Trees that are cut down and stripped of their branches for timber are approximately cylindrical. A timber company specializes in a certain type of tree that has a typical diameter of 50 cm and a typical height of about 10 meters. The density of the wood is 380 kilograms per cubic meter, and the wood 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.

170 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 $1920\ \text{kg}/\text{m}^3$. The maximum capacity of the contractor's trailer is 900 kg. Can the trailer hold the weight of 500 bricks? Justify your answer.

171 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?

G.SRT.B.5: SIMILARITY

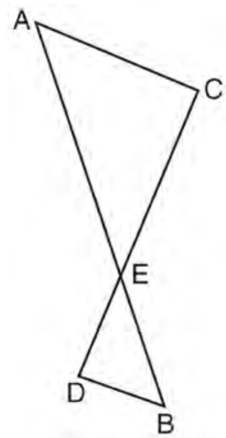
172 Triangles *ABC* and *DEF* are drawn below.



If $AB = 9$, $BC = 15$, $DE = 6$, $EF = 10$, and $\angle B \cong \angle E$, which statement is true?

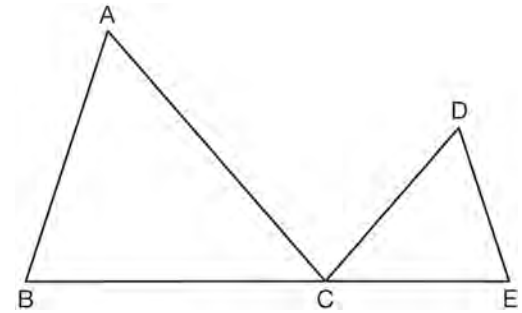
1) $\angle CAB \cong \angle DEF$
2) $\dfrac{AB}{CB} = \dfrac{FE}{DE}$
3) $\triangle ABC \sim \triangle DEF$
4) $\dfrac{AB}{DE} = \dfrac{FE}{CB}$

173 As shown in the diagram below, $\overline{AB}$ and $\overline{CD}$ intersect at E, and $\overline{AC} \parallel \overline{BD}$.



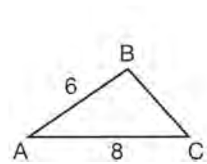
Given $\triangle AEC \sim \triangle BED$, which equation is true?
1) $\frac{CE}{DE} = \frac{EB}{EA}$
2) $\frac{AE}{BE} = \frac{AC}{BD}$
3) $\frac{EC}{AE} = \frac{BE}{ED}$
4) $\frac{ED}{EC} = \frac{AC}{BD}$

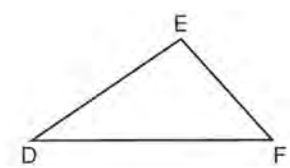
174 In the diagram below, $\triangle ABC \sim \triangle DEC$.



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

175 In the diagram below, $\triangle ABC \sim \triangle DEF$.

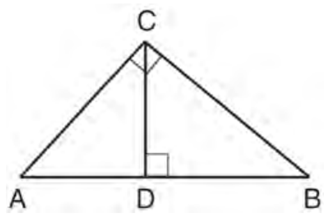




If $AB = 6$ and $AC = 8$, which statement will justify similarity by SAS?
1) $DE = 9$, $DF = 12$, and $\angle A \cong \angle D$
2) $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$
3) $DE = 36$, $DF = 64$, and $\angle C \cong \angle F$
4) $DE = 15$, $DF = 20$, and $\angle C \cong \angle F$

176 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

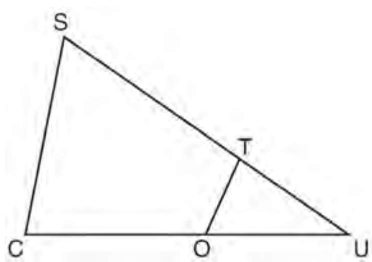
177 In the diagram below, $\overline{CD}$ is the altitude drawn to the hypotenuse $\overline{AB}$ of right triangle ABC.



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 $AB = 17$

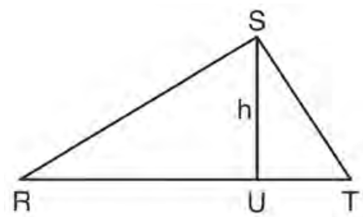
178 In $\triangle SCU$ shown below, points T and O are on $\overline{SU}$ and $\overline{CU}$, respectively. Segment OT is drawn so that $\angle C \cong \angle OTU$.



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

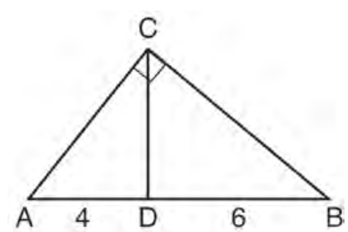
179 In $\triangle RST$ shown below, altitude $\overline{SU}$ is drawn to $\overline{RT}$ at U.



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) $6\sqrt{35}$

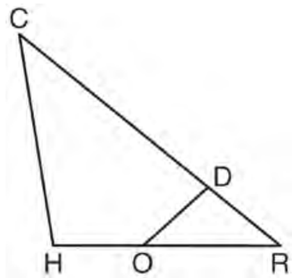
180 In the diagram of right triangle ABC, $\overline{CD}$ intersects hypotenuse $\overline{AB}$ at D.



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) $4\sqrt{2}$

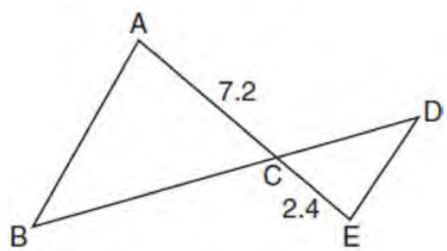
181 In triangle CHR, O is on $\overline{HR}$, and D is on $\overline{CR}$ so that $\angle H \cong \angle RDO$.



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

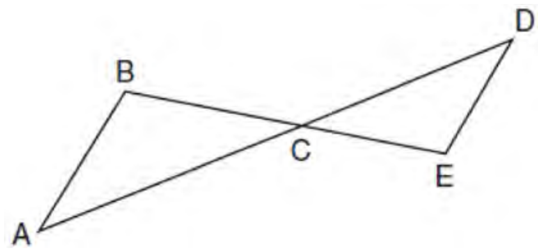
182 In the diagram below, $AC = 7.2$ and $CE = 2.4$.



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 $BC = 8.7$

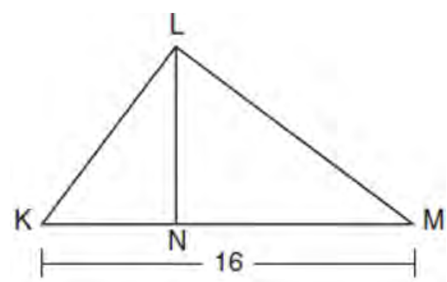
183 In the diagram below, $\overline{AD}$ intersects $\overline{BE}$ at C, and $\overline{AB} \parallel \overline{DE}$.



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

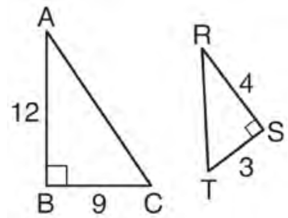
184 Kirstie is testing values that would make triangle KLM a right triangle when $\overline{LN}$ is an altitude, and $KM = 16$, as shown below.

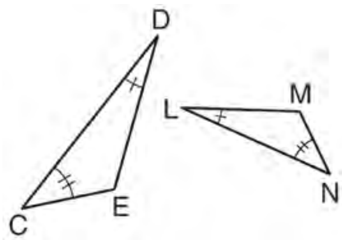


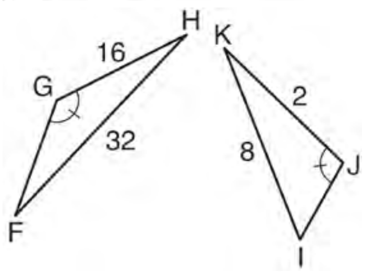
Which lengths would make triangle KLM a right triangle?

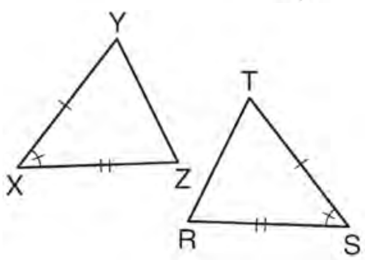
1) $LM = 13$ and $KN = 6$
2) $LM = 12$ and $NM = 9$
3) $KL = 11$ and $KN = 7$
4) $LN = 8$ and $NM = 10$

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

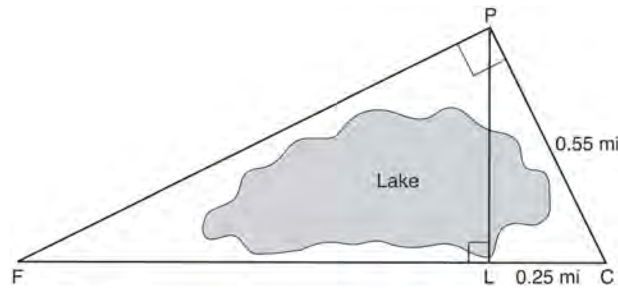
1) 

2) 

3) 

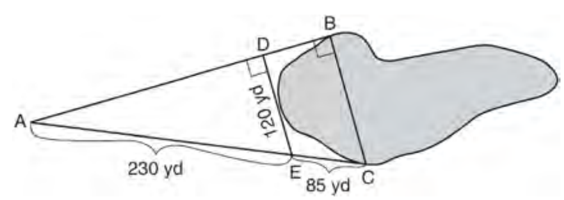
4) 

186 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.



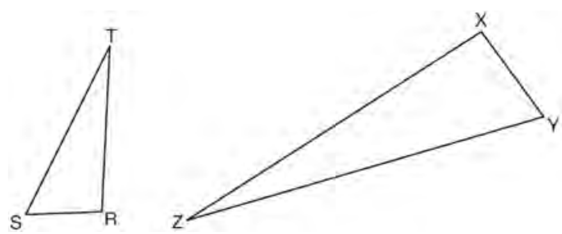
If the path from the park ranger station to the campground is 0.55 mile, determine and state, to the *nearest hundredth of a mile*, the distance between the park ranger station and the lifeguard chair. Gerald believes the distance from the first aid station to the campground is at least 1.5 miles. Is Gerald correct? Justify your answer.

187 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.

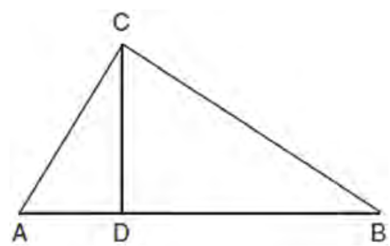


Use the surveyor's information to determine and state the distance from point B to point C, to the *nearest yard*.

188 Triangles RST and XYZ are drawn below. If $RS = 6$, $ST = 14$, $XY = 9$, $YZ = 21$, and $\angle S \cong \angle Y$, is $\triangle RST$ similar to $\triangle XYZ$? Justify your answer.



189 In right triangle ABC shown below, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$. Explain why $\triangle ABC \sim \triangle ACD$.



190 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*.

TRANSFORMATIONS

G.SRT.A.1: LINE DILATIONS

191 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) $y = 2x + 1$

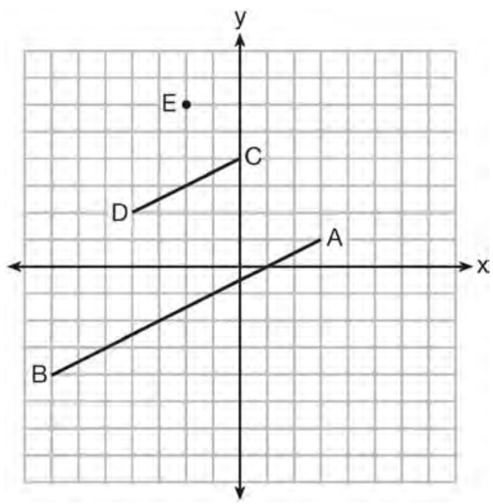
192 The line $y = 2x - 4$ is dilated by a scale factor of $\frac{3}{2}$ and centered at the origin. Which equation represents the image of the line after the dilation?
1) $y = 2x - 4$
2) $y = 2x - 6$
3) $y = 3x - 4$
4) $y = 3x - 6$

193 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) $3x - 2y = 5$

194 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) $y = 3x - 1$

195 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) $4x + 3y = 9$

196 In the diagram below, $\overline{CD}$ is the image of $\overline{AB}$ after a dilation of scale factor k with center E.



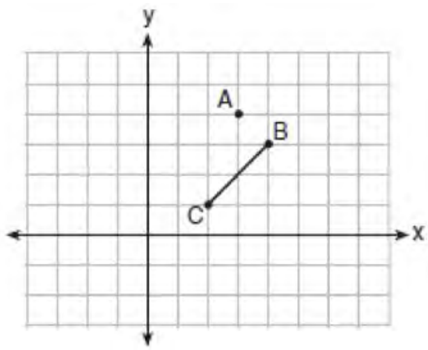
Which ratio is equal to the scale factor k of the dilation?
1) $\frac{EC}{EA}$
2) $\frac{BA}{EA}$
3) $\frac{EA}{BA}$
4) $\frac{EA}{EC}$

197 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

198 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

199 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

200 On the graph below, point $A(3,4)$ and $\overline{BC}$ with coordinates $B(4,3)$ and $C(2,1)$ are graphed.



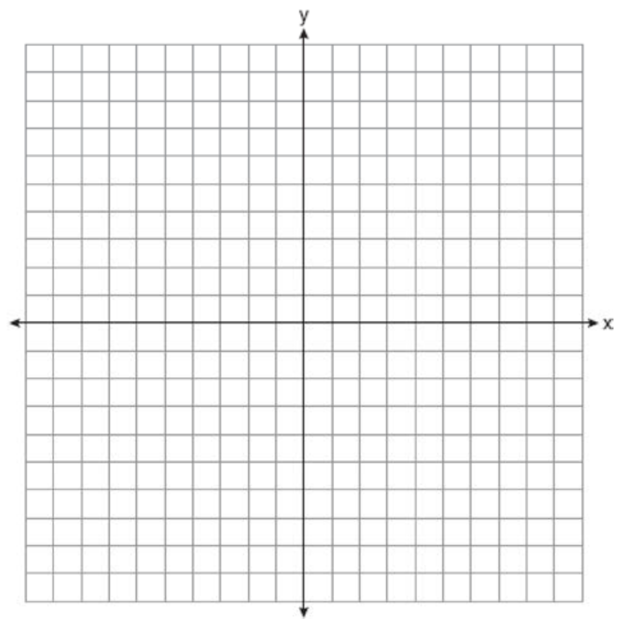
What are the coordinates of *B'* and *C'* after $\overline{BC}$ undergoes a dilation centered at point *A* with a scale factor of 2?

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 $C'(3,0)$

201 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.

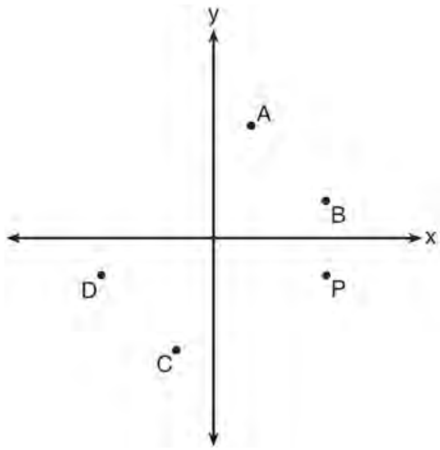
202 Line *n* is represented by the equation $3x + 4y = 20$. Determine and state the equation of line *p*, the image of line *n*, after a dilation of scale factor $\frac{1}{3}$ centered at the point $(4,2)$. [The use of the set of axes below is optional.] Explain your answer.



