JMAP
REGENTS BY COMMON CORE STATE STANDARD: TOPIC

NY Geometry Regents Exam Questions
from Spring 2014 to August 2016 Sorted by CCSS:Topic

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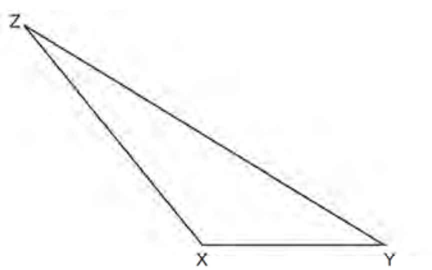
Geometry Regents Exam Questions by Common Core State Standard: Topic

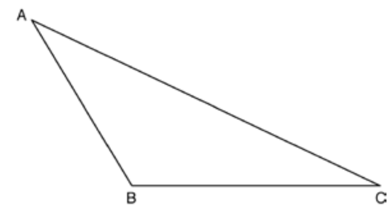
TOOLS OF GEOMETRY

G.CO.D.12-13: CONSTRUCTIONS

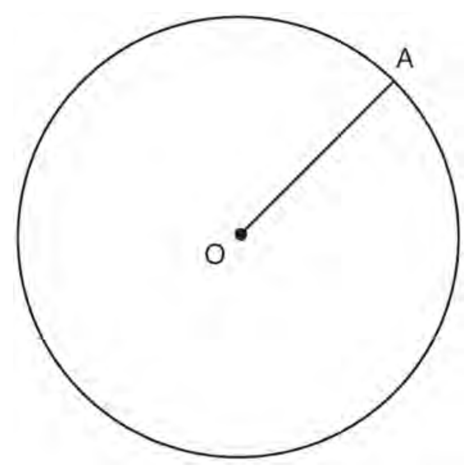
1 Triangle *XYZ* is shown below. Using a compass and straightedge, on the line below, construct and label $\triangle ABC$, such that $\triangle ABC \cong \triangle XYZ$. [Leave all construction marks.] Based on your construction, state the theorem that justifies why $\triangle ABC$ is congruent to $\triangle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



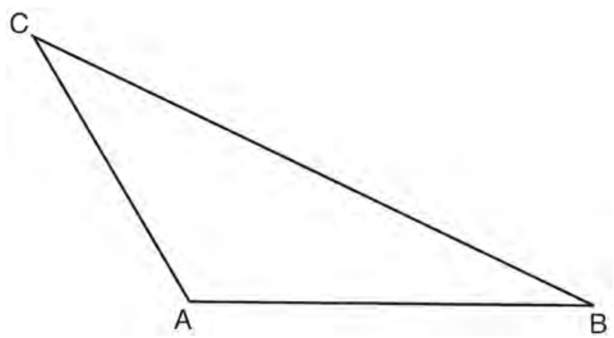
2 Using a compass and straightedge, construct an altitude of triangle *ABC* below. [Leave all construction marks.]



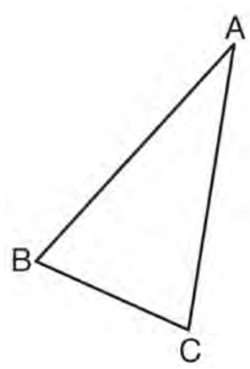
3 In the diagram below, radius $\overline{OA}$ is drawn in circle *O*. Using a compass and a straightedge, construct a line tangent to circle *O* at point *A*. [Leave all construction marks.]



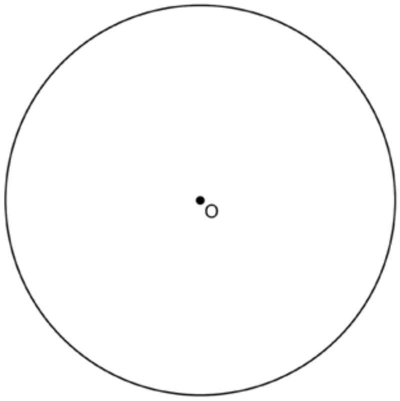
4 In the diagram of $\triangle ABC$ shown below, use a compass and straightedge to construct the median to $\overline{AB}$. [Leave all construction marks.]



5 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 $\overline{A'C'}$.

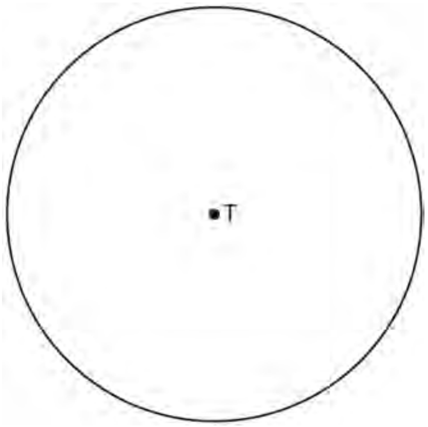


6 Using a straightedge and compass, construct a square inscribed in circle O below. [Leave all construction marks.]

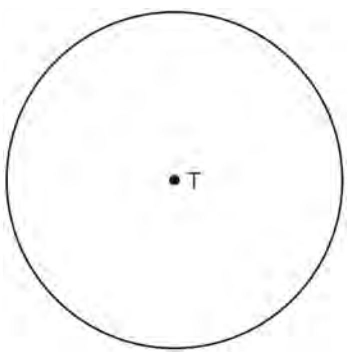


Determine the measure of the arc intercepted by two adjacent sides of the constructed square. Explain your reasoning.

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



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



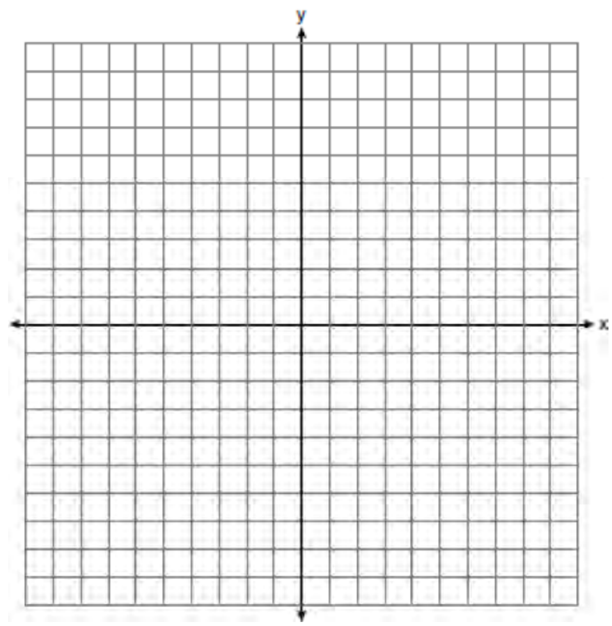
LINES AND ANGLES

G.GPE.B.6: DIRECTED LINE SEGMENTS

9 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?

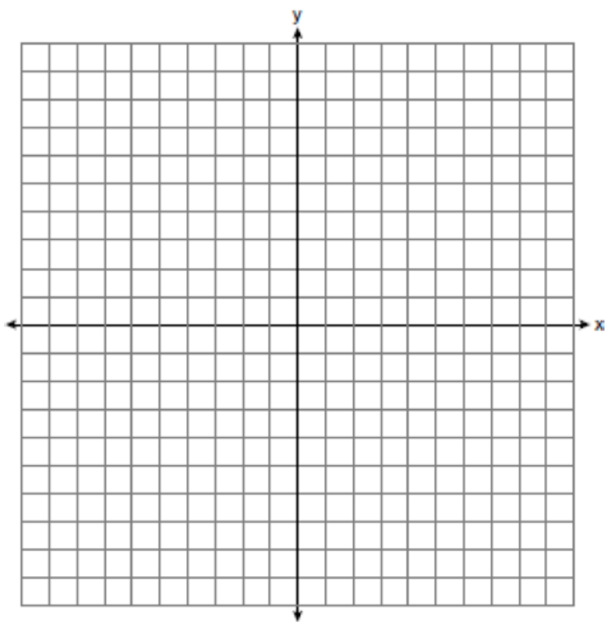
1 $(-3,-3)$
2 $(-1,-2)$
3 $\left(0,-\frac{3}{2}\right)$
4 $(1,-1)$

10 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.]



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

12 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.]



13 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.

14 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?

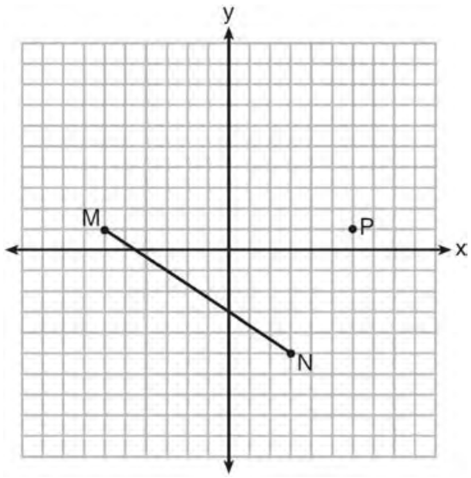
1 $\left(4,5\frac{1}{2}\right)$
2 $\left(-\frac{1}{2},-4\right)$
3 $\left(-4\frac{1}{2},0\right)$
4 $\left(-4,-\frac{1}{2}\right)$

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

15 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 $y = 2x + 6$

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

17 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 $y=2x-16$

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

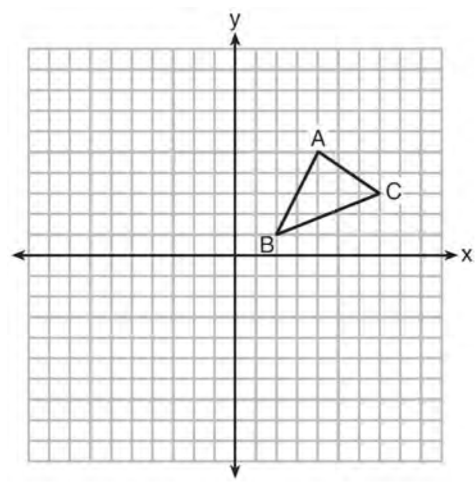
1 $y+1=\frac{4}{3}(x+3)$

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

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

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

19 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 $\frac{2}{5}$

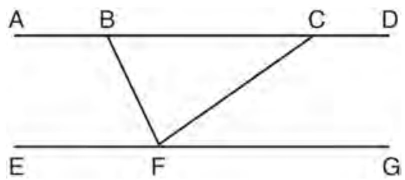
2 $\frac{3}{2}$

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

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

G.CO.C.9: LINES & ANGLES

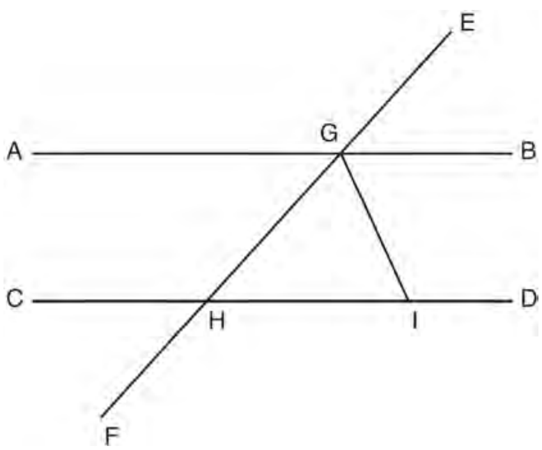
20 Steve drew line segments *ABCD*, *EFG*, *BF*, and *CF* as shown in the diagram below. Scalene $\triangle BFC$ is formed.



Which statement will allow Steve to prove $\overline{ABCD} \parallel \overline{EFG}$?

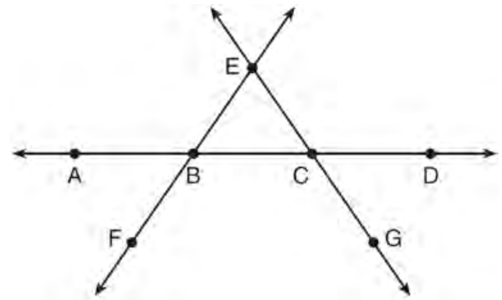
1 $\angle CFG \cong \angle FCB$
2 $\angle ABF \cong \angle BFC$
3 $\angle EFB \cong \angle CFB$
4 $\angle CBF \cong \angle GFC$

21 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 $\overline{AB} \parallel \overline{CD}$.

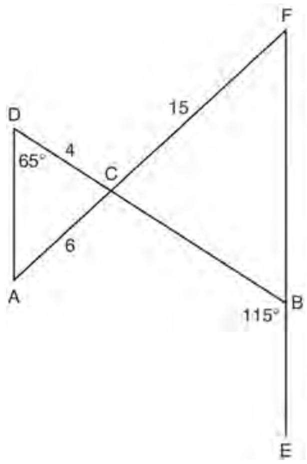
22 In the diagram below, $\overleftrightarrow{FE}$ bisects $\overline{AC}$ at *B*, and $\overleftrightarrow{GE}$ bisects $\overline{BD}$ at *C*.



Which statement is always true?

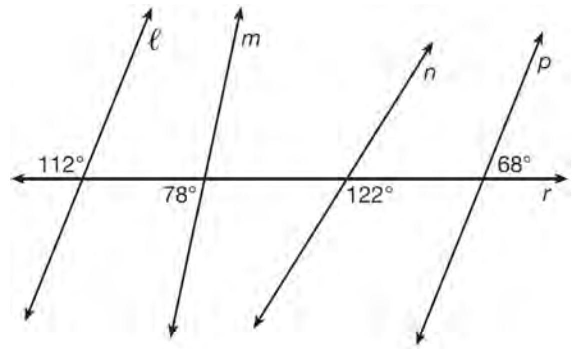
1 $\overline{AB} \cong \overline{DC}$
2 $\overline{FB} \cong \overline{EB}$
3 $\overleftrightarrow{BD}$ bisects $\overline{GE}$ at *C*.
4 $\overleftrightarrow{AC}$ bisects $\overline{FE}$ at *B*.

23 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

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



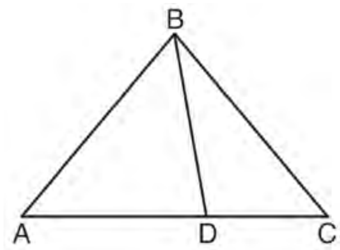
Which statement is true?
1 $\ell \parallel n$
2 $\ell \parallel p$
3 $m \parallel p$
4 $m \parallel n$

25 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 $\overline{DE}, \overline{CE}$

TRIANGLES

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

26 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.

G.SRT.C.8: PYTHAGOREAN THEOREM

27 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

28 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.

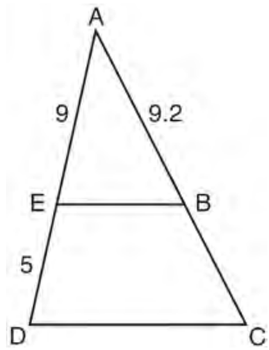
29 An equilateral triangle has sides of length 20. To the *nearest tenth*, what is the height of the equilateral triangle?
1 10.0
2 11.5
3 17.3
4 23.1

G.SRT.B.5: ISOSCELES TRIANGLE THEOREM

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

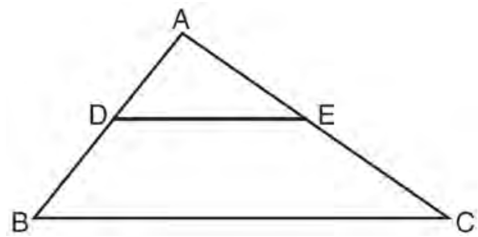
G.SRT.B.5: SIDE SPLITTER THEOREM

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



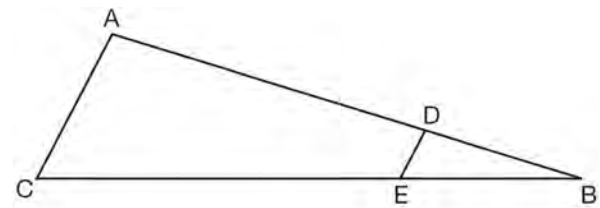
What is the length of $\overline{AC}$, to the *nearest tenth*?
1 5.1
2 5.2
3 14.3
4 14.4

32 In the diagram below, $\triangle ABC \sim \triangle ADE$.



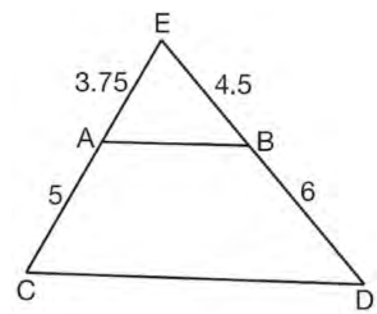
Which measurements are justified by this similarity?
1 $AD = 3$, $AB = 6$, $AE = 4$, and $AC = 12$
2 $AD = 5$, $AB = 8$, $AE = 7$, and $AC = 10$
3 $AD = 3$, $AB = 9$, $AE = 5$, and $AC = 10$
4 $AD = 2$, $AB = 6$, $AE = 5$, and $AC = 15$

33 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

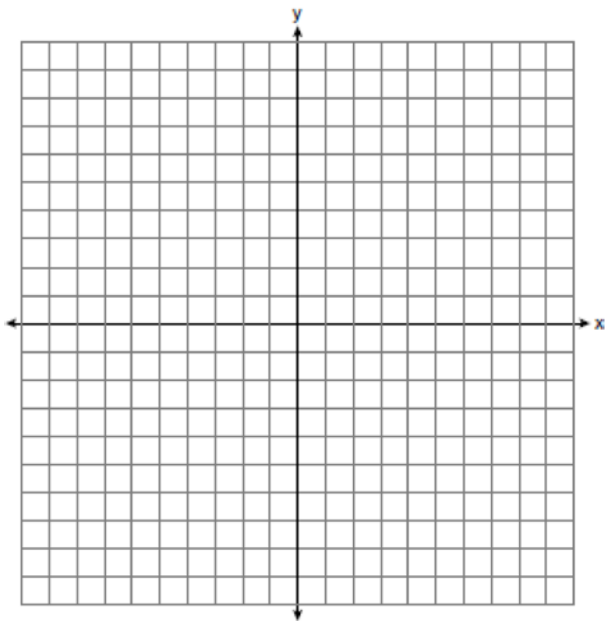
34 In $\triangle CED$ as shown below, points A and B are located on sides $\overline{CE}$ and $\overline{ED}$, respectively. Line segment AB is drawn such that $AE = 3.75$, $AC = 5$, $EB = 4.5$, and $BD = 6$.



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

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

35 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.]



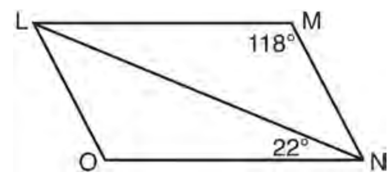
36 The coordinates of the vertices of $\triangle RST$ are $R(-2,-3)$, $S(8,2)$, and $T(4,5)$. Which type of triangle is $\triangle RST$?
1 right
2 acute
3 obtuse
4 equiangular

POLYGONS

G.CO.C.11: PARALLELOGRAMS

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

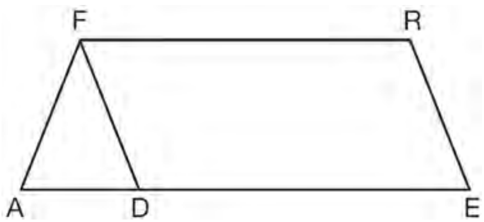
38 The diagram below shows parallelogram $LMNO$ with diagonal $\overline{LN}$, $m\angle M = 118°$, and $m\angle LNO = 22°$.



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

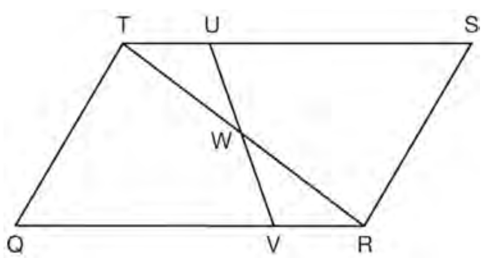
39 A parallelogram must be a rectangle when its
1 diagonals are perpendicular
2 diagonals are congruent
3 opposite sides are parallel
4 opposite sides are congruent

40 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°

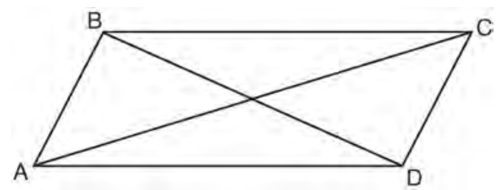
41 In parallelogram *QRST* shown below, diagonal $\overline{TR}$ is drawn, *U* and *V* are points on $\overline{TS}$ and $\overline{QR}$, respectively, and $\overline{UV}$ intersects $\overline{TR}$ at *W*.