203 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*.

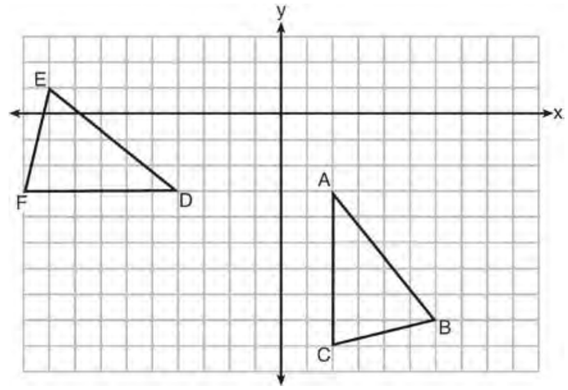
G.CO.A.5: ROTATIONS

204 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

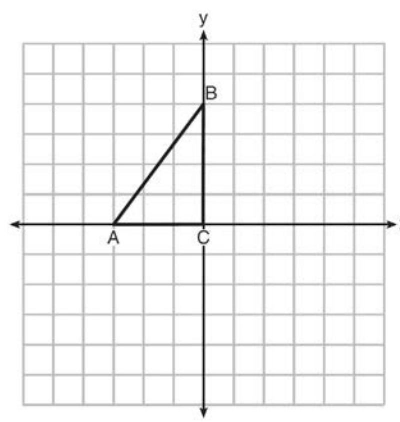
205 The grid below shows $\triangle ABC$ and $\triangle DEF$.



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

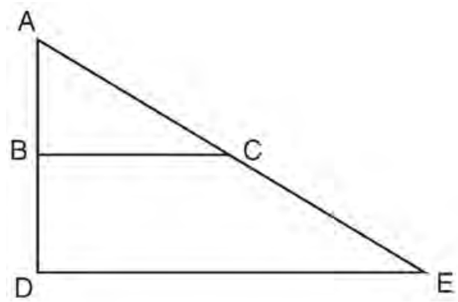
206 Triangle ABC is graphed on the set of axes below. Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a reflection over the line $x = 1$.



G.SRT.A.2: DILATIONS

207 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) $3(m\angle C') = m\angle C$

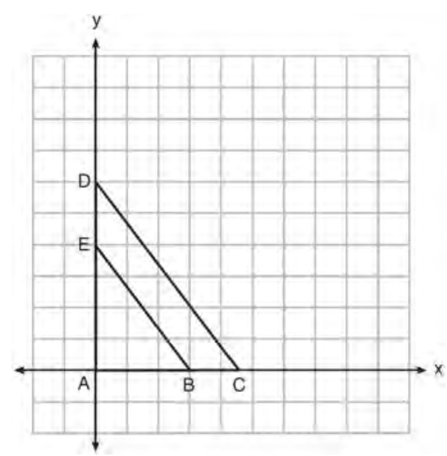
208 The image of $\triangle ABC$ after a dilation of scale factor k centered at point A is $\triangle ADE$, as shown in the diagram below.



Which statement is always true?
1) $2AB = AD$
2) $\overline{AD} \perp \overline{DE}$
3) $AC = CE$
4) $\overline{BC} \parallel \overline{DE}$

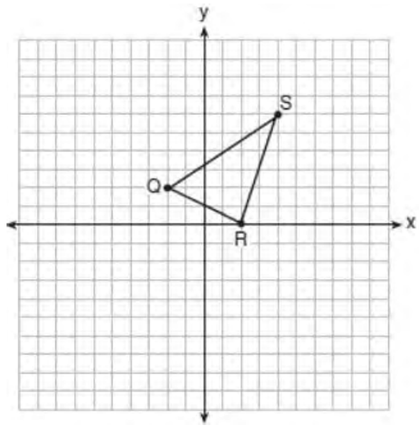
209 A triangle is dilated by a scale factor of 3 with the center of dilation at the origin. Which statement is true?
1) The area of the image is nine times the area of the original triangle.
2) The perimeter of the image is nine times the perimeter of the original triangle.
3) The slope of any side of 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.

210 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 $E(0,4)$.



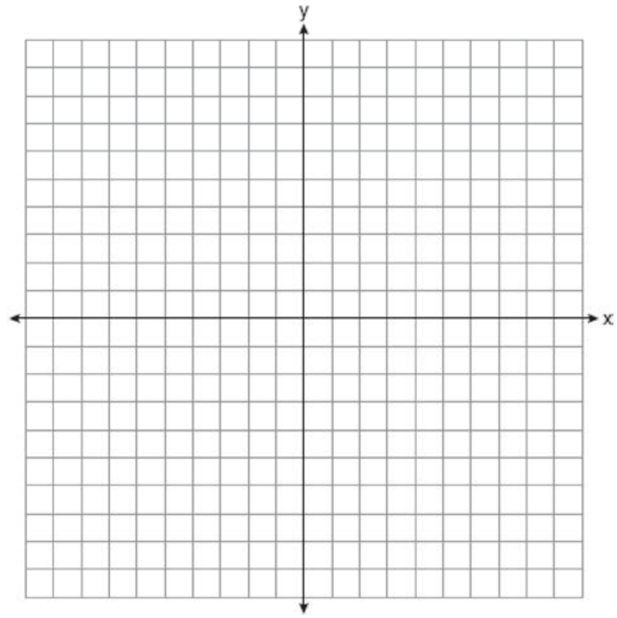
The ratio of the lengths of $\overline{BE}$ to $\overline{CD}$ is
1) $\frac{2}{3}$
2) $\frac{3}{2}$
3) $\frac{3}{4}$
4) $\frac{4}{3}$

211 Triangle QRS is graphed on the set of axes below.



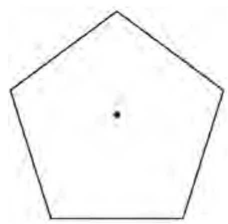
On the same set of axes, graph and label $\triangle Q'R'S'$, the image of $\triangle QRS$ after a dilation with a scale factor of $\frac{3}{2}$ centered at the origin. Use slopes to explain why $Q'R' \parallel QR$.

212 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.]



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

213 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) 54º
2) 72º
3) 108º
4) 360º

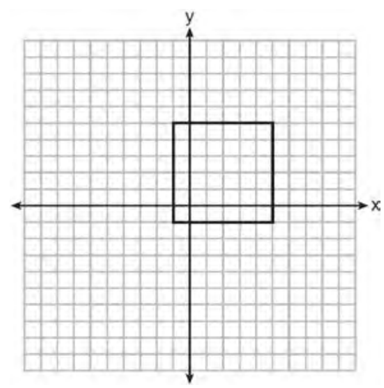
214 Which rotation about its center will carry a regular decagon onto itself?
1) 54°
2) 162°
3) 198°
4) 252°

215 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°

216 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

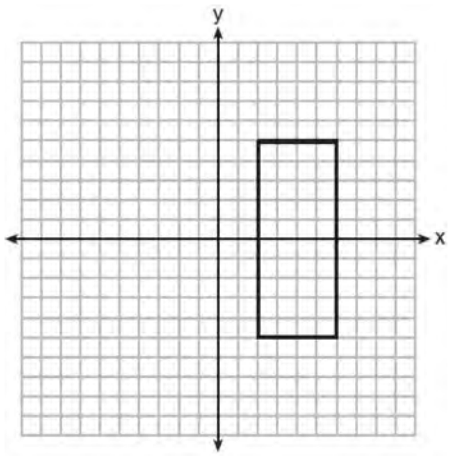
217 Which regular polygon has a minimum rotation of 45° to carry the polygon onto itself?
1) octagon
2) decagon
3) hexagon
4) pentagon

218 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) $x + y = 4$

219 As shown in the graph below, the quadrilateral is a rectangle.

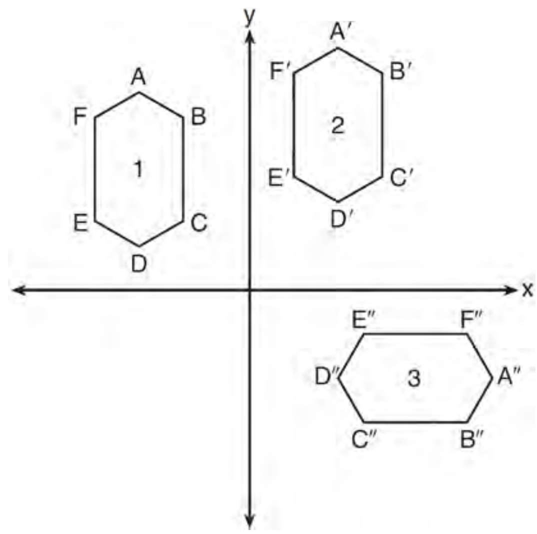


Which transformation would *not* map the rectangle onto itself?
1) a reflection over the x-axis
2) a reflection over the line $x = 4$
3) a rotation of 180° about the origin
4) a rotation of 180° about the point $(4,0)$

220 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.

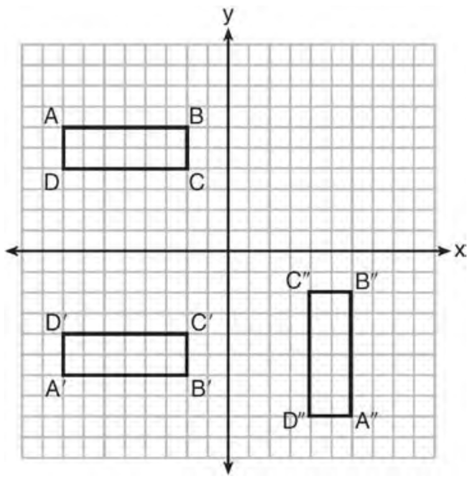
G.CO.A.5, G.SRT.A.2: COMPOSITIONS OF TRANSFORMATIONS

221 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

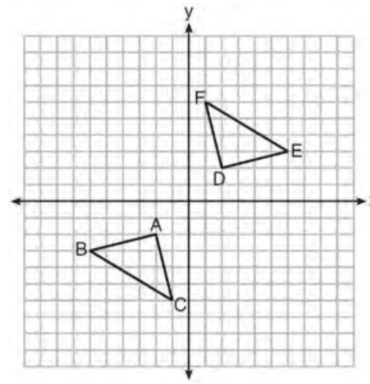
222 A sequence of transformations maps rectangle *ABCD* onto rectangle *A"B"C"D"*, as shown in the diagram below.



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

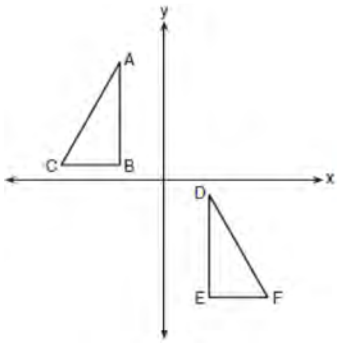
223 Triangle *ABC* and triangle *DEF* are graphed on the set of axes below.



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

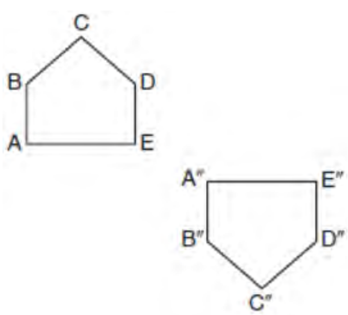
224 In the diagram below, $\triangle ABC \cong \triangle DEF$.



Which sequence of transformations maps $\triangle ABC$ onto $\triangle DEF$?

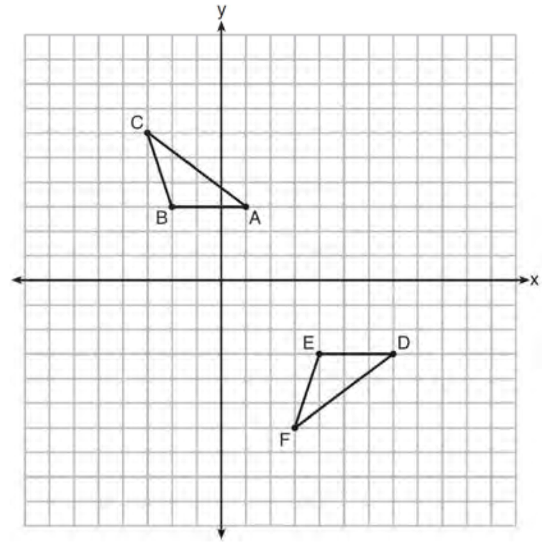
1) a reflection over the x-axis followed by a translation
2) a reflection over the y-axis followed by a translation
3) a rotation of 180° about the origin followed by a translation
4) a counterclockwise rotation of 90° about the origin followed by a translation

225 Identify which sequence of transformations could map pentagon $ABCDE$ onto pentagon $A''B''C''D''E''$, as shown below.

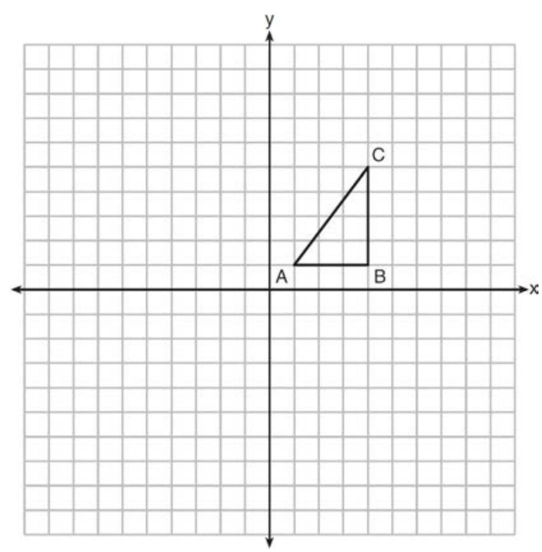


1) dilation followed by a rotation
2) translation followed by a rotation
3) line reflection followed by a translation
4) line reflection followed by a line reflection

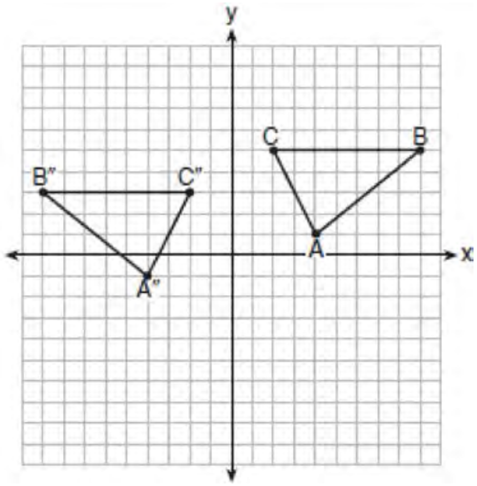
226 Describe a sequence of transformations that will map $\triangle ABC$ onto $\triangle DEF$ as shown below.



227 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 $y = 0$.

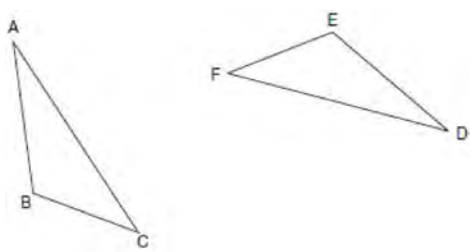


228 The graph below shows $\triangle ABC$ and its image, $\triangle A''B''C''$.



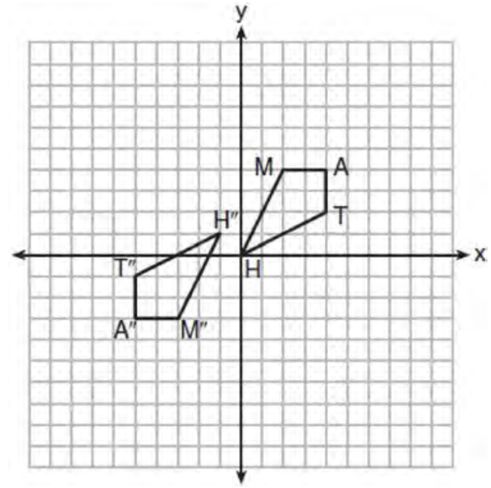
Describe a sequence of rigid motions which would map $\triangle ABC$ onto $\triangle A''B''C''$.