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

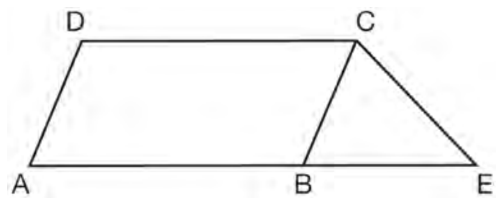
42 In parallelogram *ABCD*, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at *E*. Which statement does *not* prove parallelogram *ABCD* is a rhombus?
1 $\overline{AC} \cong \overline{DB}$
2 $\overline{AB} \cong \overline{BC}$
3 $\overline{AC} \perp \overline{DB}$
4 $\overline{AC}$ bisects $\angle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

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

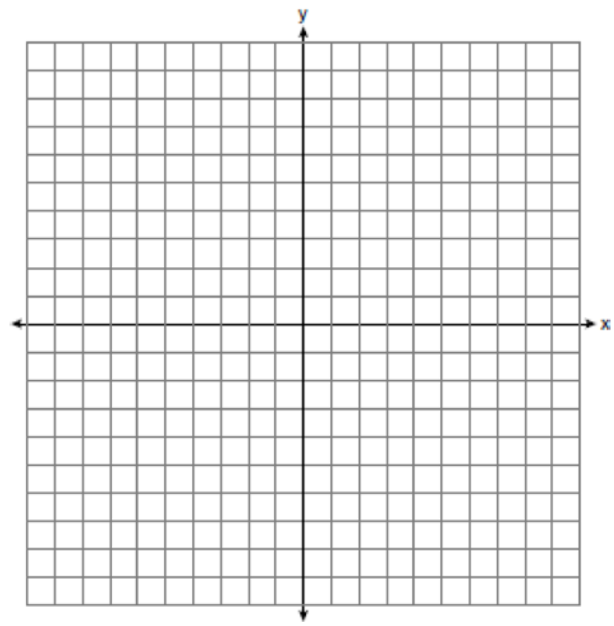
44 In the diagram below, $ABCD$ is a parallelogram, $\overline{AB}$ is extended through B to E, and $\overline{CE}$ is drawn.



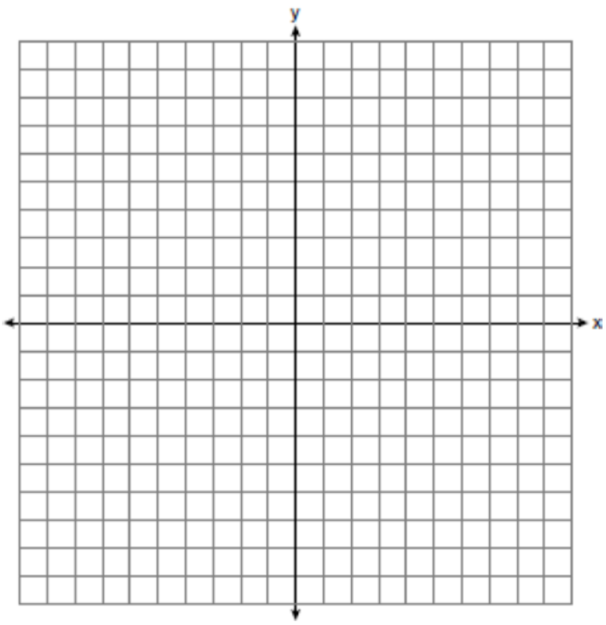
If $\overline{CE} \cong \overline{BE}$ and $m\angle D = 112°$, what is $m\angle E$?
1 44°
2 56°
3 68°
4 112°

G.GPE.B.4, 7: POLYGONS IN THE COORDINATE PLANE

45 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 $\overline{AH}$.



46 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.]



47 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

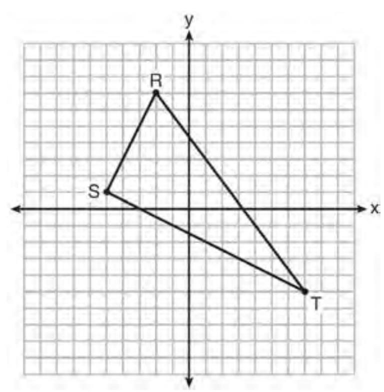
48 The diagonals of rhombus $TEAM$ intersect at $P(2,1)$. If the equation of the line that contains diagonal $\overline{TA}$ is $y=-x+3$, what is the equation of a line that contains diagonal EM?

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

49 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 $25\sqrt{2}$

50 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

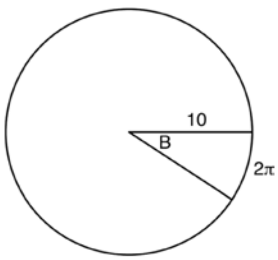
51 The coordinates of vertices A and B of $\triangle ABC$ are $A(3,4)$ and $B(3,12)$. If the area of $\triangle ABC$ is 24 square units, what could be the coordinates of point C?

1 $(3,6)$
2 $(8,-3)$
3 $(-3,8)$
4 $(6,3)$

CONICS

G.C.B.5: ARC LENGTH

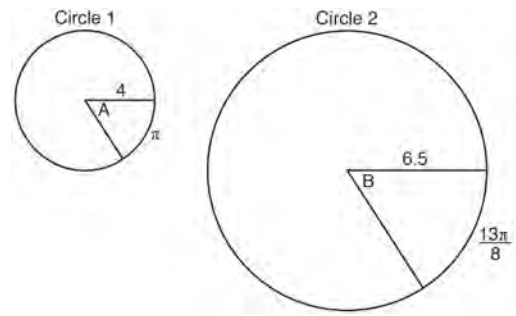
52 In the diagram below, the circle shown has radius 10. Angle B intercepts an arc with a length of 2π.



What is the measure of angle B, in radians?

1 $10+2\pi$
2 20π
3 $\frac{\pi}{5}$
4 $\frac{5}{\pi}$

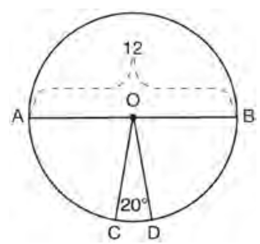
53 In the diagram below, Circle 1 has radius 4, while Circle 2 has radius 6.5. Angle A intercepts an arc of length π, and angle B intercepts an arc of length $\frac{13\pi}{8}$.



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

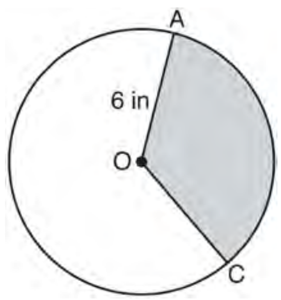
G.C.B.5: SECTORS

54 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.

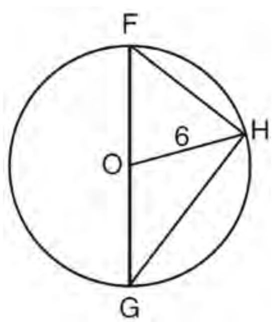


If $\overset{\frown}{AC} \cong \overset{\frown}{BD}$, find the area of sector BOD in terms of π.

55 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 $m\angle AOC$.



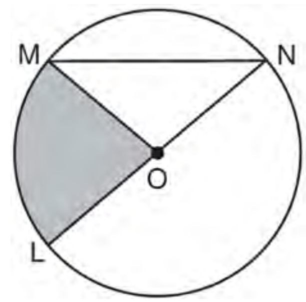
56 Triangle FGH is inscribed in circle O, the length of radius $\overline{OH}$ is 6, and $\overline{FH} \cong \overline{OG}$.



What is the area of the sector formed by angle FOH?

1 2π
2 $\frac{3}{2}\pi$
3 6π
4 24π

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



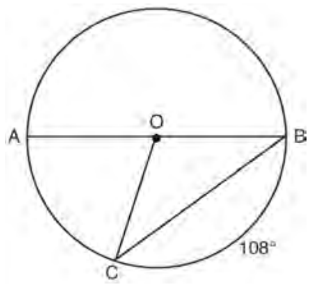
If the length of $\overline{NL}$ is 6 cm, what is $m\angle N$?

1 10º
2 20º
3 40º
4 80º

58 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 $\frac{64\pi}{3}$

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

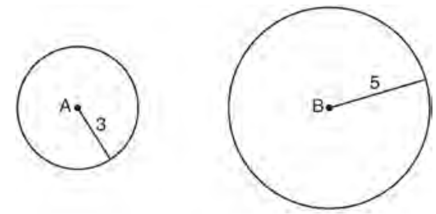
Carl $\frac{3}{10} \cdot \pi \cdot (\frac{1}{2}AB)^2$

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

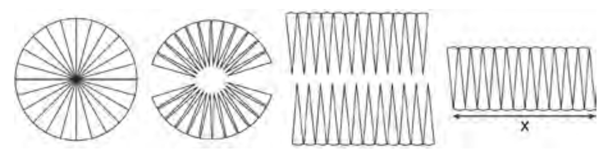
G.GMD.A.1, G.MG.A.3, G.C.A.1: PROPERTIES OF CIRCLES

60 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.

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

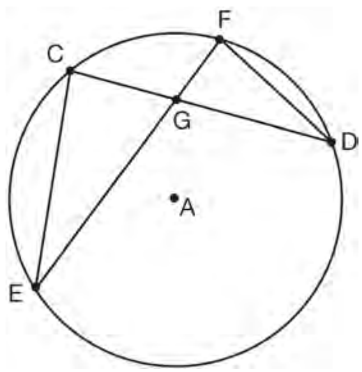


To the *nearest integer*, the value of x is
1 31
2 16
3 12
4 10

62 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.A.2: CHORDS, SECANTS AND TANGENTS

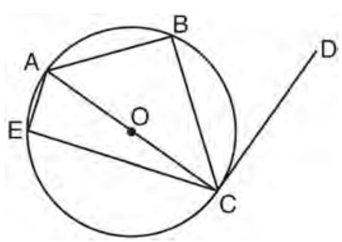
63 In the diagram of circle A shown below, chords $\overline{CD}$ and $\overline{EF}$ intersect at G, and chords $\overline{CE}$ and $\overline{FD}$ are drawn.



Which statement is *not* always true?

1 $\overline{CG} \cong \overline{FG}$
2 $\angle CEG \cong \angle FDG$
3 $\frac{CE}{EG} = \frac{FD}{DG}$
4 $\triangle CEG \sim \triangle FDG$

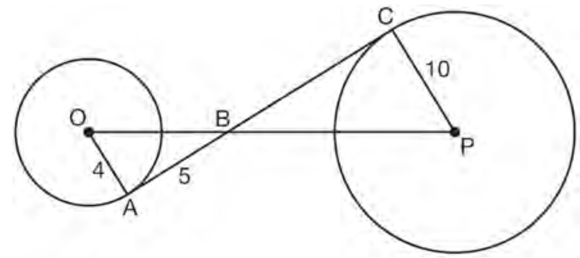
64 In circle O shown below, diameter $\overline{AC}$ is perpendicular to $\overline{CD}$ at point C, and chords $\overline{AB}$, $\overline{BC}$, $\overline{AE}$, and $\overline{CE}$ are drawn.



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 $\angle CBA \cong \angle AEC$

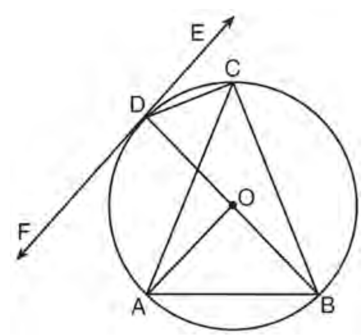
65 In the diagram shown below, $\overline{AC}$ is tangent to circle O at A and to circle P at C, $\overline{OP}$ intersects $\overline{AC}$ at B, $OA = 4$, $AB = 5$, and $PC = 10$.



What is the length of $\overline{BC}$?

1 6.4
2 8
3 12.5
4 16

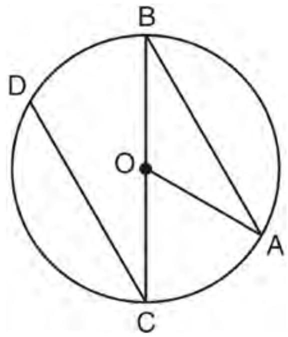
66 In the diagram below, $\overline{DC}$, $\overline{AC}$, $\overline{DOB}$, $\overline{CB}$, and $\overline{AB}$ are chords of circle O, $\overleftrightarrow{FDE}$ is tangent at point D, and radius $\overline{AO}$ is drawn. Sam decides to apply this theorem to the diagram: "An angle inscribed in a semi-circle is a right angle."



Which angle is Sam referring to?

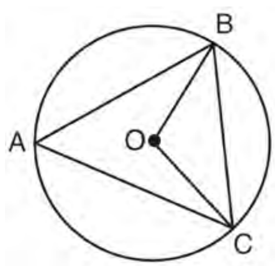
1 $\angle AOB$
2 $\angle BAC$
3 $\angle DCB$
4 $\angle FDB$

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



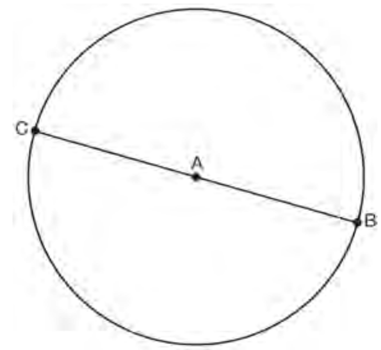
If $m\angle BCD = 30°$, determine and state $m\angle AOB$.

68 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.



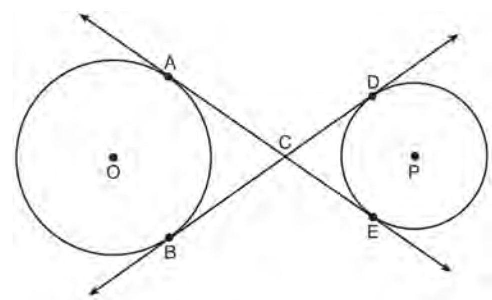
Which statement must always be true?
1 $\angle BAC \cong \angle BOC$
2 $m\angle BAC = \frac{1}{2} m\angle BOC$
3 $\triangle BAC$ and $\triangle BOC$ are isosceles.
4 The area of $\triangle BAC$ is twice the area of $\triangle BOC$.

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



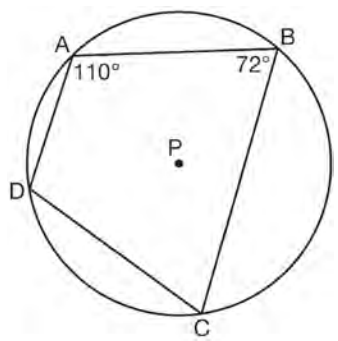
Point D, which is unique from points B and C, is plotted on circle A. Which statement must always be true?
1 $\triangle BCD$ is a right triangle.
2 $\triangle BCD$ is an isosceles triangle.
3 $\triangle BAD$ and $\triangle CBD$ are similar triangles.
4 $\triangle BAD$ and $\triangle CAD$ are congruent triangles.

70 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 $\overline{CD}$.



G.C.A.3: INSCRIBED QUADRILATERALS

71 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

72 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

73 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

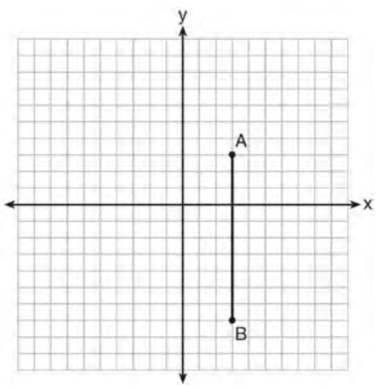
74 What are the coordinates of the center and length of the radius of the circle whose equation is $x^2 + 6x + y^2 - 4y = 23$?
1 $(3,-2)$ and 36
2 $(3,-2)$ and 6
3 $(-3,2)$ and 36
4 $(-3,2)$ and 6

75 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

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

77 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

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

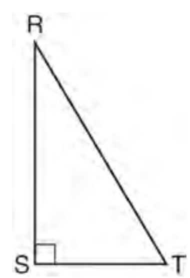
78 The center of circle Q has coordinates $(3,-2)$. If circle Q passes through $R(7,1)$, what is the length of its diameter?
1 50
2 25
3 10
4 5

79 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

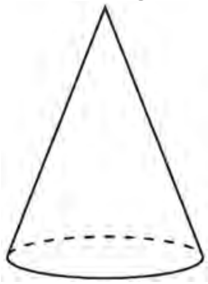
G.GMD.B.4: ROTATIONS OF TWO-DIMENSIONAL OBJECTS

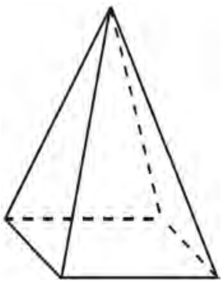
80 Which object is formed when right triangle RST shown below is rotated around leg $\overline{RS}$?

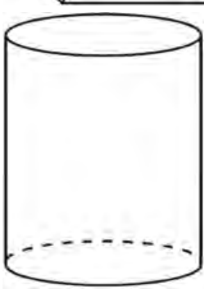


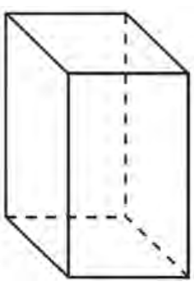
1 a pyramid with a square base
2 an isosceles triangle
3 a right triangle
4 a cone

81 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 

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

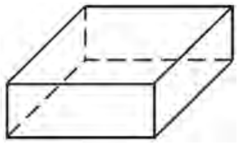
1 pyramid
2 rectangular prism
3 cone
4 cylinder

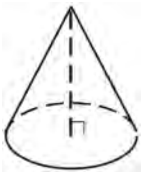
83 If an equilateral triangle is continuously rotated around one of its medians, which 3-dimensional object is generated?

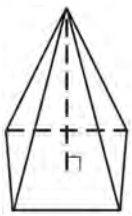
1 cone
2 pyramid
3 prism
4 sphere

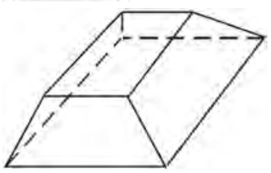
G.GMD.B.4: CROSS-SECTIONS OF THREE-DIMENSIONAL OBJECTS

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

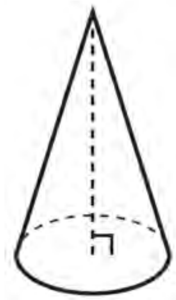
1 

2 

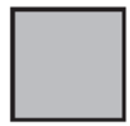
3 

4 

85 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 

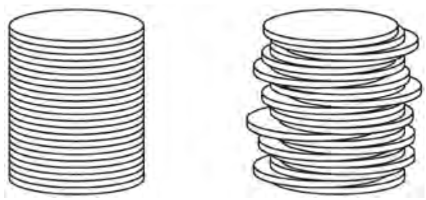
3 

4 

86 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

G.GMD.A.1, 3, G.MG.A.1, 3: VOLUME

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

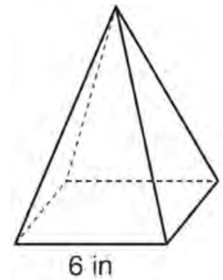


Use Cavelieri's principle to explain why the volumes of these two stacks of quarters are equal.

88 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

89 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

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



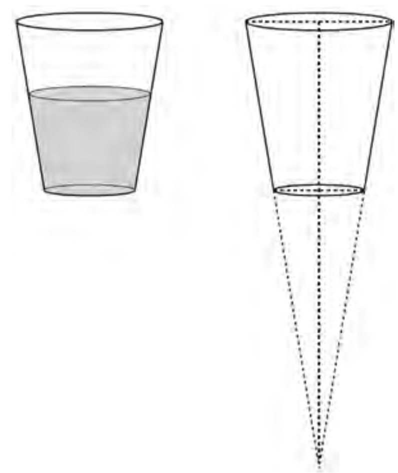
If the altitude of the pyramid measures 12 inches, its volume, in cubic inches, is
1 72
2 144
3 288
4 432

91 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 $(8.5)^3 - \frac{1}{3}\pi(4)^2(8)$

92 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

93 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.