229 Triangle *ABC* and triangle *DEF* are drawn below.



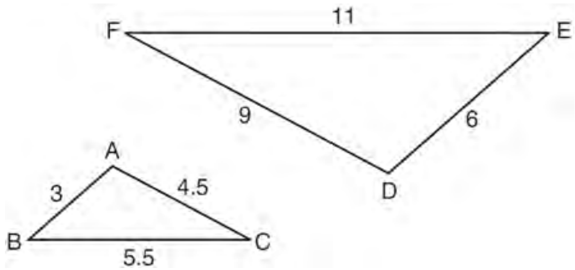
If $\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$, and $\angle A \cong \angle D$, write a sequence of transformations that maps triangle *ABC* onto triangle *DEF*.

230 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"*.

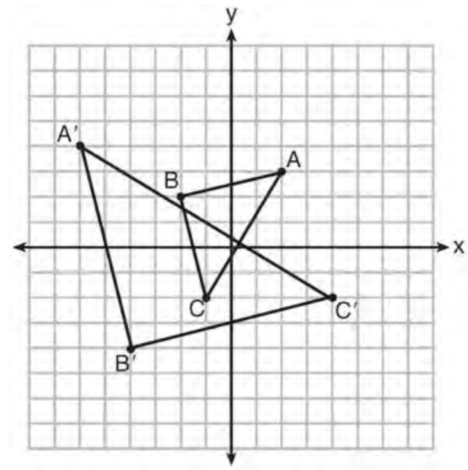
231 In the diagram below, $\triangle DEF$ is the image of $\triangle ABC$ after a clockwise rotation of 180° and a dilation where $AB = 3$, $BC = 5.5$, $AC = 4.5$, $DE = 6$, $FD = 9$, and $EF = 11$.



Which relationship must always be true?

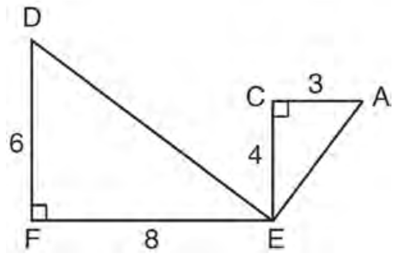
1) $\dfrac{m\angle A}{m\angle D} = \dfrac{1}{2}$
2) $\dfrac{m\angle C}{m\angle F} = \dfrac{2}{1}$
3) $\dfrac{m\angle A}{m\angle C} = \dfrac{m\angle F}{m\angle D}$
4) $\dfrac{m\angle B}{m\angle E} = \dfrac{m\angle C}{m\angle F}$

232 Which sequence of transformations will map $\triangle ABC$ onto $\triangle A'B'C'$?



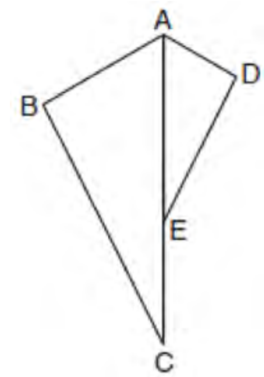
1) reflection and translation
2) rotation and reflection
3) translation and dilation
4) dilation and rotation

233 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

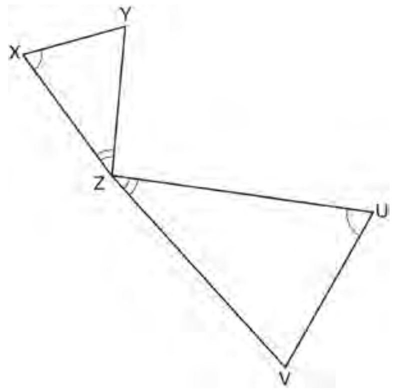
234 In the diagram below, $\triangle ADE$ is the image of $\triangle ABC$ after a reflection over the line AC followed by a dilation of scale factor $\frac{AE}{AC}$ centered at point A.



Which statement must be true?
1) $m\angle BAC \cong m\angle AED$
2) $m\angle ABC \cong m\angle ADE$
3) $m\angle DAE \cong \frac{1}{2} m\angle BAC$
4) $m\angle ACB \cong \frac{1}{2} m\angle DAB$

235 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

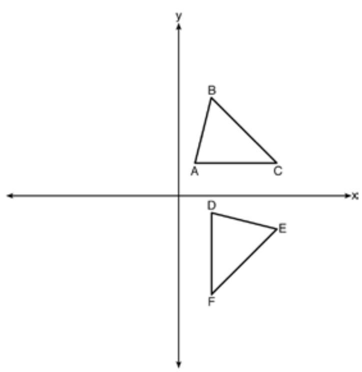
236 In the diagram below, triangles XYZ and UVZ are drawn such that $\angle X \cong \angle U$ and $\angle XZY \cong \angle UZV$.



Describe a sequence of similarity transformations that shows $\triangle XYZ$ is similar to $\triangle UVZ$.

G.CO.B.6: PROPERTIES OF TRANSFORMATIONS

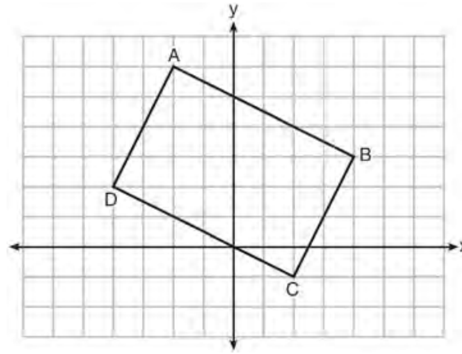
237 The image of $\triangle ABC$ after a rotation of 90º clockwise about the origin is $\triangle DEF$, as shown below.



Which statement is true?

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

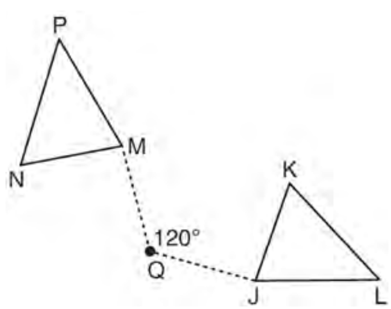
238 Quadrilateral $ABCD$ is graphed on the set of axes below.



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 $B'(-3,4)$

239 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.



G.CO.A.2: IDENTIFYING TRANSFORMATIONS

240 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

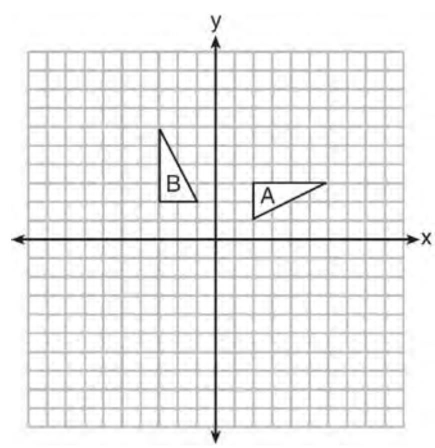
241 If $\triangle A'B'C'$ is the image of $\triangle ABC$, under which transformation will the triangles *not* be congruent?
1) reflection over the x-axis
2) translation to the left 5 and down 4
3) dilation centered at the origin with scale factor 2
4) rotation of 270° counterclockwise about the origin

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

243 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

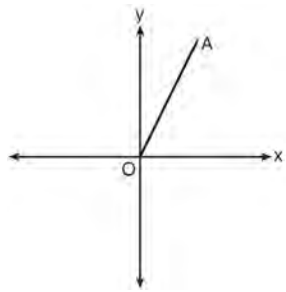
244 The image of $\triangle DEF$ is $\triangle D'E'F'$. Under which transformation will he triangles *not* be congruent?
1) a reflection through the origin
2) a reflection over the line $y = x$
3) a dilation with a scale factor of 1 centered at $(2,3)$
4) a dilation with a scale factor of $\frac{3}{2}$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

245 In the diagram below, which single transformation was used to map triangle A onto triangle B?



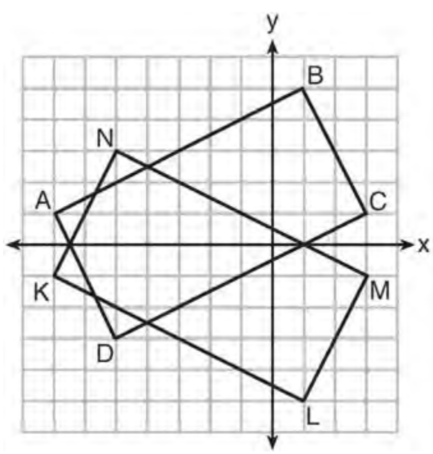
1) line reflection
2) rotation
3) dilation
4) translation

246 Which transformation of $\overline{OA}$ would result in an image parallel to $\overline{OA}$?



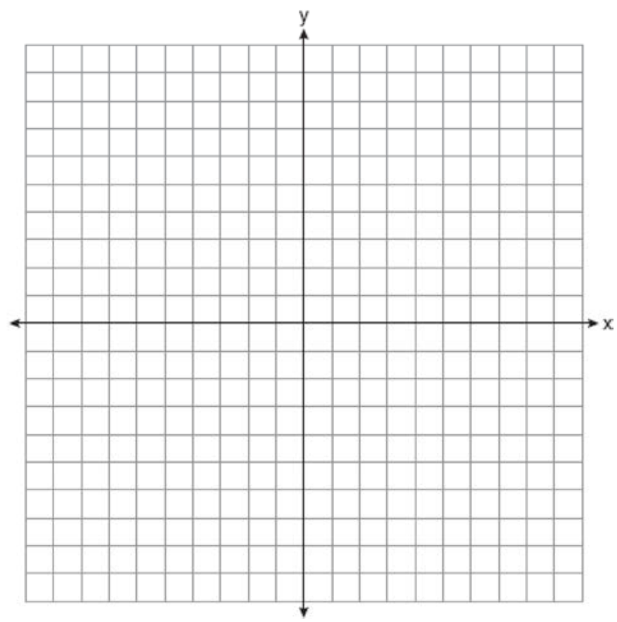
1) a translation of two units down
2) a reflection over the x-axis
3) a reflection over the y-axis
4) a clockwise rotation of 90° about the origin

247 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

248 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 $\triangle ABC \cong \triangle DEF$.



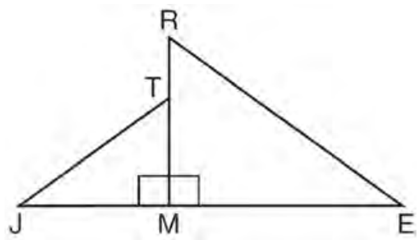
G.CO.A.2: ANALYTICAL REPRESENTATIONS OF TRANSFORMATIONS

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

TRIGONOMETRY

G.SRT.C.6: TRIGONOMETRIC RATIOS

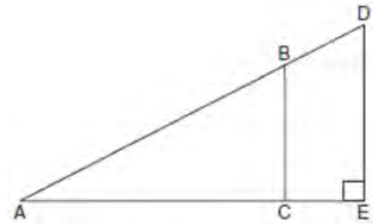
250 In the diagram below, $\triangle ERM \sim \triangle JTM$.



Which statement is always true?

1) $\cos J = \frac{RM}{RE}$
2) $\cos R = \frac{JM}{JT}$
3) $\tan T = \frac{RM}{EM}$
4) $\tan E = \frac{TM}{JM}$

251 In the diagram of right triangle ADE below, $\overline{BC} \parallel \overline{DE}$.

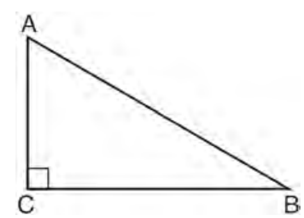


Which ratio is always equivalent to the sine of $\angle A$?

1) $\frac{AD}{DE}$
2) $\frac{AE}{AD}$
3) $\frac{BC}{AB}$
4) $\frac{AB}{AC}$

G.SRT.C.7: COFUNCTIONS

252 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) $\sin A = \cos B$

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

254 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) $\sin\angle A = \cos\angle B$

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

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

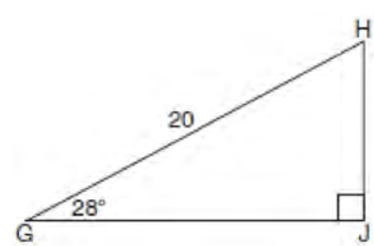
257 In a right triangle, $\sin(40 - x)° = \cos(3x)°$. What is the value of x?
1) 10
2) 15
3) 20
4) 25

258 Explain why $\cos(x) = \sin(90 - x)$ for x such that $0 < x < 90$.

259 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.

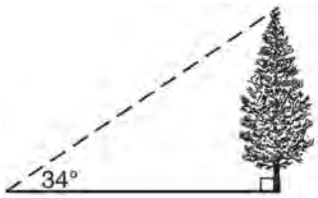
260 Find the value of R that will make the equation $\sin 73° = \cos R$ true when $0° < R < 90°$. Explain your answer.

261 When instructed to find the length of $\overline{HJ}$ in right triangle HJG, Alex wrote the equation $\sin 28° = \frac{HJ}{20}$ while Marlene wrote $\cos 62° = \frac{HJ}{20}$. Are both students' equations correct? Explain why.



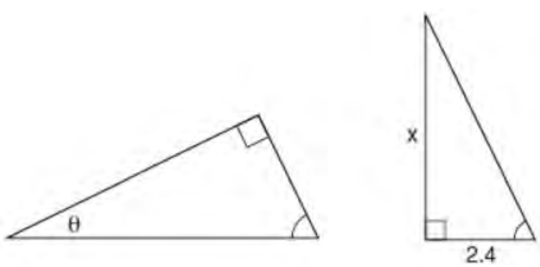
G.SRT.C.8: USING TRIGONOMETRY TO FIND A SIDE

262 As shown in the diagram below, the angle of elevation from a point on the ground to the top of the tree is 34°.



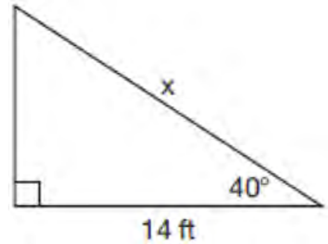
If the point is 20 feet from the base of the tree, what is the height of the tree, to the *nearest tenth of a foot*?
1) 29.7
2) 16.6
3) 13.5
4) 11.2

263 The diagram below shows two similar triangles.



If $\tan\theta = \frac{3}{7}$, what is the value of x, to the *nearest tenth*?
1) 1.2
2) 5.6
3) 7.6
4) 8.8

264 Given the right triangle in the diagram below, what is the value of x, to the *nearest foot*?



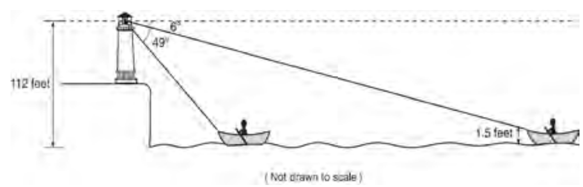
1) 11
2) 17
3) 18
4) 22

265 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

266 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

267 In right triangle ABC, $m\angle A = 32°$, $m\angle B = 90°$, and $AE = 6.2$ 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

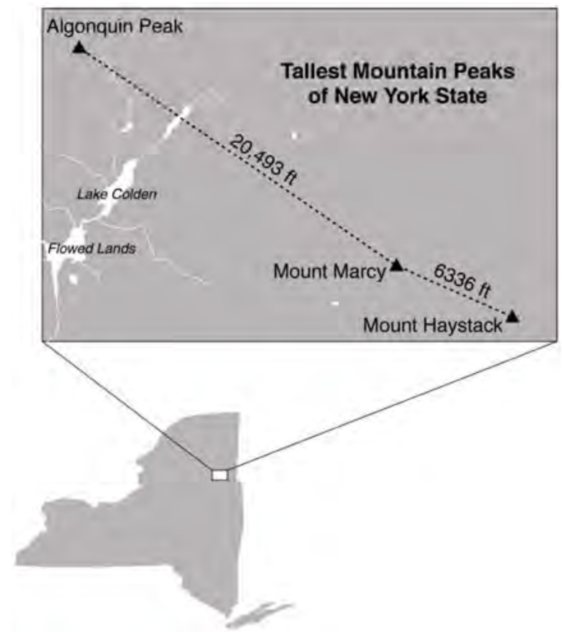
268 As shown below, a canoe is approaching a lighthouse on the coastline of a lake. The front of the canoe is 1.5 feet above the water and an observer in the lighthouse is 112 feet above the water.



(Not drawn to scale)

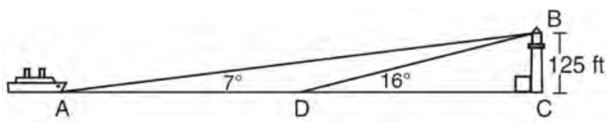
At 5:00, the observer in the lighthouse measured the angle of depression to the front of the canoe to be 6°. Five minutes later, the observer measured and saw the angle of depression to the front of the canoe had increased by 49°. Determine and state, to the *nearest foot per minute*, the average speed at which the canoe traveled toward the lighthouse.

269 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.



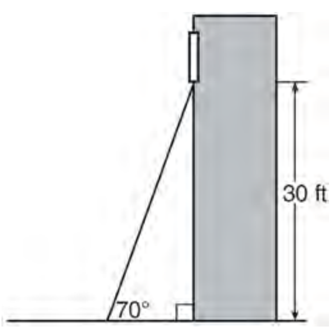
The angle of depression from the peak of Mount Marcy to the peak of Mount Haystack is 3.47 degrees. The angle of elevation from the peak of Algonquin Peak to the peak of Mount Marcy is 0.64 degrees. What are the heights, to the *nearest foot*, of Mount Marcy and Algonquin Peak? Justify your answer.

270 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°.

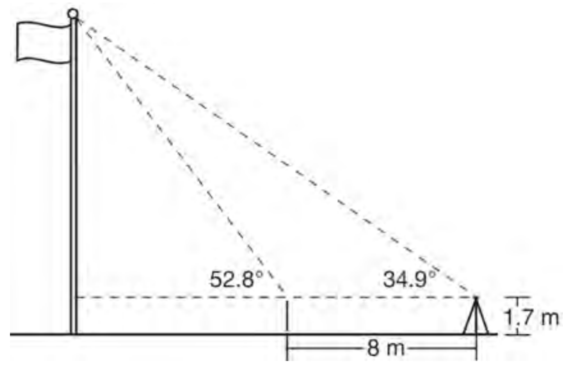


To the *nearest foot*, determine and state how far the ship traveled from point *A* to point *D*.

271 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.

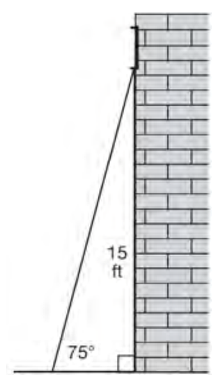


272 Cathy wants to determine the height of the flagpole shown in the diagram below. She uses a survey instrument to measure the angle of elevation to the top of the flagpole, and determines it to be 34.9°. She walks 8 meters closer and determines the new measure of the angle of elevation to be 52.8°. 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.

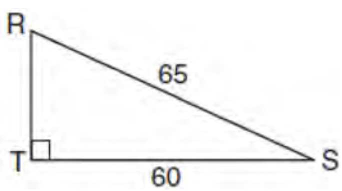
273 In the diagram below, a window of a house is 15 feet above the ground. A ladder is placed against the house with its base at an angle of 75° with the ground. Determine and state the length of the ladder to the *nearest tenth of a foot*.



274 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*.

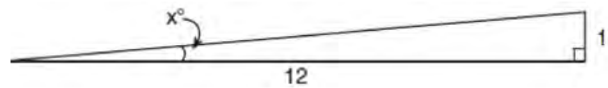
G.SRT.C.8: USING TRIGONOMETRY TO FIND AN ANGLE

275 In the diagram of $\triangle RST$ below, $m\angle T = 90°$, $RS = 65$, and $ST = 60$.



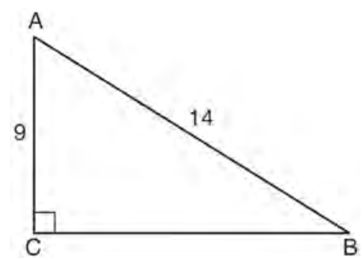
What is the measure of $\angle S$, to the *nearest degree*?
1) 23º
2) 43º
3) 47º
4) 67º

276 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

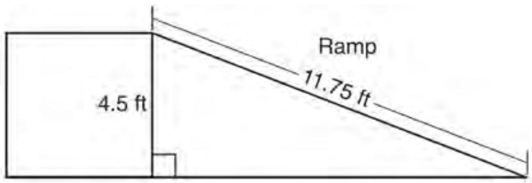
277 In the diagram of right triangle ABC shown below, $AB = 14$ and $AC = 9$.



What is the measure of $\angle A$, to the *nearest degree*?
1) 33
2) 40
3) 50
4) 57

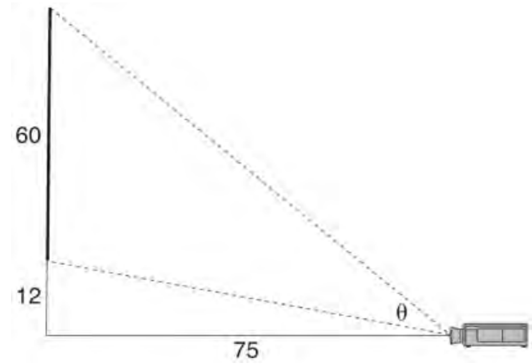
278 A man who is 5 feet 9 inches tall casts a shadow of 8 feet 6 inches. Assuming that the man is standing perpendicular to the ground, what is the angle of elevation from the end of the shadow to the top of the man's head, to the *nearest tenth of a degree*?
1) 34.1
2) 34.5
3) 42.6
4) 55.9

279 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.

280 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.

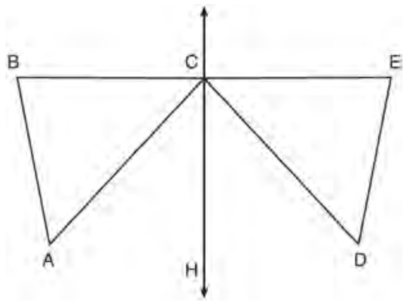
281 A ladder leans against a building. The top of the ladder touches the building 10 feet above the ground. The foot of the ladder is 4 feet from the building. Find, to the *nearest degree*, the angle that the ladder makes with the level ground.

LOGIC

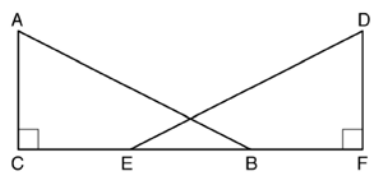
G.CO.B.7-8, G.SRT.B.5: TRIANGLE CONGRUENCY

282 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 $\overline{DE}$

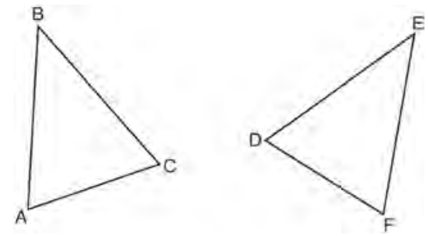
283 Given: D is the image of A after a reflection over $\overleftrightarrow{CH}$.
$\overleftrightarrow{CH}$ is the perpendicular bisector of $\overline{BCE}$
$\triangle ABC$ and $\triangle DEC$ are drawn
Prove: $\triangle ABC \cong \triangle DEC$



284 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 $\triangle ABC \cong \triangle DEF$.

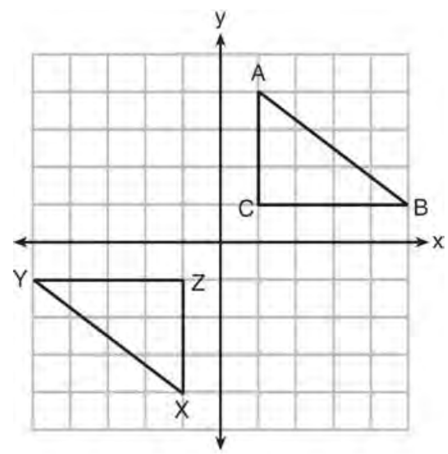


285 Which statement is sufficient evidence that $\triangle DEF$ is congruent to $\triangle ABC$?



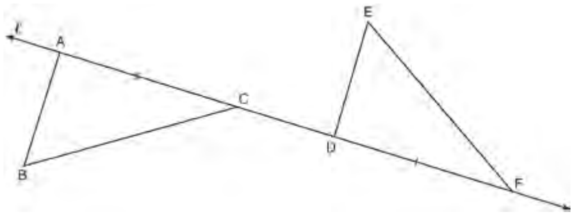
1) $AB = DE$ and $BC = EF$
2) $\angle D \cong \angle A$, $\angle B \cong \angle E$, $\angle C \cong \angle F$
3) There is a sequence of rigid motions that maps $\overline{AB}$ onto $\overline{DE}$, $\overline{BC}$ onto $\overline{EF}$, and $\overline{AC}$ onto $\overline{DF}$.
4) There is a sequence of rigid motions that maps point A onto point D, $\overline{AB}$ onto $\overline{DE}$, and $\angle B$ onto $\angle E$.

286 In the diagram below, $\triangle ABC$ and $\triangle XYZ$ are graphed.



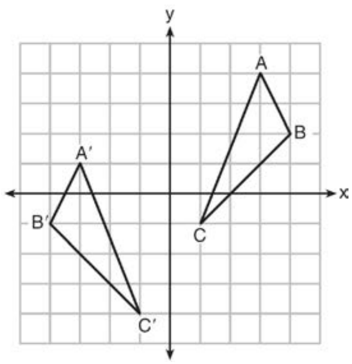
Use the properties of rigid motions to explain why $\triangle ABC \cong \triangle XYZ$.

287 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points A, C, D, and F are collinear on line ℓ.



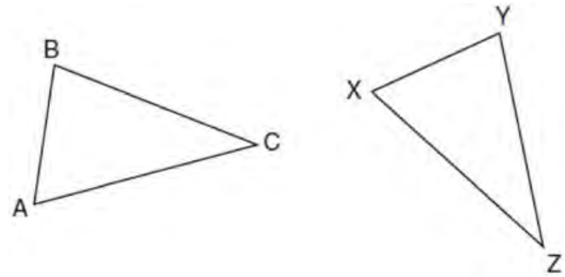
Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ, such that point D is mapped onto point A. Determine and state the location of F'. Explain your answer. Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ. Suppose that E'' is located at B. Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.

288 As graphed on the set of axes below, $\triangle A'B'C'$ is the image of $\triangle ABC$ after a sequence of transformations.



Is $\triangle A'B'C'$ congruent to $\triangle ABC$? Use the properties of rigid motion to explain your answer.

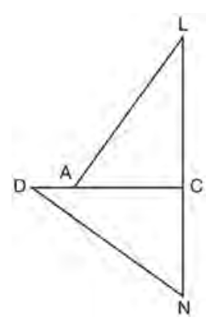
289 In the diagram below of $\triangle ABC$ and $\triangle XYZ$, a sequence of rigid motions maps $\angle A$ onto $\angle X$, $\angle C$ onto $\angle Z$, and $\overline{AC}$ onto $\overline{XZ}$.



Determine and state whether $\overline{BC} \cong \overline{YZ}$. Explain why.

290 After a reflection over a line, $\triangle A'B'C'$ is the image of $\triangle ABC$. Explain why triangle ABC is congruent to triangle $\triangle A'B'C'$.

291 In the diagram of $\triangle LAC$ and $\triangle DNC$ below, $\overline{LA} \cong \overline{DN}$, $\overline{CA} \cong \overline{CN}$, and $\overline{DAC} \perp \overline{LCN}$.

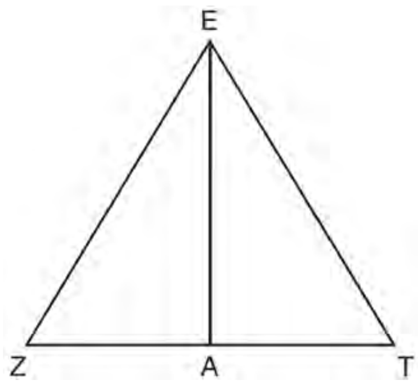


a) Prove that $\triangle LAC \cong \triangle DNC$.
b) Describe a sequence of rigid motions that will map $\triangle LAC$ onto $\triangle DNC$.

292 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 $\triangle DEF$

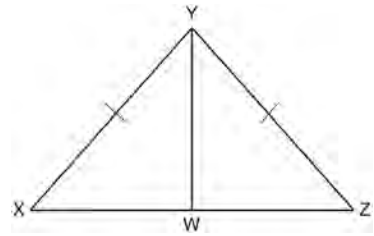
G.CO.C.10, G.SRT.B.5: TRIANGLE PROOFS

293 Line segment EA is the perpendicular bisector of $\overline{ZT}$, and $\overline{ZE}$ and $\overline{TE}$ are drawn.

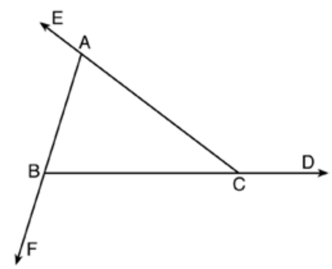


Which conclusion can *not* be proven?
1) $\overline{EA}$ bisects angle ZET.
2) Triangle EZT is equilateral.
3) $\overline{EA}$ is a median of triangle EZT.
4) Angle Z is congruent to angle T.

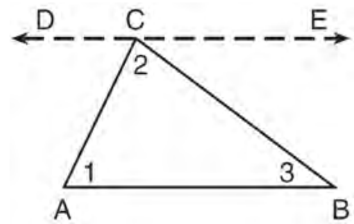
294 Given: $\triangle XYZ$, $\overline{XY} \cong \overline{ZY}$, and $\overline{YW}$ bisects $\angle XYZ$
Prove that $\angle YWZ$ is a right angle.



295 Prove the sum of the exterior angles of a triangle is 360°.



296 Given the theorem, "The sum of the measures of the interior angles of a triangle is 180°," complete the proof for this theorem.

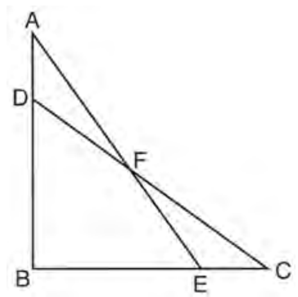


Given: $\triangle ABC$
Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180°$
Fill in the missing reasons below.