94 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.

95 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

G.MG.A.3: SURFACE AND LATERAL AREA

96 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.MG.A.2: DENSITY

97 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.

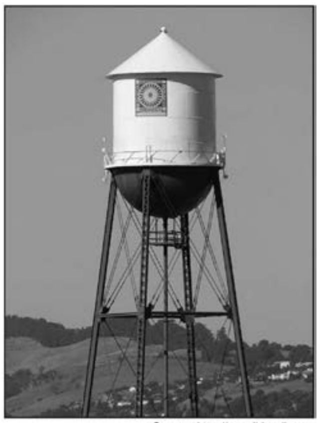
98 A contractor needs to purchase 500 bricks. The dimensions of each brick are 5.1 cm by 10.2 cm by 20.3 cm, and the density of each brick is $1920\ \text{kg}/\text{m}^3$. The maximum capacity of the contractor's trailer is 900 kg. Can the trailer hold the weight of 500 bricks? Justify your answer.

99 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

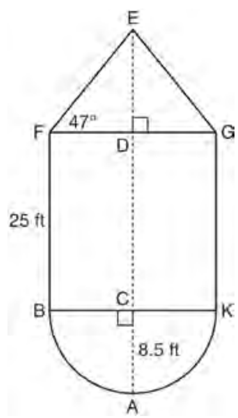
100 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*. State which type of wood the cube is made of, using the density table below.

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

101 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

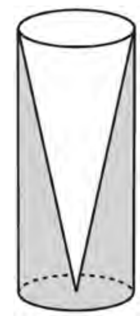


If $AC = 8.5$ feet, $BF = 25$ feet, and $m\angle EFD = 47°$, determine and state, to the *nearest cubic foot*, the volume of the water tower. The water tower was constructed to hold a maximum of 400,000 pounds of water. If water weighs 62.4 pounds per cubic foot, can the water tower be filled to 85%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

102 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

103 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?

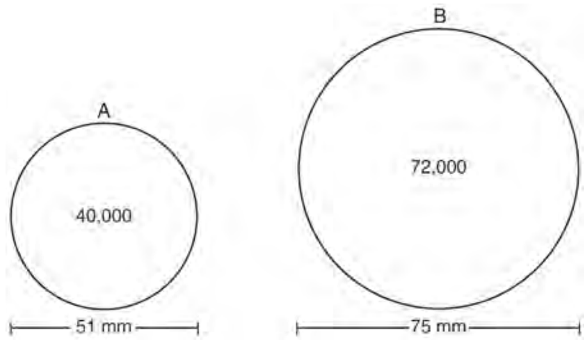


Walter goes to a hobby store to buy the wax for his candles. The wax costs $0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles? If Walter spent a total of $37.83 for the molds and charges $1.95 for each candle, what is Walter's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

104 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

105 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.



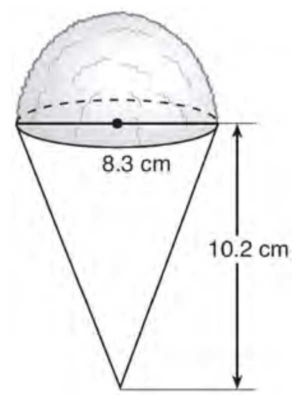
Determine and state which petri dish has the greater population density of bacteria at the end of the first hour.

106 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

107 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

108 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

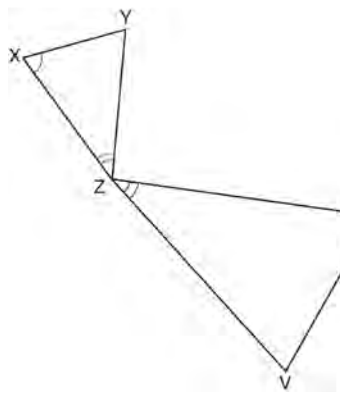
109 A snow cone consists of a paper cone completely filled with shaved ice and topped with a hemisphere of shaved ice, as shown in the diagram below. The inside diameter of both the cone and the hemisphere is 8.3 centimeters. The height of the cone is 10.2 centimeters.



The desired density of the shaved ice is $0.697\ \text{g/cm}^3$, and the cost, per kilogram, of ice is $3.83. Determine and state the cost of the ice needed to make 50 snow cones.

G.SRT.A.2-3, G.SRT.B.5: TRIANGLE SIMILARITY

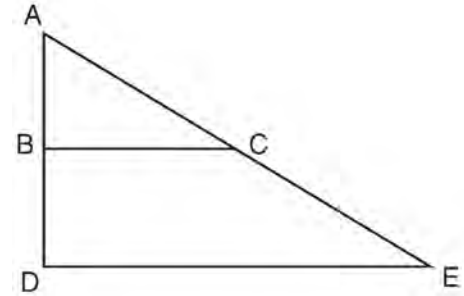
110 In the diagram below, triangles XYZ and UVZ are drawn such that $\angle X \cong \angle U$ and $\angle XZY \cong \angle UZV$.



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

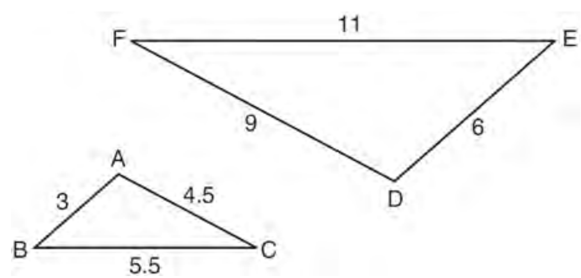
111 If $\triangle ABC$ is dilated by a scale factor of 3, which statement is true of the image $\triangle A'B'C'$?
1 $3A'B' = AB$
2 $B'C' = 3BC$
3 $m\angle A' = 3(m\angle A)$
4 $3(m\angle C') = m\angle C$

112 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 $\overline{BC} \parallel \overline{DE}$

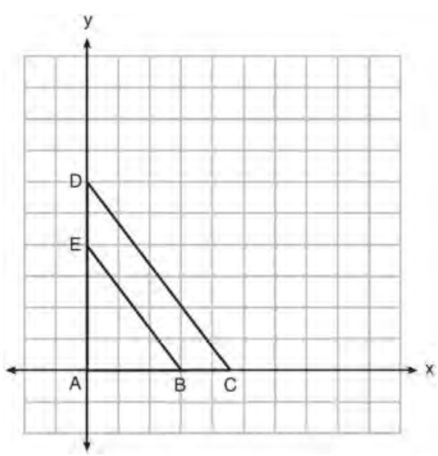
113 In the diagram below, $\triangle DEF$ is the image of $\triangle ABC$ after a clockwise rotation of 180° and a dilation where $AB = 3$, $BC = 5.5$, $AC = 4.5$, $DE = 6$, $FD = 9$, and $EF = 11$.



Which relationship must always be true?
1 $\frac{m\angle A}{m\angle D} = \frac{1}{2}$
2 $\frac{m\angle C}{m\angle F} = \frac{2}{1}$
3 $\frac{m\angle A}{m\angle C} = \frac{m\angle F}{m\angle D}$
4 $\frac{m\angle B}{m\angle E} = \frac{m\angle C}{m\angle F}$

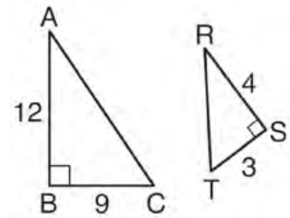
114 A triangle is dilated by a scale factor of 3 with the center of dilation at the origin. Which statement is true?
1 The area of the image is nine times the area of the original triangle.
2 The perimeter of the image is nine times the perimeter of the original triangle.
3 The slope of any side of the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

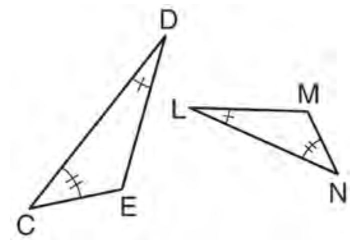
115 In the diagram below, $\triangle ABE$ is the image of $\triangle ACD$ after a dilation centered at the origin. The coordinates of the vertices are $A(0,0)$, $B(3,0)$, $C(4.5,0)$, $D(0,6)$, and $E(0,4)$.

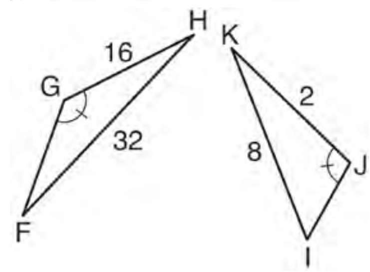


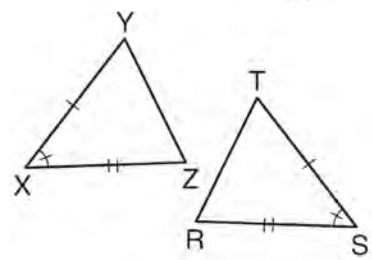
The ratio of the lengths of $\overline{BE}$ to $\overline{CD}$ is
1 $\frac{2}{3}$
2 $\frac{3}{2}$
3 $\frac{3}{4}$
4 $\frac{4}{3}$

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

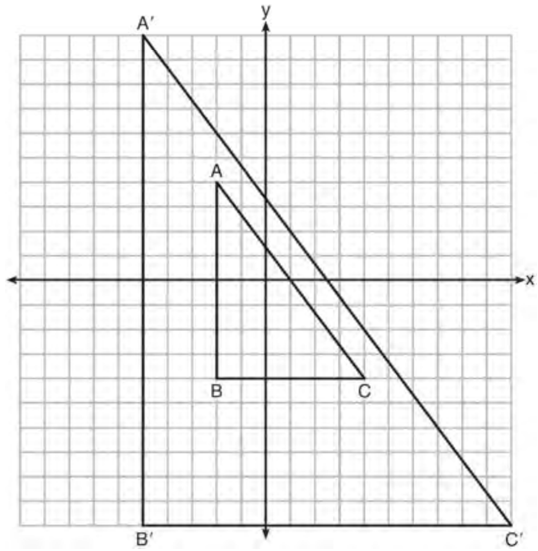
1 

2 

3 

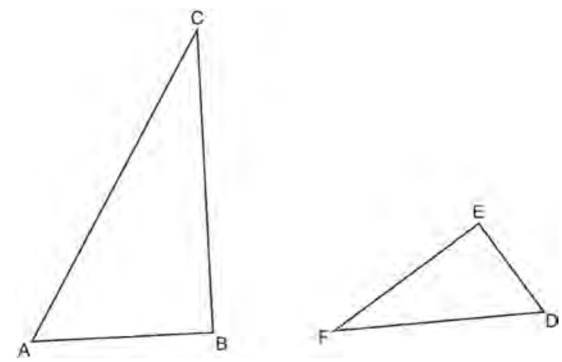
4 

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



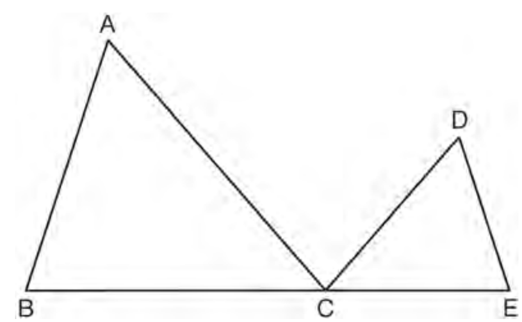
Describe the transformation that was performed. Explain why $\triangle A'B'C' \sim \triangle ABC$.

118 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 $\frac{AB}{CB} = \frac{FE}{DE}$
3 $\triangle ABC \sim \triangle DEF$
4 $\frac{AB}{DE} = \frac{FE}{CB}$

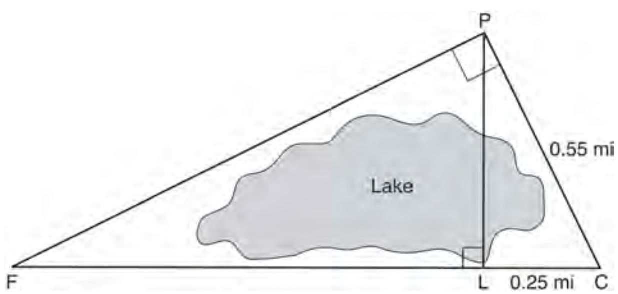
119 In the diagram below, $\triangle ABC \sim \triangle DEC$.



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

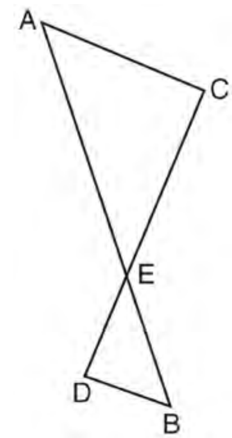
120 A flagpole casts a shadow 16.60 meters long. Tim stands at a distance of 12.45 meters from the base of the flagpole, such that the end of Tim's shadow meets the end of the flagpole's shadow. If Tim is 1.65 meters tall, determine and state the height of the flagpole to the *nearest tenth of a meter*.

121 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.

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



Given $\triangle AEC \sim \triangle BED$, which equation is true?

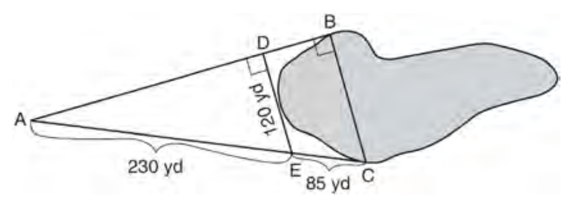
1 $\dfrac{CE}{DE} = \dfrac{EB}{EA}$

2 $\dfrac{AE}{BE} = \dfrac{AC}{BD}$

3 $\dfrac{EC}{AE} = \dfrac{BE}{ED}$

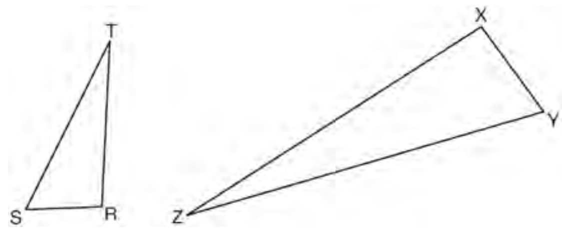
4 $\dfrac{ED}{EC} = \dfrac{AC}{BD}$

123 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.

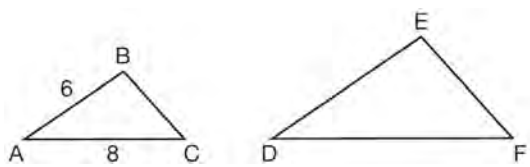


Use the surveyor's information to determine and state the distance from point B to point C, to the *nearest yard*.

124 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.



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



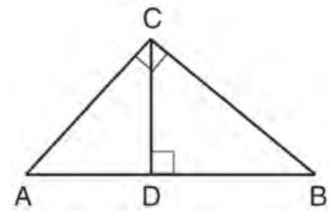
If $AB=6$ and $AC=8$, which statement will justify similarity by SAS?

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 $\angle C \cong \angle F$

126 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

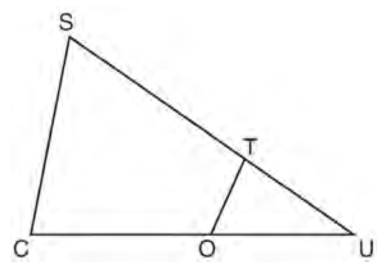
127 In the diagram below, $\overline{CD}$ is the altitude drawn to the hypotenuse $\overline{AB}$ of right triangle ABC.



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 $AB=17$

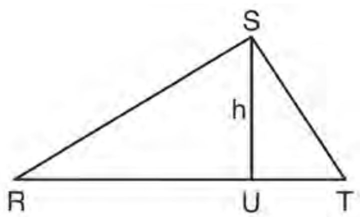
128 In $\triangle SCU$ shown below, points T and O are on $\overline{SU}$ and $\overline{CU}$, respectively. Segment OT is drawn so that $\angle C \cong \angle OTU$.



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

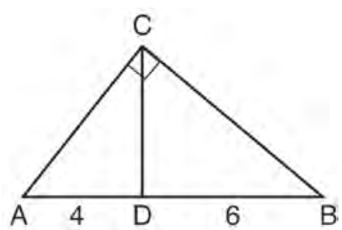
129 In $\triangle RST$ shown below, altitude $\overline{SU}$ is drawn to $\overline{RT}$ at U.



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 $6\sqrt{35}$

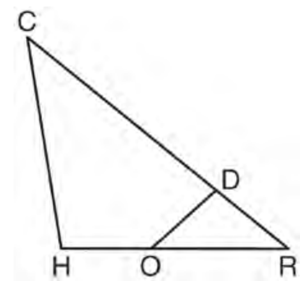
130 In the diagram of right triangle ABC, $\overline{CD}$ intersects hypotenuse $\overline{AB}$ at D.



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 $4\sqrt{2}$

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



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

TRANSFORMATIONS

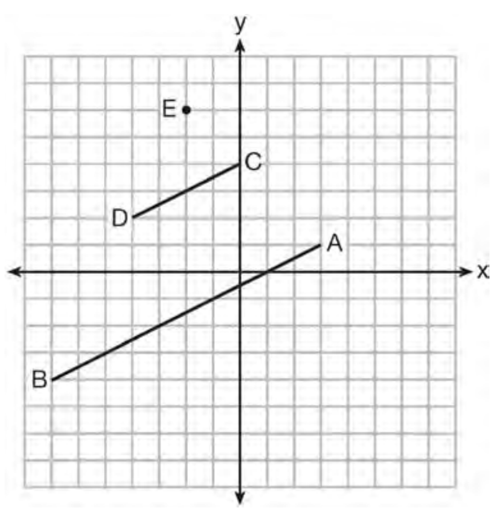
G.SRT.A.1: LINE DILATIONS

132 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 $y = 2x + 1$

133 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 $y = 3x - 6$

134 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 $\frac{EA}{EC}$

135 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 $3x - 2y = 5$

136 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 $y = 3x - 1$

137 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

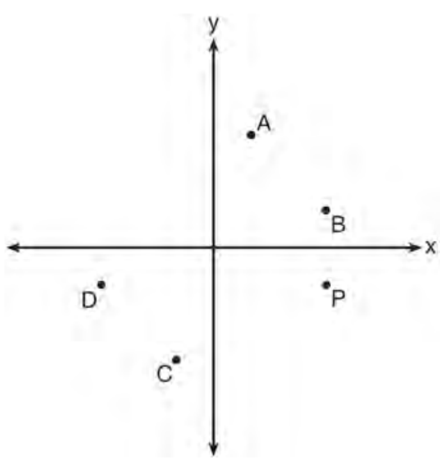
138 Line ℓ is mapped onto line m by a dilation centered at the origin with a scale factor of 2. The equation of line ℓ is $3x - y = 4$. Determine and state an equation for line m.

139 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

140 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

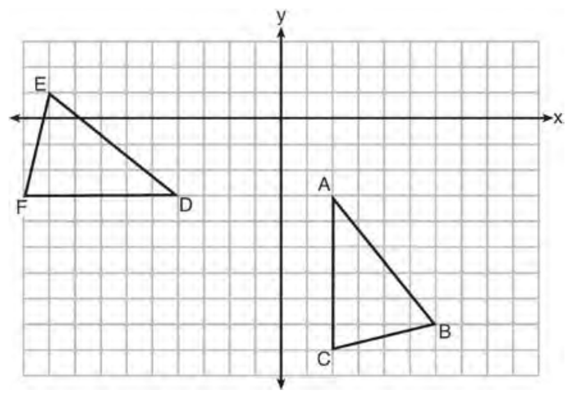
G.CO.A.5: ROTATIONS

141 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

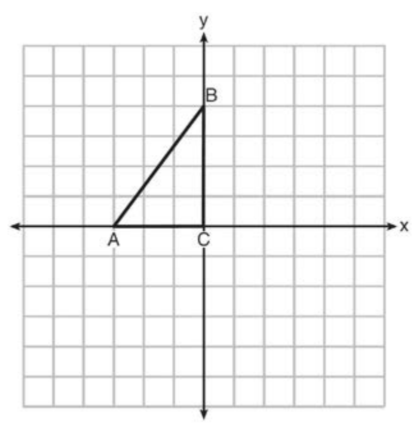
142 The grid below shows $\triangle ABC$ and $\triangle DEF$.



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.