Statements	**Reasons**
(1) $\triangle ABC$	(1) Given
(2) Through point C, draw $\overleftrightarrow{DCE}$ 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) ______

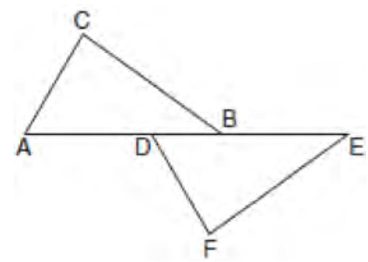
297 Two right triangles must be congruent if
1) an acute angle in each triangle is congruent
2) the lengths of the hypotenuses are equal
3) the corresponding legs are congruent
4) the areas are equal

298 Given: $\triangle ABE$ and $\triangle CBD$ shown in the diagram below with $\overline{DB} \cong \overline{BE}$



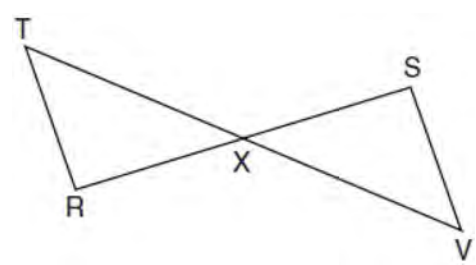
Which statement is needed to prove $\triangle ABE \cong \triangle CBD$ using only SAS $\cong$ SAS?
1) $\angle CDB \cong \angle AEB$
2) $\angle AFD \cong \angle EFC$
3) $\overline{AD} \cong \overline{CE}$
4) $\overline{AE} \cong \overline{CD}$

299 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

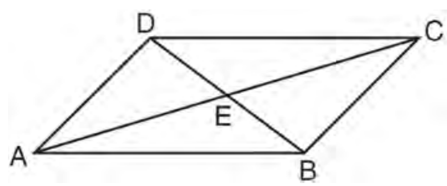
300 Given: $\overline{RS}$ and $\overline{TV}$ bisect each other at point X
$\overline{TR}$ and $\overline{SV}$ are drawn



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

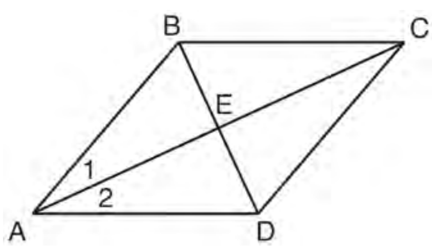
G.CO.C.11, G.SRT.B.5: QUADRILATERAL PROOFS

301 In parallelogram $ABCD$ shown below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E.



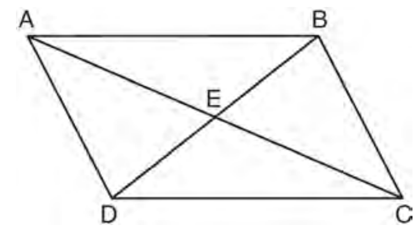
Prove: $\angle ACD \cong \angle CAB$

302 Given: Quadrilateral $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ that bisect each other, and $\angle 1 \cong \angle 2$



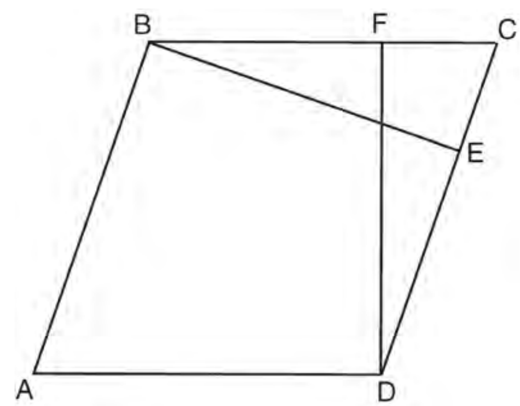
Prove: $\triangle ACD$ is an isosceles triangle and $\triangle AEB$ is a right triangle

303 Given: Quadrilateral $ABCD$ is a parallelogram with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at E



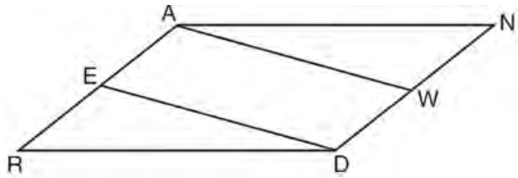
Prove: $\triangle AED \cong \triangle CEB$
Describe a single rigid motion that maps $\triangle AED$ onto $\triangle CEB$.

304 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$.



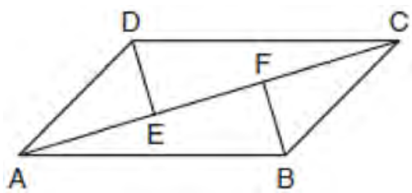
Prove $ABCD$ is a rhombus.

305 Given: Parallelogram $ANDR$ with $\overline{AW}$ and $\overline{DE}$ bisecting $\overline{NWD}$ and $\overline{REA}$ at points W and E, respectively



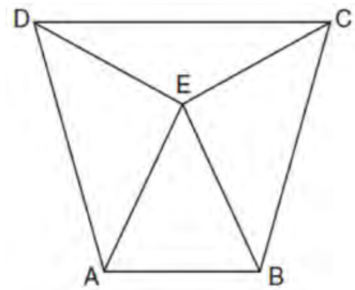
Prove that $\triangle ANW \cong \triangle DRE$. Prove that quadrilateral $AWDE$ is a parallelogram.

306 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: $\overline{AE} \cong \overline{CF}$

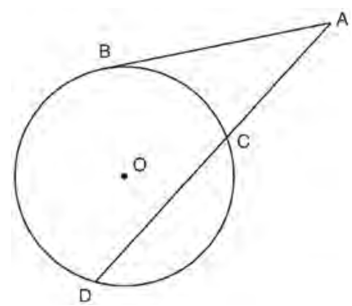
307 Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.



Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

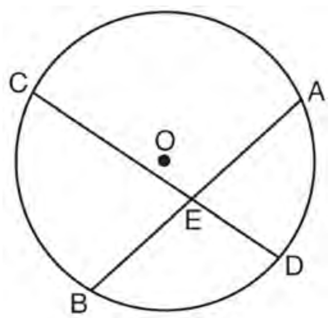
G.SRT.B.5: CIRCLE PROOFS

308 In the diagram below, secant $\overline{ACD}$ and tangent $\overline{AB}$ are drawn from external point A to circle O.



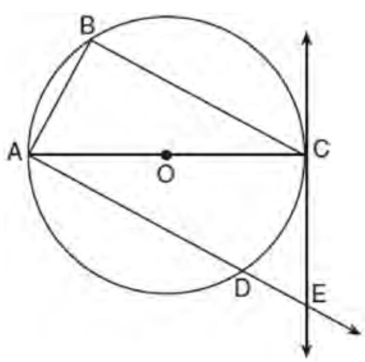
Prove the theorem: If a secant and a tangent are drawn to a circle from an external point, the product of the lengths of the secant segment and its external segment equals the length of the tangent segment squared. ($AC \cdot AD = AB^2$)

309 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 $AE \cdot EB = CE \cdot ED$.

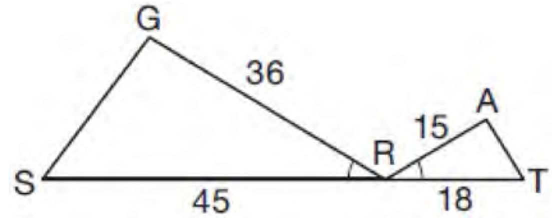
310 In the diagram below of circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overline{ADE}$, and chord $\overline{AB}$ is drawn.



Prove: $\dfrac{BC}{CA} = \dfrac{AB}{EC}$

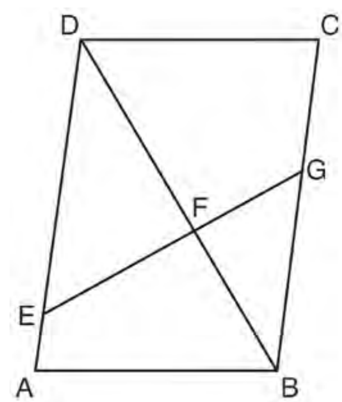
G.SRT.A.3, G.C.A.1: SIMILARITY PROOFS

311 In the diagram below, $\angle GRS \cong \angle ART$, $GR = 36$, $SR = 45$, $AR = 15$, and $RT = 18$.



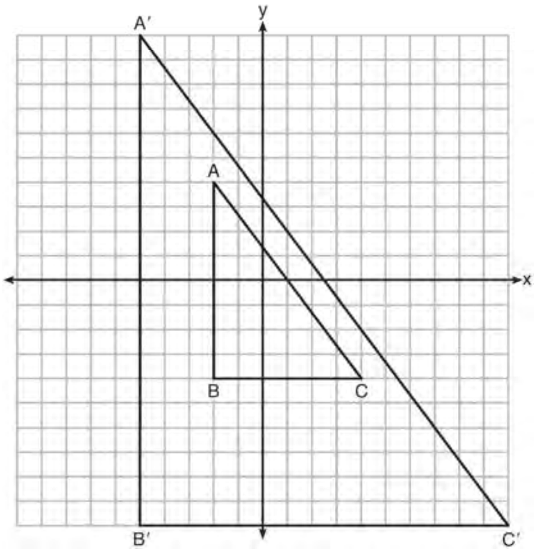
Which triangle similarity statement is correct?
1) $\triangle GRS \sim \triangle ART$ by AA.
2) $\triangle GRS \sim \triangle ART$ by SAS.
3) $\triangle GRS \sim \triangle ART$ by SSS.
4) $\triangle GRS$ is not similar to $\triangle ART$.

312 Given: Parallelogram $ABCD$, $\overline{EFG}$, and diagonal $\overline{DFB}$



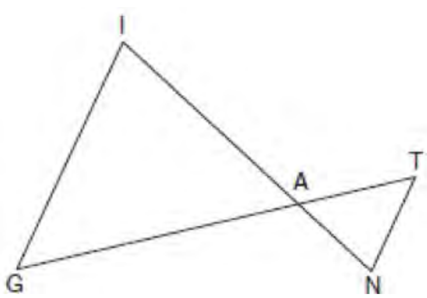
Prove: $\triangle DEF \sim \triangle BGF$

313 In the diagram below, $\triangle A'B'C'$ is the image of $\triangle ABC$ after a transformation.



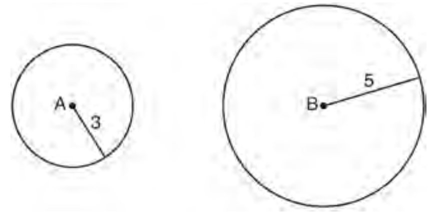
Describe the transformation that was performed. Explain why $\triangle A'B'C' \sim \triangle ABC$.

314 In the diagram below, $\overline{GI}$ is parallel to $\overline{NT}$, and $\overline{IN}$ intersects $\overline{GT}$ at A.



Prove: $\triangle GIA \sim \triangle TNA$

315 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 Common Core State Standard: Topic
Answer Section

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

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

3 ANS: 4 PTS: 2 REF: 081503geo 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

$$\begin{array}{rl} v = \pi r^2 h & (1)\ 6^2 \cdot 10 = 360 \\ 150\pi = \pi r^2 h & (2)\ 10^2 \cdot 6 = 600 \\ 150 = r^2 h & (3)\ 5^2 \cdot 6 = 150 \\ & (4)\ 3^2 \cdot 10 = 900 \end{array}$$

PTS: 2 REF: 081713geo NAT: G.GMD.B.4 TOP: Rotations of Two-Dimensional Objects

6 ANS: 1 PTS: 2 REF: 081603geo NAT: G.GMD.B.4
TOP: Rotations of Two-Dimensional Objects

7 ANS: 2 PTS: 2 REF: 061506geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

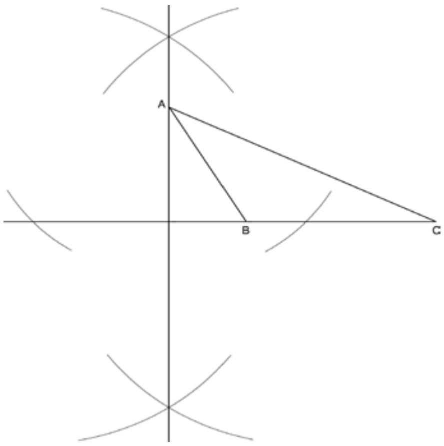
8 ANS: 1 PTS: 2 REF: 011601geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

9 ANS: 3 PTS: 2 REF: 081613geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

10 ANS: 4 PTS: 2 REF: 011723geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

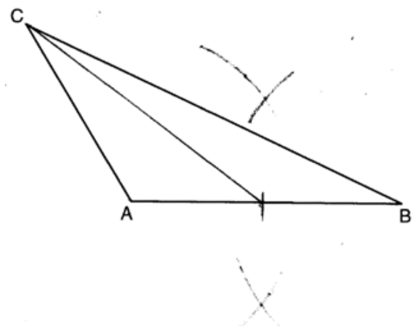
11 ANS: 2 PTS: 2 REF: 081701geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

12 ANS:



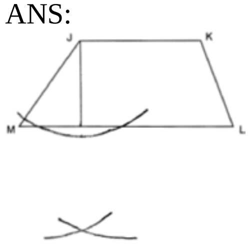
PTS: 2 REF: fall1409geo NAT: G.CO.D.12 TOP: Constructions
KEY: parallel and perpendicular lines

13 ANS:



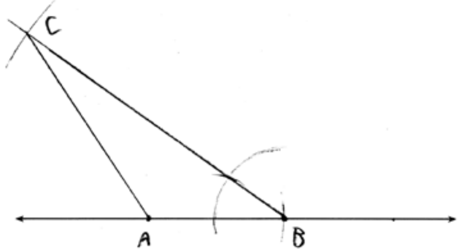
PTS: 2 REF: 081628geo NAT: G.CO.D.12 TOP: Constructions
KEY: line bisector

14 ANS:



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

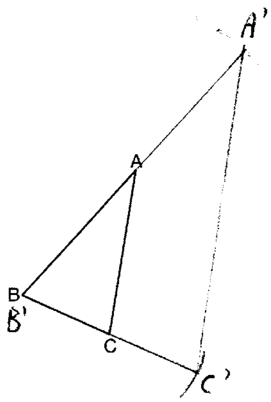
15 ANS:



SAS ≅ SAS

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

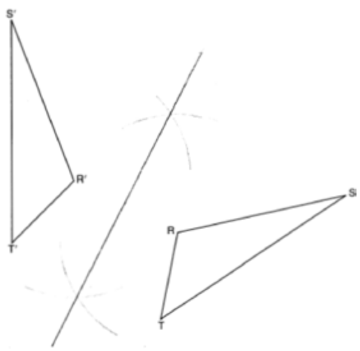
16 ANS:



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

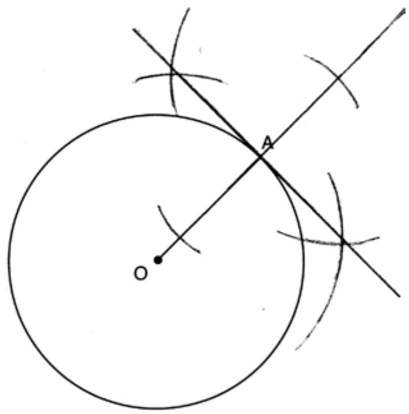
PTS: 4 REF: 081632geo NAT: G.CO.D.12 TOP: Constructions
KEY: congruent and similar figures

17 ANS:



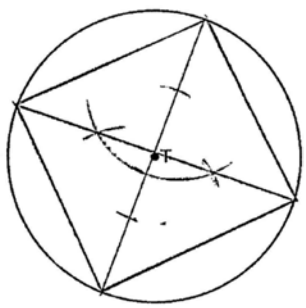
PTS: 2 REF: 011725geo NAT: G.CO.D.12 TOP: Constructions
KEY: line bisector

18 ANS:



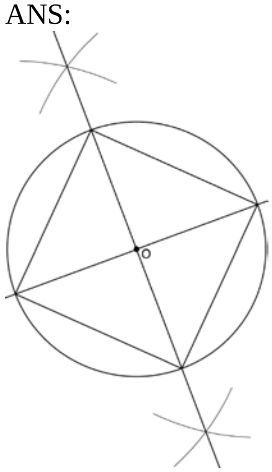
PTS: 2 REF: 061631geo NAT: G.CO.D.12 TOP: Constructions
KEY: parallel and perpendicular lines

19 ANS:



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

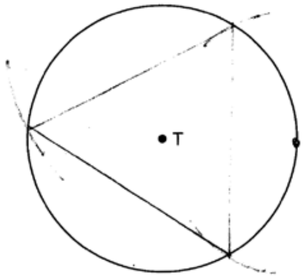
20 ANS:



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.