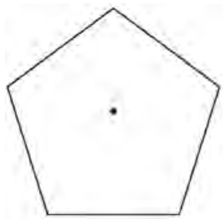
G.CO.A.5: REFLECTIONS

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

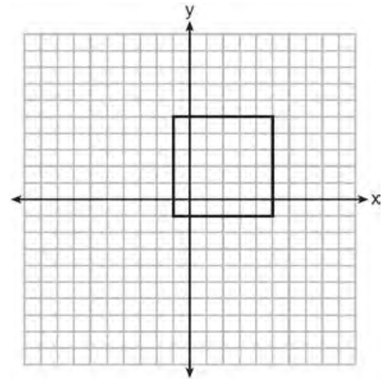
144 A regular pentagon is shown in the diagram below.



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

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

146 In the diagram below, a square is graphed in the coordinate plane.

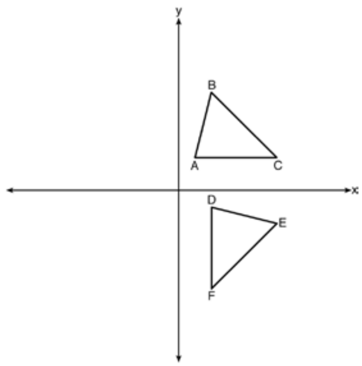


A reflection over which line does *not* carry the square onto itself?
1 $x = 5$
2 $y = 2$
3 $y = x$
4 $x + y = 4$

147 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.B.6: PROPERTIES OF TRANSFORMATIONS

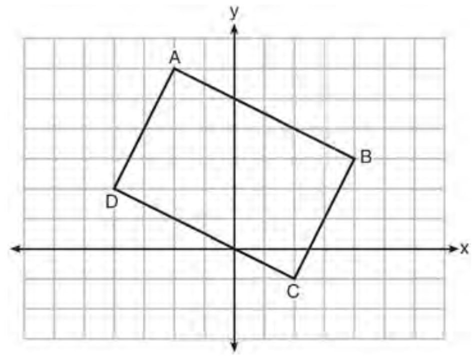
148 The image of $\triangle ABC$ after a rotation of 90º clockwise about the origin is $\triangle DEF$, as shown below.



Which statement is true?

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

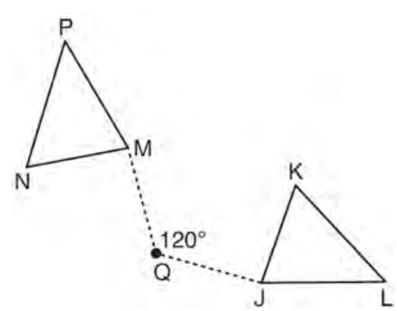
149 Quadrilateral *ABCD* is graphed on the set of axes below.



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 $B'(-3,4)$

150 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.

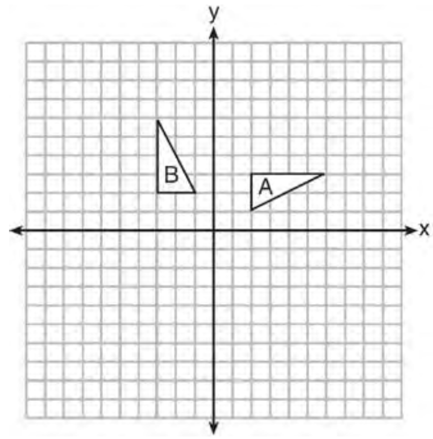


G.CO.A.5: IDENTIFYING TRANSFORMATIONS

151 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

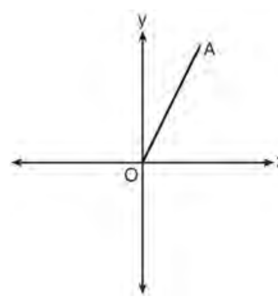
152 If $\triangle A'B'C'$ is the image of $\triangle ABC$, under which transformation will the triangles *not* be congruent?
1 reflection over the *x*-axis
2 translation to the left 5 and down 4
3 dilation centered at the origin with scale factor 2
4 rotation of 270° counterclockwise about the origin

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



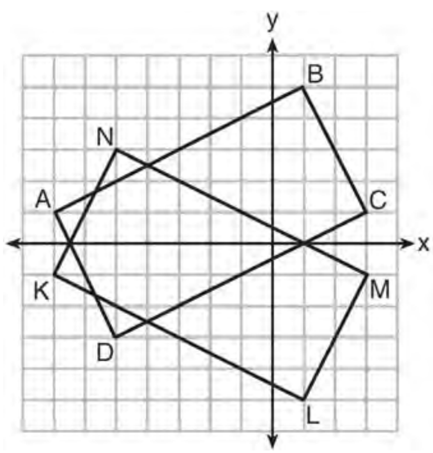
1 line reflection
2 rotation
3 dilation
4 translation

154 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

155 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

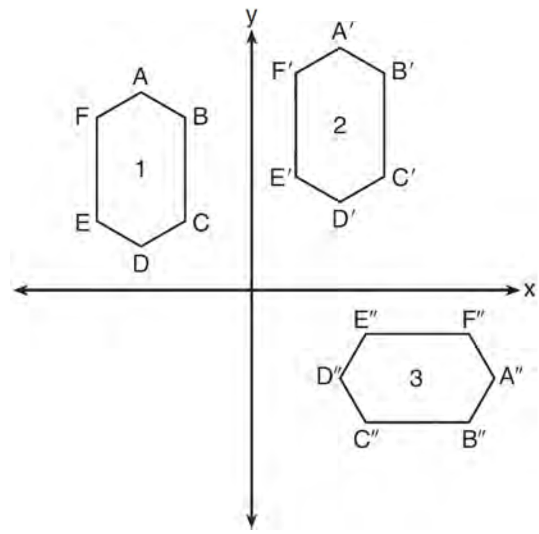
156 Which transformation would *not* always produce an image that would be congruent to the original figure?
1 translation
2 dilation
3 rotation
4 reflection

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

157 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 $(x,y) \to (x+2,y-5)$

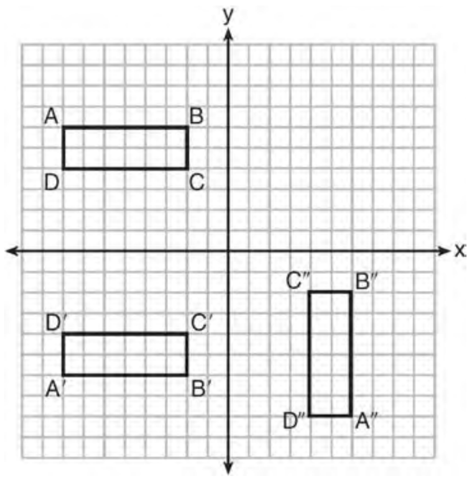
G.CO.A.5, G.SRT.A.2: COMPOSITIONS OF TRANSFORMATIONS

158 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

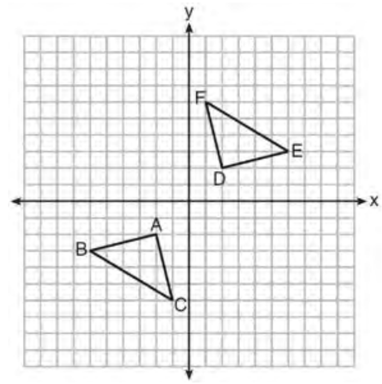
159 A sequence of transformations maps rectangle *ABCD* onto rectangle *A"B"C"D"*, as shown in the diagram below.



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

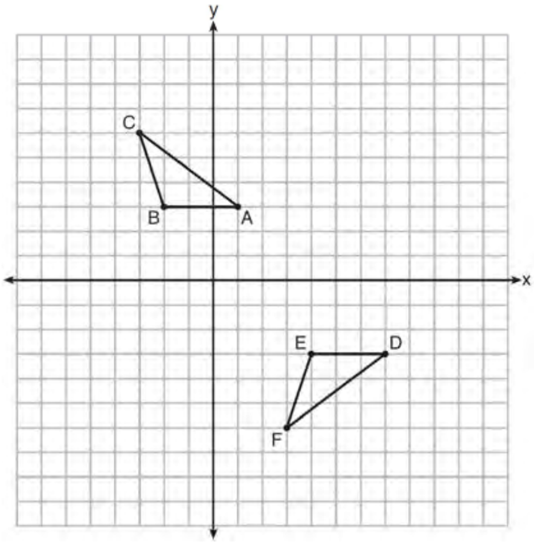
160 Triangle *ABC* and triangle *DEF* are graphed on the set of axes below.



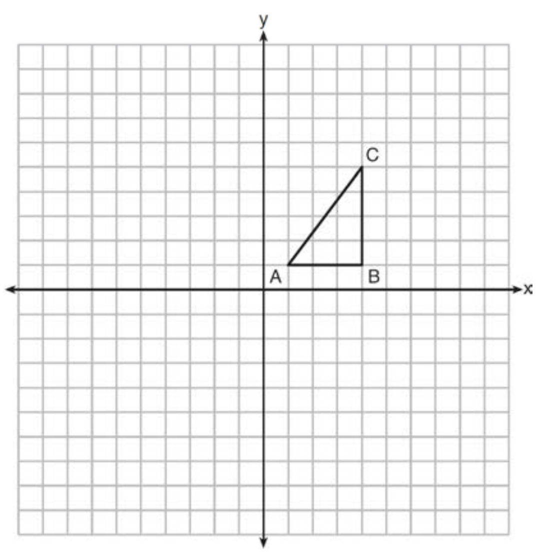
Which sequence of transformations maps triangle *ABC* onto triangle *DEF*?

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

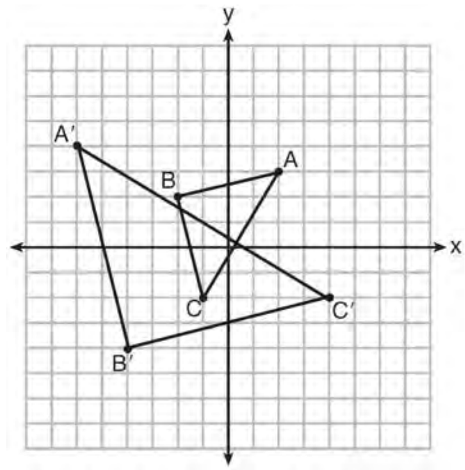
161 Describe a sequence of transformations that will map $\triangle ABC$ onto $\triangle DEF$ as shown below.