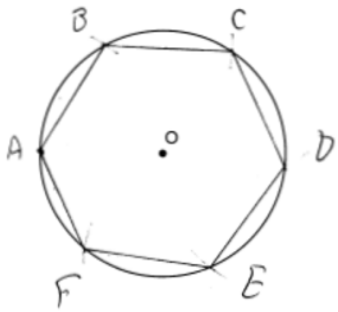
PTS: 4 REF: fall1412geo NAT: G.CO.D.13 TOP: Constructions

21 ANS:



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

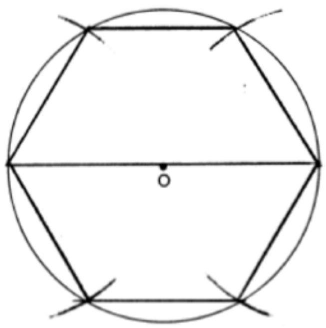
22 ANS:



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

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

23 ANS:



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

24 ANS: 1

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

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

25 ANS: 4

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

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

$-5+6$ $-4+3$

1 -1

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

26 ANS: 4

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

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

27 ANS: 1

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

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

28 ANS: 2

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

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

29 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

30 ANS:

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

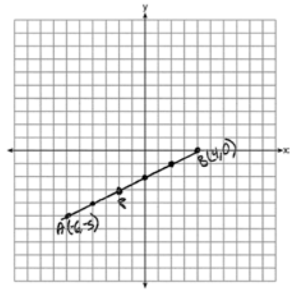
$4+\frac{4}{9}(18)$ $2+\frac{4}{9}(0)$

$4+8$ $2+0$

12 2

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

31 ANS:



$$-6+\frac{2}{5}(4--6)\quad -5+\frac{2}{5}(0--5)\quad (-2,-3)$$

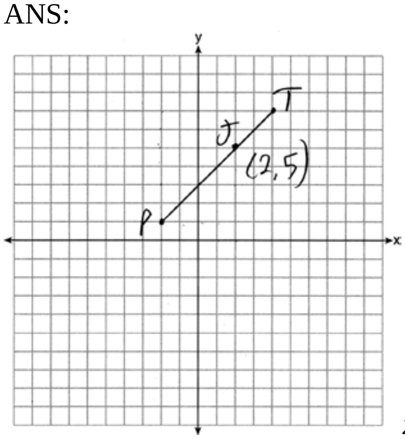
$$-6+\frac{2}{5}(10)\qquad -5+\frac{2}{5}(5)$$

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

$$-2\qquad -3$$

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

32 ANS:



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

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

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

33 ANS: 1
Alternate interior angles

PTS: 2 REF: 061517geo NAT: G.CO.C.9 TOP: Lines and Angles

34 ANS: 1 PTS: 2 REF: 011606geo NAT: G.CO.C.9
TOP: Lines and Angles

35 ANS: 2 PTS: 2 REF: 081601geo NAT: G.CO.C.9
TOP: Lines and Angles

36 ANS: 4 PTS: 2 REF: 081611geo NAT: G.CO.C.9
TOP: Lines and Angles

37 ANS: 1

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

$$f=10$$

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

38 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

39 ANS: 1

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

$$1=-4+b$$

$$5=b$$

PTS: 2 REF: 081510geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: write equation of parallel line

40 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.5 TOP: Parallel and Perpendicular Lines
KEY: find slope of perpendicular line

41 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

42 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

43 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

44 ANS: 4

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

$m_{\perp} = 2$ $\quad -4 = 12 + b$

$-16 = b$

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

45 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

46 ANS: 2

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

$m_{\perp} = -\frac{2}{3}$ $\quad 1 = 4 + b$

$-3 = b$

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

47 ANS: 3

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

PTS: 2 REF: 081608geo NAT: G.SRT.C.8 TOP: Pythagorean Theorem
KEY: without graphics

48 ANS: 2

$$\begin{aligned} s^2 + s^2 &= 7^2 \\ 2s^2 &= 49 \\ s^2 &= 24.5 \\ s &\approx 4.9 \end{aligned}$$

PTS: 2 REF: 081511geo NAT: G.SRT.C.8 TOP: Pythagorean Theorem

49 ANS:

$\frac{16}{9} = \frac{x}{20.6}$ $D = \sqrt{36.6^2 + 20.6^2} \approx 42$

$x \approx 36.6$

PTS: 4 REF: 011632geo NAT: G.SRT.C.8 TOP: Pythagorean Theorem
KEY: without graphics

50 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

51 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.SRT.B.5 TOP: Isosceles Triangle Theorem

52 ANS:

$180 - 2(25) = 130$

PTS: 2 REF: 011730geo NAT: G.SRT.B.5 TOP: Isosceles Triangle Theorem

53 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

54 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

55 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

56 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

57 ANS: 4

$\frac{2}{6} = \frac{5}{15}$

PTS: 2 REF: 081517geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

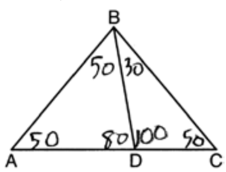
58 ANS:

$\frac{3.75}{5} = \frac{4.5}{6}$ $\overline{AB}$ is parallel to $\overline{CD}$ because $\overline{AB}$ divides the sides proportionately.

$39.375 = 39.375$

PTS: 2 REF: 061627geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

59 ANS: 2



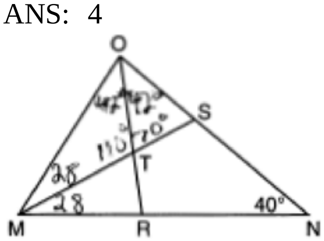
PTS: 2 REF: 081604geo NAT: G.CO.C.10 TOP: Interior and Exterior Angles of Triangles

60 ANS: 2

$\angle B = 180 - (82 + 26) = 72$; $\angle DEC = 180 - 26 = 154$; $\angle EDB = 360 - (154 + 26 + 72) = 108$; $\angle BDF = \frac{108}{2} = 54$; $\angle DFB = 180 - (54 + 72) = 54$

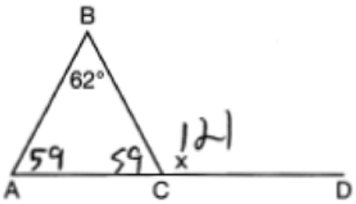
PTS: 2 REF: 061710geo NAT: G.CO.C.10 TOP: Interior and Exterior Angles of Triangles

61 ANS: 4



PTS: 2 REF: 061717geo NAT: G.CO.C.10 TOP: Interior and Exterior Angles of Triangles

62 ANS: 4

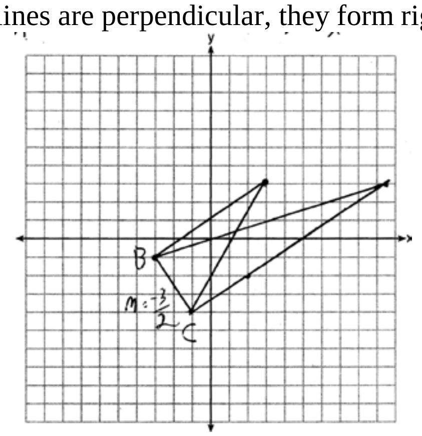


PTS: 2 REF: 081711geo NAT: G.CO.C.10 TOP: Exterior Angle Theorem

63 ANS: 4 PTS: 2 REF: 011704geo NAT: G.CO.C.10
TOP: Midsegments

64 ANS: 4 PTS: 2 REF: 081716geo NAT: G.CO.C.10
TOP: Midsegments

65 ANS:
The slopes of perpendicular line are opposite reciprocals. Since the lines are perpendicular, they form right angles



and a right triangle. $m_{\overline{BC}} = -\frac{3}{2}$ $\quad -1 = \frac{2}{3}(-3) + b$ or $\quad -4 = \frac{2}{3}(-1) + b$

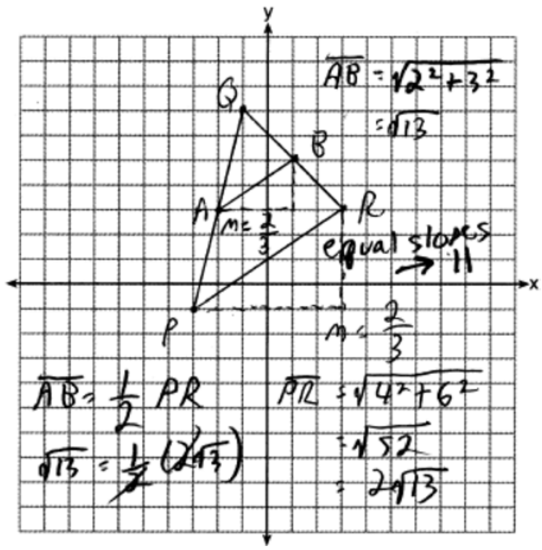
$m_{\perp} = \frac{2}{3}$

$$\begin{aligned} -1 &= -2 + b \\ 1 &= b \\ 3 &= \frac{2}{3}x + 1 \\ 2 &= \frac{2}{3}x \\ 3 &= x \end{aligned}$$

$$\begin{aligned} \frac{-12}{3} &= \frac{-2}{3} + b \\ -\frac{10}{3} &= b \\ 3 &= \frac{2}{3}x - \frac{10}{3} \\ 9 &= 2x - 10 \\ 19 &= 2x \\ 9.5 &= x \end{aligned}$$

PTS: 4 REF: 081533geo NAT: G.GPE.B.4 TOP: Triangles in the Coordinate Plane

66 ANS:



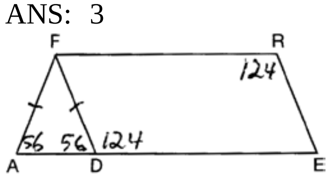
PTS: 4 REF: 081732geo NAT: G.GPE.B.4 TOP: Triangles in the Coordinate Plane

67 ANS: 1

$m_{\overline{RT}} = \dfrac{5 - -3}{4 - -2} = \dfrac{8}{6} = \dfrac{4}{3}$ $m_{\overline{ST}} = \dfrac{5-2}{4-8} = \dfrac{3}{-4} = -\dfrac{3}{4}$ Slopes are opposite reciprocals, so lines form a right angle.

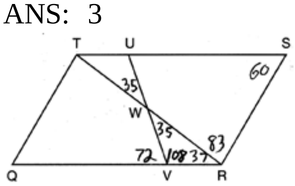
PTS: 2 REF: 011618geo NAT: G.GPE.B.4 TOP: Triangles in the Coordinate Plane

68 ANS: 3



PTS: 2 REF: 081508geo NAT: G.CO.C.11 TOP: Interior and Exterior Angles of Polygons

69 ANS: 3



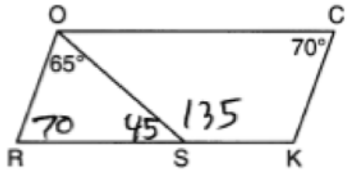
PTS: 2 REF: 011603geo NAT: G.CO.C.11 TOP: Interior and Exterior Angles of Polygons

70 ANS: 1

$180 - (68 \cdot 2)$

PTS: 2 REF: 081624geo NAT: G.CO.C.11 TOP: Interior and Exterior Angles of Polygons

71 ANS: 4



PTS: 2 REF: 081708geo NAT: G.CO.C.11 TOP: Interior and Exterior Angles of Polygons

72 ANS:
Opposite angles in a parallelogram are congruent, so $m\angle O = 118°$. 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

73 ANS: 3
(3) Could be a trapezoid.

PTS: 2 REF: 081607geo NAT: G.CO.C.11 TOP: Parallelograms

74 ANS: 2 PTS: 2 REF: 061720geo NAT: G.CO.C.11
TOP: Parallelograms

75 ANS: 4 PTS: 2 REF: 061513geo NAT: G.CO.C.11
TOP: Parallelograms

76 ANS: 4 PTS: 2 REF: 011705geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

77 ANS: 1 PTS: 2 REF: 011716geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

78 ANS: 2 PTS: 2 REF: 081501geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

79 ANS: 4 PTS: 2 REF: 061711geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

80 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

81 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

82 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

83 ANS: 1

$m_{\overline{TA}} = -1 \quad y = mx + b$

$m_{\overline{EM}} = 1 \quad 1 = 1(2) + b$

$-1 = b$

PTS: 2 REF: 081614geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: general

84 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

85 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

86 ANS:

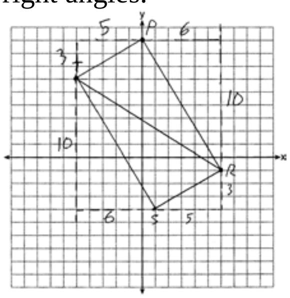
$M\left(\frac{4+0}{2}, \frac{6-1}{2}\right) = M\left(2, \frac{5}{2}\right)$ $m = \frac{6--1}{4-0} = \frac{7}{4}$ $m_{\perp} = -\frac{4}{7}$ $y - 2.5 = -\frac{4}{7}(x-2)$ The diagonals, $\overline{MT}$ and $\overline{AH}$, of rhombus *MATH* are perpendicular bisectors of each other.

PTS: 4 REF: fall1411geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

87 ANS:

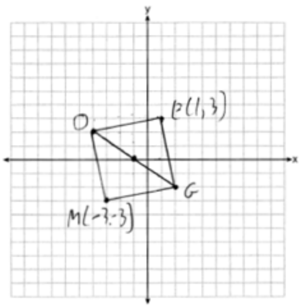
$m_{\overline{TS}} = \frac{-10}{6} = -\frac{5}{3}$ $m_{\overline{SR}} = \frac{3}{5}$ Since the slopes of $\overline{TS}$ and $\overline{SR}$ are opposite reciprocals, they are perpendicular and form a right angle. $\triangle RST$ is a right triangle because $\angle S$ is a right angle. $P(0,9)$ $m_{\overline{RP}} = \frac{-10}{6} = -\frac{5}{3}$ $m_{\overline{PT}} = \frac{3}{5}$

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

88 ANS:



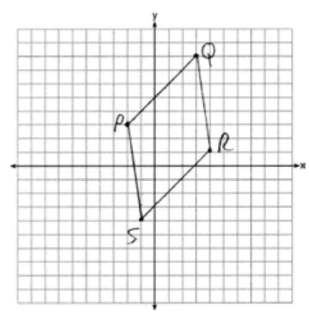
PTS: 2 REF: 011731geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

89 ANS:

$\overline{PQ}\ \sqrt{(8-3)^2+(3--2)^2}=\sqrt{50}$ $\overline{QR}\ \sqrt{(1-8)^2+(4-3)^2}=\sqrt{50}$ $\overline{RS}\ \sqrt{(-4-1)^2+(-1-4)^2}=\sqrt{50}$

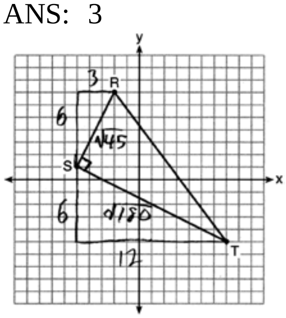
$\overline{PS}\ \sqrt{(-4-3)^2+(-1--2)^2}=\sqrt{50}$ *PQRS* is a rhombus because all sides are congruent. $m_{\overline{PQ}}=\dfrac{8-3}{3--2}=\dfrac{5}{5}=1$

$m_{\overline{QR}}=\dfrac{1-8}{4-3}=-7$ 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

90 ANS: 3



$\sqrt{45}=3\sqrt{5}$ $a=\dfrac{1}{2}\left(3\sqrt{5}\right)\left(6\sqrt{5}\right)=\dfrac{1}{2}(18)(5)=45$

$\sqrt{180}=6\sqrt{5}$

PTS: 2 REF: 061622geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

91 ANS: 3 PTS: 2 REF: 061702geo NAT: G.GPE.B.7
TOP: Polygons in the Coordinate Plane

92 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

93 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

94 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

95 ANS: 3

$5 \cdot \frac{10}{4} = \frac{50}{4} = 12.5$

PTS: 2 REF: 081512geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: common tangents

96 ANS: 4

$\frac{1}{2}(360 - 268) = 46$

PTS: 2 REF: 061704geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: inscribed

97 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

98 ANS: 1

Parallel chords intercept congruent arcs. $\frac{180-130}{2} = 25$

PTS: 2 REF: 081704geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: parallel lines

99 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

100 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

101 ANS: 2 PTS: 2 REF: 061610geo NAT: G.C.A.2
TOP: Chords, Secants and Tangents KEY: inscribed

102 ANS: 1 PTS: 2 REF: 061508geo NAT: G.C.A.2
TOP: Chords, Secants and Tangents KEY: inscribed

103 ANS: 1 PTS: 2 REF: 061520geo NAT: G.C.A.2
TOP: Chords, Secants and Tangents KEY: mixed

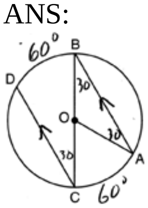
104 ANS: 3 PTS: 2 REF: 011621geo NAT: G.C.A.2
TOP: Chords, Secants and Tangents KEY: inscribed

105 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

106 ANS:



$180 - 2(30) = 120$

PTS: 2 REF: 011626geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: parallel lines

107 ANS:

$$\frac{3}{8} \cdot 56 = 21$$

PTS: 2 REF: 081625geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: common tangents

108 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

109 ANS: 3 PTS: 2 REF: 081515geo NAT: G.C.A.3
TOP: Inscribed Quadrilaterals

110 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

111 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

112 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

113 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

114 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

115 ANS: 1

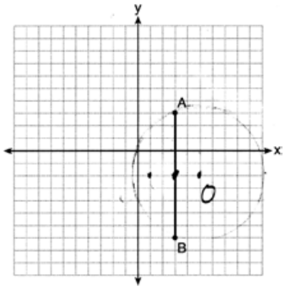
$x^2 + y^2 - 12y + 36 = -20 + 36$

$x^2 + (y - 6)^2 = 16$

PTS: 2 REF: 061712geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

116 ANS: 2 PTS: 2 REF: 061603geo NAT: G.GPE.A.1
TOP: Equations of Circles KEY: find center and radius | completing the square

117 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

118 ANS:

$x^2 - 6x + 9 + y^2 + 8y + 16 = 56 + 9 + 16$ $(3,-4)$; $r = 9$

$(x - 3)^2 + (y + 4)^2 = 81$

PTS: 2 REF: 081731geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

119 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

120 ANS: 3

$\sqrt{(-5)^2 + 12^2} = \sqrt{169}$ $\sqrt{11^2 + (2\sqrt{12})^2} = \sqrt{121 + 48} = \sqrt{169}$

PTS: 2 REF: 011722geo NAT: G.GPE.B.4 TOP: Circles in the Coordinate Plane

121 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

122 ANS: 1

$\frac{64}{4}=16 \quad 16^2=256 \quad \begin{aligned}2w+2(w+2)&=64\\ w&=15\end{aligned} \quad 15\times17=255 \quad \begin{aligned}2w+2(w+4)&=64\\ w&=14\end{aligned} \quad 14\times18=252 \quad \begin{aligned}2w+2(w+6)&=64\\ w&=13\end{aligned}$

$13\times19=247$

PTS: 2 REF: 011708geo NAT: G.MG.A.3 TOP: Area of Polygons

123 ANS:

$$\begin{aligned}x^2+x^2&=58^2\\ 2x^2&=3364\\ x&=\sqrt{1682}\end{aligned} \qquad A=(\sqrt{1682}+8)^2\approx 2402.2$$

PTS: 4 REF: 081734geo NAT: G.MG.A.3 TOP: Area of Polygons

124 ANS: 2

$SA=6\cdot12^2=864$

$\frac{864}{450}=1.92$

PTS: 2 REF: 061519geo NAT: G.MG.A.3 TOP: Surface Area

125 ANS: 2

x is $\frac{1}{2}$ the circumference. $\frac{C}{2}=\frac{10\pi}{2}\approx16$

PTS: 2 REF: 061523geo NAT: G.GMD.A.1 TOP: Circumference

126 ANS: 1

$\frac{1000}{20\pi}\approx15.9$

PTS: 2 REF: 011623geo NAT: G.GMD.A.1 TOP: Circumference

127 ANS: 3

$\theta=\frac{s}{r}=\frac{2\pi}{10}=\frac{\pi}{5}$

PTS: 2 REF: fall1404geo NAT: G.C.B.5 TOP: Arc Length
KEY: angle

128 ANS:

$$\begin{aligned}s&=\theta\cdot r\\ \pi&=A\cdot4\\ \frac{\pi}{4}&=A\end{aligned} \qquad \begin{aligned}s&=\theta\cdot r\\ \frac{13\pi}{8}&=B\cdot6.5\\ \frac{\pi}{4}&=B\end{aligned}$$

Yes, both angles are equal.

PTS: 2 REF: 061629geo NAT: G.C.B.5 TOP: Arc Length
KEY: arc length

129 ANS: 3

$$\frac{60}{360} \cdot 6^2 \pi = 6\pi$$

PTS: 2 REF: 081518geo NAT: G.C.B.5 TOP: Sectors

130 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

131 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

132 ANS: 2 PTS: 2 REF: 081619geo NAT: G.C.B.5 TOP: Sectors

133 ANS: 4

$$\frac{300}{360} \cdot 8^2 \pi = \frac{160\pi}{3}$$

PTS: 2 REF: 011721geo NAT: G.C.B.5 TOP: Sectors

134 ANS: 2

$$\frac{\frac{512\pi}{3}}{\left(\frac{32}{2}\right)^2 \pi} \cdot 2\pi = \frac{4\pi}{3}$$

PTS: 2 REF: 081723geo NAT: G.C.B.5 TOP: Sectors

135 ANS:

$$\frac{\left(\frac{180-20}{2}\right)}{360} \times \pi(6)^2 = \frac{80}{360} \times 36\pi = 8\pi$$

PTS: 4 REF: spr1410geo NAT: G.C.B.5 TOP: Sectors

136 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

137 ANS:

$\frac{40}{360} \cdot \pi(4.5)^2 = 2.25\pi$

PTS: 2 REF: 061726geo NAT: G.C.B.5 TOP: Sectors

138 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

139 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

140 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

141 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

142 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

143 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

144 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

145 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

146 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

147 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

148 ANS: 4 PTS: 2 REF: 061606geo NAT: G.GMD.A.3
TOP: Volume KEY: compositions

149 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

150 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

151 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

152 ANS:

$C=2\pi r$ $V=\frac{1}{3}\pi\cdot 5^2\cdot 13\approx 340$

$31.416=2\pi r$

$5\approx r$

PTS: 4 REF: 011734geo NAT: G.GMD.A.3 TOP: Volume
KEY: cones

153 ANS:

$20000\text{ g}\left(\frac{1\text{ ft}^3}{7.48\text{ g}}\right)=2673.8\text{ ft}^3$ $2673.8=\pi r^2(34.5)$ $9.9+1=10.9$

$r\approx 4.967$

$d\approx 9.9$

PTS: 4 REF: 061734geo NAT: G.GMD.A.3 TOP: Volume
KEY: cylinders

154 ANS:

$\tan 16.5=\frac{x}{13.5}$ $9\times 16\times 4.5=648$ $3752-(35\times 16\times .5)=3472$

$x\approx 4$ $13.5\times 16\times 4.5=972$ $3472\times 7.48\approx 25971$

$4+4.5=8.5$ $\frac{1}{2}\times 13.5\times 16\times 4=432$ $\frac{25971}{10.5}\approx 2473.4$

$12.5\times 16\times 8.5=\underline{1700}$ $\frac{2473.4}{60}\approx 41$

3752

PTS: 6 REF: 081736geo NAT: G.GMD.A.3 TOP: Volume
KEY: compositions

155 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

156 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

157 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

Geometry Regents Exam Questions by Common Core State Standard: Topic
Answer Section

158 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

159 ANS: 2

$$\frac{4}{3}\pi\cdot 4^3+0.075\approx 20$$

PTS: 2 REF: 011619geo NAT: G.MG.A.2 TOP: Density

160 ANS: 2

$$\frac{1\text{ l}}{1.2\text{ oz}}\left(\frac{16\text{ oz}}{1\text{ lb}}\right)=\frac{13.\overline{3}\text{ l}}{\text{lb}}\quad \frac{13.\overline{3}\text{ l}}{\text{lb}}\left(\frac{1\text{ g}}{3.785\text{ l}}\right)\approx\frac{3.5\text{ g}}{1\text{ lb}}$$

PTS: 2 REF: 061618geo NAT: G.MG.A.2 TOP: Density

161 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

162 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

163 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

164 ANS:
$\frac{137.8}{6^3} \approx 0.638$ Ash

PTS: 2 REF: 081525geo NAT: G.MG.A.2 TOP: Density

165 ANS:
$\frac{40000}{\pi\left(\frac{51}{2}\right)^2} \approx 19.6$ $\frac{72000}{\pi\left(\frac{75}{2}\right)^2} \approx 16.3$ Dish A

PTS: 2 REF: 011630geo NAT: G.MG.A.2 TOP: Density

166 ANS:
$V = \frac{1}{3}\pi\left(\frac{8.3}{2}\right)^2(10.2) + \frac{1}{2}\cdot\frac{4}{3}\pi\left(\frac{8.3}{2}\right)^3 \approx 183.961 + 149.693 \approx 333.65\text{ cm}^3$ $333.65 \times 50 = 16682.7\text{ cm}^3$
$16682.7 \times 0.697 = 11627.8\text{ g}$ $11.6278 \times 3.83 = \$44.53$

PTS: 6 REF: 081636geo NAT: G.MG.A.2 TOP: Density

167 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

168 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

169 ANS:
$r = 25\text{ cm}\left(\frac{1\text{ m}}{100\text{ cm}}\right) = 0.25\text{ m}$ $V = \pi(0.25\text{ m})^2(10\text{ m}) = 0.625\pi\text{ m}^3$ $W = 0.625\pi\text{ m}^3\left(\frac{380\text{ K}}{1\text{ m}^3}\right) \approx 746.1\,K$
$n = \frac{\$50,000}{\left(\frac{\$4.75}{\text{K}}\right)(746.1\text{ K})} = 14.1$ 15 trees

PTS: 4 REF: spr1412geo NAT: G.MG.A.2 TOP: Density

170 ANS:
No, the weight of the bricks is greater than 900 kg. $500 \times (5.1 \text{ cm} \times 10.2 \text{ cm} \times 20.3 \text{ cm}) = 528{,}003 \text{ cm}^3$.
$528{,}003 \text{ cm}^3 \times \frac{1 \text{ m}^3}{100 \text{ cm}^3} = 0.528003 \text{ m}^3$. $\frac{1920 \text{ kg}}{\text{m}^3} \times 0.528003 \text{ m}^3 \approx 1013 \text{ kg}$.

PTS: 2 REF: fall1406geo NAT: G.MG.A.2 TOP: Density

171 ANS:
C: $V = \pi(26.7)^2(750) - \pi(24.2)^2(750) = 95{,}437.5\pi$

$$95{,}437.5\pi \text{ cm}^3 \left(\frac{2.7 \text{ g}}{\text{cm}^3}\right)\left(\frac{1 \text{ kg}}{1000 \text{ g}}\right)\left(\frac{\$0.38}{\text{kg}}\right) = \$307.62$$

P: $V = 40^2(750) - 35^2(750) = 281{,}250$ $\$307.62 - 288.56 = \$19.06$

$$281{,}250 \text{ cm}^3 \left(\frac{2.7 \text{ g}}{\text{cm}^3}\right)\left(\frac{1 \text{ kg}}{1000 \text{ g}}\right)\left(\frac{\$0.38}{\text{kg}}\right) = \$288.56$$

PTS: 6 REF: 011736geo NAT: G.MG.A.2 TOP: Density

172 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

173 ANS: 2 PTS: 2 REF: 081519geo NAT: G.SRT.B.5
TOP: Similarity KEY: basic

174 ANS: 4
$\frac{7}{12} \cdot 30 = 17.5$

PTS: 2 REF: 061521geo NAT: G.SRT.B.5 TOP: Similarity
KEY: perimeter and area

175 ANS: 1
$\frac{6}{8} = \frac{9}{12}$

PTS: 2 REF: 011613geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

176 ANS: 4

$\frac{1}{2} = \frac{x+3}{3x-1}$ $GR = 3(7) - 1 = 20$

$3x - 1 = 2x + 6$

$x = 7$

PTS: 2 REF: 011620geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

177 ANS: 2

$\sqrt{3 \cdot 21} = \sqrt{63} = 3\sqrt{7}$

PTS: 2 REF: 011622geo NAT: G.SRT.B.5 TOP: Similarity
KEY: altitude

178 ANS: 3

$\frac{12}{4} = \frac{x}{5}$ $15 - 4 = 11$

$x = 15$

PTS: 2 REF: 011624geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

179 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

180 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

181 ANS: 3

$\frac{x}{10} = \frac{6}{4}$ $\overline{CD} = 15 - 4 = 11$

$x = 15$

PTS: 2 REF: 081612geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

182 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

183 ANS: 4

$$\frac{6.6}{x} = \frac{4.2}{5.25}$$

$$4.2x = 34.65$$

$$x = 8.25$$

PTS: 2 REF: 081705geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

184 ANS: 2

$$12^2 = 9 \cdot 16$$

$$144 = 144$$

PTS: 2 REF: 081718geo NAT: G.SRT.B.5 TOP: Similarity
KEY: leg

185 ANS: 3

1) $\frac{12}{9} = \frac{4}{3}$ 2) AA 3) $\frac{32}{16} \neq \frac{8}{2}$ 4) SAS

PTS: 2 REF: 061605geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

186 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

187 ANS:

$$\frac{120}{230} = \frac{x}{315}$$

$$x = 164$$

PTS: 2 REF: 081527geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

188 ANS:

$\frac{6}{14} = \frac{9}{21}$ SAS

$126 = 126$

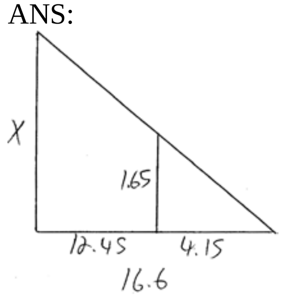
PTS: 2 REF: 081529geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

189 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

190 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

191 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

192 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, $\left(0 \cdot \frac{3}{2}, -4 \cdot \frac{3}{2}\right) \to (0,-6)$. So the equation of the dilated line is $y = 2x - 6$.

PTS: 2 REF: fall1403geo NAT: G.SRT.A.1 TOP: Line Dilations

193 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
194 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
195 ANS: 1
Since a dilation preserves parallelism, the line $4y = 3x + 7$ and its image $3x - 4y = 9$ are parallel, with slopes of $\frac{3}{4}$.

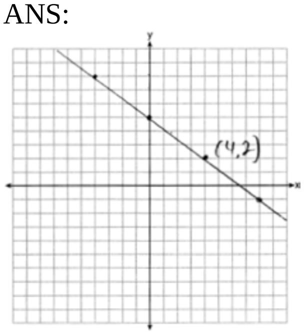
PTS: 2 REF: 081710geo NAT: G.SRT.A.1 TOP: Line Dilations
196 ANS: 1 PTS: 2 REF: 061518geo NAT: G.SRT.A.1
TOP: Line Dilations
197 ANS: 2 PTS: 2 REF: 011610geo NAT: G.SRT.A.1
TOP: Line Dilations
198 ANS: 4
$3 \times 6 = 18$

PTS: 2 REF: 061602geo NAT: G.SRT.A.1 TOP: Line Dilations
199 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
200 ANS: 1
B: $(4-3, 3-4) \to (1,-1) \to (2,-2) \to (2+3, -2+4)$

C: $(2-3, 1-4) \to (-1,-3) \to (-2,-6) \to (-2+3, -6+4)$

PTS: 2 REF: 011713geo NAT: G.SRT.A.1 TOP: Line Dilations
201 ANS: 3 PTS: 2 REF: 061706geo NAT: G.SRT.A.1
TOP: Line Dilations
202 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

203 ANS:
$\ell: y = 3x - 4$

$m: y = 3x - 8$

PTS: 2 REF: 011631geo NAT: G.SRT.A.1 TOP: Line Dilations

204 ANS: 1 PTS: 2 REF: 081605geo NAT: G.CO.A.5
TOP: Rotations KEY: grids

205 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

$A(2,-3)-(2,-3)=(0,0)\rightarrow(0,0)+(2,-3)=A'(2,-3)$

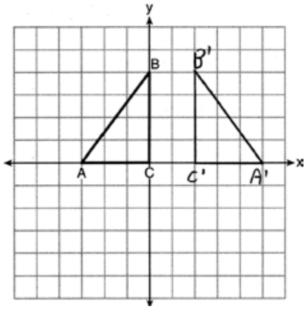
$B(6,-8)-(2,-3)=(4,-5)\rightarrow(5,4)+(2,-3)=B'(7,1)$

$C(2,-9)-(2,-3)=(0,-6)\rightarrow(6,0)+(2,-3)=C'(8,-3)$

$\triangle A'B'C'$ and reflections preserve distance.

PTS: 4 REF: 081633geo NAT: G.CO.A.5 TOP: Rotations
KEY: grids

206 ANS:



PTS: 2 REF: 011625geo NAT: G.CO.A.5 TOP: Reflections
KEY: grids

207 ANS: 2 PTS: 2 REF: 061516geo NAT: G.SRT.A.2
TOP: Dilations

208 ANS: 4 PTS: 2 REF: 081506geo NAT: G.SRT.A.2
TOP: Dilations

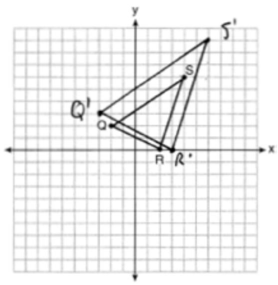
209 ANS: 1
$3^2 = 9$

PTS: 2 REF: 081520geo NAT: G.SRT.A.2 TOP: Dilations

210 ANS: 1
$\frac{4}{6} = \frac{3}{4.5} = \frac{2}{3}$

PTS: 2 REF: 081523geo NAT: G.SRT.A.2 TOP: Dilations

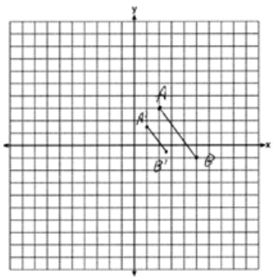
211 ANS:



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

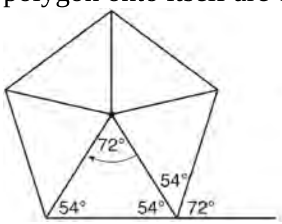
212 ANS:



$\sqrt{(2.5-1)^2+(-.5-1.5)^2}=\sqrt{2.25+4}=2.5$

PTS: 2 REF: 081729geo NAT: G.SRT.A.2 TOP: Dilations

213 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.



$\frac{360}{5}=72.$

PTS: 2 REF: spr1402geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

214 ANS: 4
$\frac{360°}{10}=36°$ 252º is a multiple of 36º

PTS: 2 REF: 011717geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

215 ANS: 4
$\frac{360°}{10}=36°$ 252º is a multiple of 36º

PTS: 2 REF: 081722geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

216 ANS: 1 PTS: 2 REF: 061707geo NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself

217 ANS: 1

$\frac{360°}{45°} = 8$

PTS: 2 REF: 061510geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

218 ANS: 1 PTS: 2 REF: 081505geo NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself

219 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

220 ANS:

$\frac{360}{6} = 60$

PTS: 2 REF: 081627geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

221 ANS: 4 PTS: 2 REF: 061504geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify

222 ANS: 1 PTS: 2 REF: 081507geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify

223 ANS: 1 PTS: 2 REF: 011608geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify

224 ANS: 2 PTS: 2 REF: 061701geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify

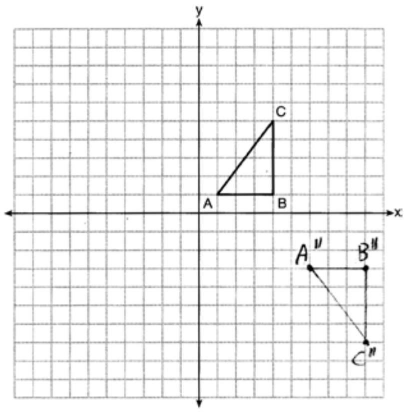
225 ANS: 3 PTS: 2 REF: 011710geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify

226 ANS:

$T_{6,0} \circ r_{x\text{-axis}}$

PTS: 2 REF: 061625geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify

227 ANS:



PTS: 2 REF: 081626geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: grids

228 ANS:
$T_{0,-2} \circ r_{y\text{-axis}}$

PTS: 2 REF: 011726geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify

229 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

230 ANS:
R_{180° about $\left(-\frac{1}{2}, \frac{1}{2}\right)$

PTS: 2 REF: 081727geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify

231 ANS: 4 PTS: 2 REF: 081514geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids

232 ANS: 4 PTS: 2 REF: 061608geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids

233 ANS: 4 PTS: 2 REF: 081609geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids

234 ANS: 2 PTS: 2 REF: 011702geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: basic

235 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

236 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 $\frac{ZU}{ZX}$ 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

237 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

238 ANS: 4 PTS: 2 REF: 011611geo NAT: G.CO.B.6
TOP: Properties of Transformations KEY: graphics

239 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

240 ANS: 4 PTS: 2 REF: 061502geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: basic

241 ANS: 3 PTS: 2 REF: 081502geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: basic

242 ANS: 2 PTS: 2 REF: 081602geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: basic

243 ANS: 4 PTS: 2 REF: 011706geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: basic

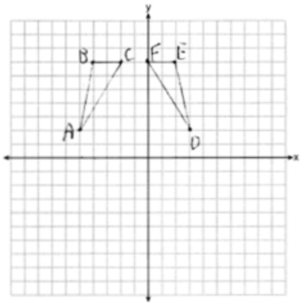
244 ANS: 4 PTS: 2 REF: 081702geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: basic

245 ANS: 2 PTS: 2 REF: 081513geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: graphics

246 ANS: 1 PTS: 2 REF: 061604geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: graphics

247 ANS: 3 PTS: 2 REF: 061616geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: graphics

248 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

249 ANS: 3 PTS: 2 REF: 011605geo NAT: G.CO.A.2
TOP: Analytical Representations of Transformations KEY: basic

250 ANS: 4 PTS: 2 REF: 061615geo NAT: G.SRT.C.6
TOP: Trigonometric Ratios

251 ANS: 3 PTS: 2 REF: 011714geo NAT: G.SRT.C.6
TOP: Trigonometric Ratios

252 ANS: 4 PTS: 2 REF: 061512geo NAT: G.SRT.C.7
TOP: Cofunctions

253 ANS: 1 PTS: 2 REF: 081504geo NAT: G.SRT.C.7
TOP: Cofunctions

254 ANS: 4 PTS: 2 REF: 011609geo NAT: G.SRT.C.7
TOP: Cofunctions

255 ANS: 1 PTS: 2 REF: 081606geo NAT: G.SRT.C.7
TOP: Cofunctions

256 ANS: 3 PTS: 2 REF: 061703geo NAT: G.SRT.C.7
TOP: Cofunctions

257 ANS: 4

$$\begin{aligned} 40 - x + 3x &= 90 \\ 2x &= 50 \\ x &= 25 \end{aligned}$$

PTS: 2 REF: 081721geo NAT: G.SRT.C.7 TOP: Cofunctions

258 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

259 ANS:
$4x - .07 = 2x + .01$ 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

260 ANS:
$73 + R = 90$ Equal cofunctions are complementary.

$R = 17$

PTS: 2 REF: 061628geo NAT: G.SRT.C.7 TOP: Cofunctions

261 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

262 ANS: 3
$\tan 34 = \frac{T}{20}$

$T \approx 13.5$

PTS: 2 REF: 061505geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: graphics

263 ANS: 2
$\tan \theta = \frac{2.4}{x}$

$\frac{3}{7} = \frac{2.4}{x}$

$x = 5.6$

PTS: 2 REF: 011707geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

264 ANS: 3
$\cos 40 = \frac{14}{x}$

$x \approx 18$

PTS: 2 REF: 011712geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

265 ANS: 4

$\sin 70 = \frac{x}{20}$

$x \approx 18.8$

PTS: 2 REF: 061611geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: without graphics

266 ANS: 4

$\sin 71 = \frac{x}{20}$

$x = 20\sin 71 \approx 19$

PTS: 2 REF: 061721geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: without graphics

267 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

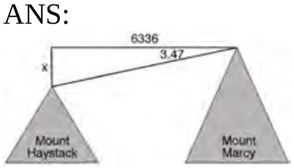
268 ANS:

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. $\tan 6 = \frac{112 - 1.5}{x}$ $\tan(49 + 6) = \frac{112 - 1.5}{y}$ $\frac{1051.3 - 77.4}{5} \approx 195$

$x \approx 1051.3$ $y \approx 77.4$

PTS: 4 REF: spr1409geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: advanced

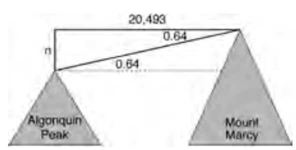
269 ANS:



$\tan 3.47 = \frac{M}{6336}$

$M \approx 384$

$4960 + 384 = 5344$



$\tan 0.64 = \frac{A}{20{,}493}$

$A \approx 229$

$5344 - 229 = 5115$

PTS: 6 REF: fall1413geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: advanced

270 ANS:

$\tan 7 = \frac{125}{x}$ $\quad \tan 16 = \frac{125}{y}$ $\quad 1018 - 436 \approx 582$

$x \approx 1018$ $\quad y \approx 436$

PTS: 4 REF: 081532geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: advanced

271 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

272 ANS:

$\tan 52.8 = \frac{h}{x}$

$h = x\tan 52.8$

$\tan 34.9 = \frac{h}{x+8}$

$h = (x+8)\tan 34.9$

$x\tan 52.8 = x\tan 34.9 + 8\tan 34.9$

$x\tan 52.8 - x\tan 34.9 = 8\tan 34.9$

$x(\tan 52.8 - \tan 34.9) = 8\tan 34.9$

$x = \frac{8\tan 34.9}{\tan 52.8 - \tan 34.9}$

$x \approx 9$

$\tan 52.8 \approx \frac{h}{9}$

$x \approx 11.86$

$11.86 + 1.7 \approx 13.6$

PTS: 6 REF: 011636geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: advanced

273 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

274 ANS:

$\tan 15 = \frac{6250}{x}$ $\quad \tan 52 = \frac{6250}{y}$ $\quad 23325.3 - 4883 = 18442$ $\quad \frac{18442\text{ ft}}{1\text{ min}}\left(\frac{1\text{ mi}}{5280\text{ ft}}\right)\left(\frac{60\text{ min}}{1\text{ h}}\right) \approx 210$

$x \approx 23325.3$ $\quad y \approx 4883$

PTS: 6 REF: 061736geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: advanced

275 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

276 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

277 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

278 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

279 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

280 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

281 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

282 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

283 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

284 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

285 ANS: 3 PTS: 2 REF: 061524geo NAT: G.CO.B.7
TOP: Triangle Congruency

286 ANS:
The transformation is a rotation, which is a rigid motion.

PTS: 2 REF: 081530geo NAT: G.CO.B.7 TOP: Triangle Congruency

287 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

288 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

289 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

290 ANS:
Reflections are rigid motions that preserve distance.

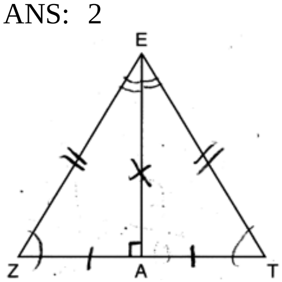
PTS: 2 REF: 061530geo NAT: G.CO.B.7 TOP: Triangle Congruency

291 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

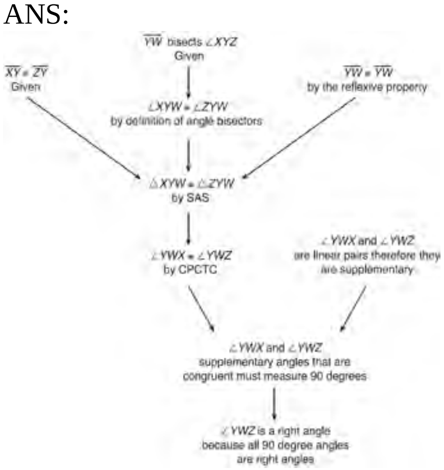
292 ANS: 1 PTS: 2 REF: 011703geo NAT: G.SRT.B.5
TOP: Triangle Congruency

293 ANS: 2



PTS: 2 REF: 061619geo NAT: G.CO.C.10 TOP: Triangle Proofs

294 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

295 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

296 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

297 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

298 ANS: 3 PTS: 2 REF: 081622geo NAT: G.SRT.B.5
TOP: Triangle Proofs KEY: statements

299 ANS: 2 PTS: 2 REF: 061709geo NAT: G.SRT.B.5
TOP: Triangle Proofs KEY: statements

300 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

301 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

302 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

303 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

304 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

305 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

306 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

307 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

308 ANS:
Circle O, secant $\overline{ACD}$, tangent $\overline{AB}$ (Given). Chords $\overline{BC}$ and $\overline{BD}$ are drawn (Auxiliary lines). $\angle A \cong \angle A$, $\overset{\frown}{BC} \cong \overset{\frown}{BC}$ (Reflexive property). $m\angle BDC = \frac{1}{2} m\overset{\frown}{BC}$ (The measure of an inscribed angle is half the measure of the intercepted arc). $m\angle CBA = \frac{1}{2} m\overset{\frown}{BC}$ (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

309 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

310 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

311 ANS: 4

$$\frac{36}{45} \ne \frac{15}{18}$$

$$\frac{4}{5} \ne \frac{5}{6}$$

PTS: 2 REF: 081709geo NAT: G.SRT.A.3 TOP: Similarity Proofs

312 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

313 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

314 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

315 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