162 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 $y=0$.

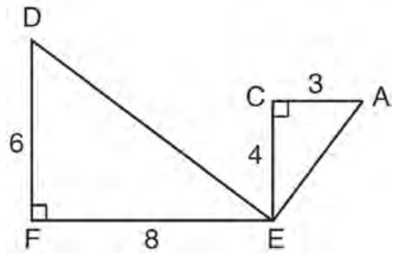


163 Which sequence of transformations will map $\triangle ABC$ onto $\triangle A'B'C'$?



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

164 Given: $\triangle AEC$, $\triangle DEF$, and $\overline{FE} \perp \overline{CE}$



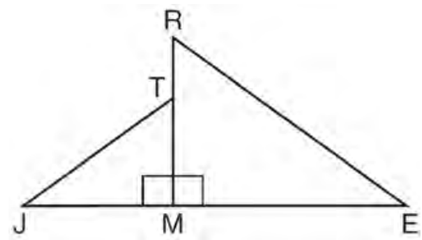
What is a correct sequence of similarity transformations that shows $\triangle AEC \sim \triangle DEF$?

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

TRIGONOMETRY

G.SRT.C.6: TRIGONOMETRIC RATIOS

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



Which statement is always true?

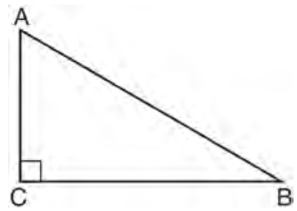
1 $\cos J = \frac{RM}{RE}$
2 $\cos R = \frac{JM}{JT}$
3 $\tan T = \frac{RM}{EM}$
4 $\tan E = \frac{TM}{JM}$

G.SRT.C.7: COFUNCTIONS

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

167 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.

168 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 $\sin A = \cos B$

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

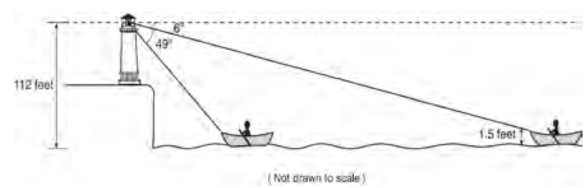
170 In $\triangle ABC$, the complement of $\angle B$ is $\angle A$. Which statement is always true?
1 $\tan\angle A = \tan\angle B$
2 $\sin\angle A = \sin\angle B$
3 $\cos\angle A = \tan\angle B$
4 $\sin\angle A = \cos\angle B$

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

172 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 $\frac{5}{\sqrt{21}}$

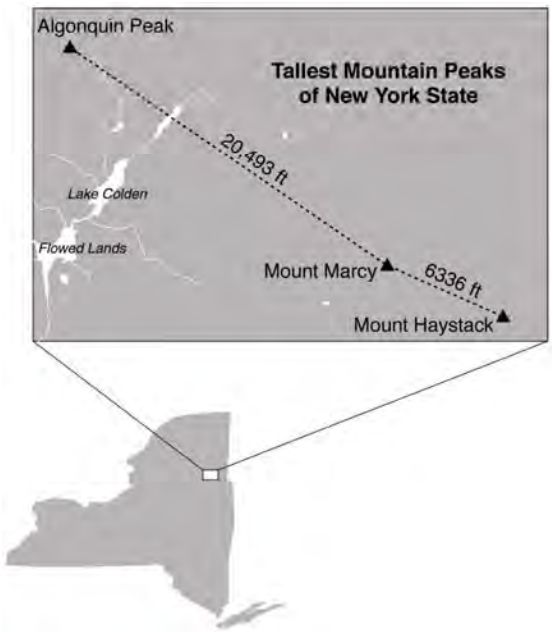
G.SRT.C.8: USING TRIGONOMETRY TO FIND A SIDE

173 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.



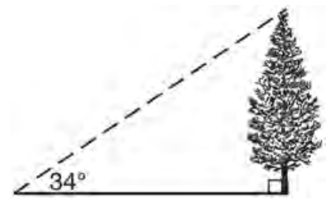
At 5:00, the observer in the lighthouse measured the angle of depression to the front of the canoe to be 6°. Five minutes later, the observer measured and saw the angle of depression to the front of the canoe had increased by 49°. Determine and state, to the *nearest foot per minute*, the average speed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

174 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.



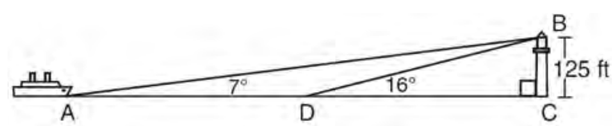
The angle of depression from the peak of Mount Marcy to the peak of Mount Haystack is 3.47 degrees. The angle of elevation from the peak of Algonquin Peak to the peak of Mount Marcy is 0.64 degrees. What are the heights, to the *nearest foot*, of Mount Marcy and Algonquin Peak? Justify your answer.

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



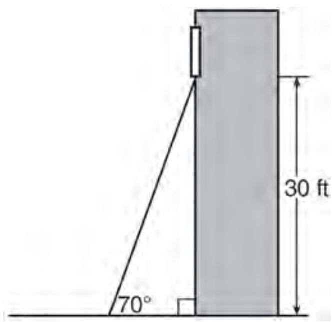
If the point is 20 feet from the base of the tree, what is the height of the tree, to the *nearest tenth of a foot*?
1 29.7
2 16.6
3 13.5
4 11.2

176 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°.

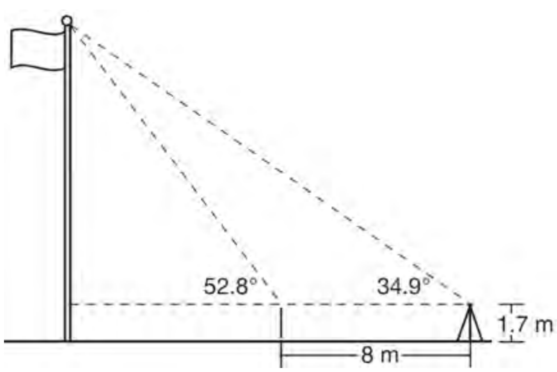


To the *nearest foot*, determine and state how far the ship traveled from point *A* to point *D*.

177 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.



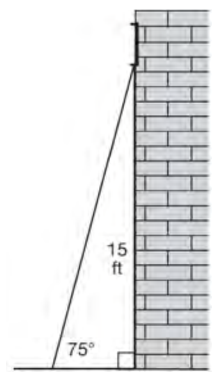
178 Cathy wants to determine the height of the flagpole shown in the diagram below. She uses a survey instrument to measure the angle of elevation to the top of the flagpole, and determines it to be 34.9°. She walks 8 meters closer and determines the new measure of the angle of elevation to be 52.8°.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

179 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

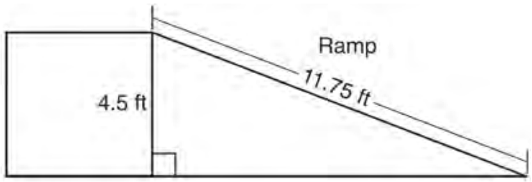
180 In the diagram below, a window of a house is 15 feet above the ground. A ladder is placed against the house with its base at an angle of 75° with the ground. Determine and state the length of the ladder to the *nearest tenth of a foot*.



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

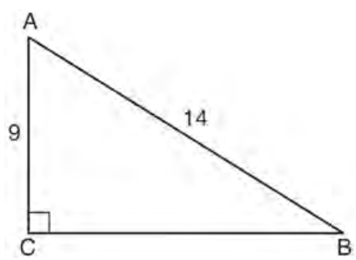
181 A man who is 5 feet 9 inches tall casts a shadow of 8 feet 6 inches. Assuming that the man is standing perpendicular to the ground, what is the angle of elevation from the end of the shadow to the top of the man's head, to the *nearest tenth of a degree*?
1 34.1
2 34.5
3 42.6
4 55.9

182 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.

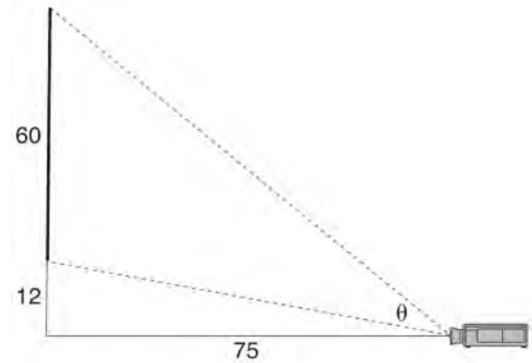
183 In the diagram of right triangle *ABC* shown below, $AB = 14$ and $AC = 9$.



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

184 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.

185 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.

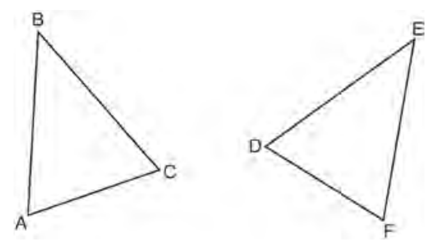


Determine and state, to the *nearest tenth of a degree*, the measure of θ, the projection angle.

LOGIC

G.CO.B.7-8: TRIANGLE CONGRUENCY

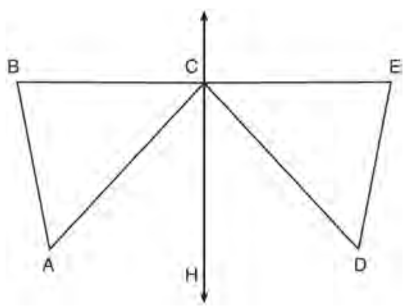
186 Which statement is sufficient evidence that $\triangle DEF$ is congruent to $\triangle ABC$?



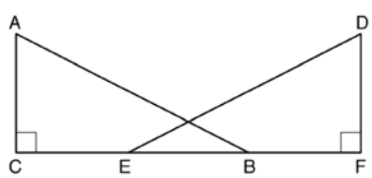
1 $AB = DE$ and $BC = EF$
2 $\angle D \cong \angle A$, $\angle B \cong \angle E$, $\angle C \cong \angle F$
3 There is a sequence of rigid motions that maps $\overline{AB}$ onto $\overline{DE}$, $\overline{BC}$ onto $\overline{EF}$, and $\overline{AC}$ onto $\overline{DF}$.
4 There is a sequence of rigid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

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

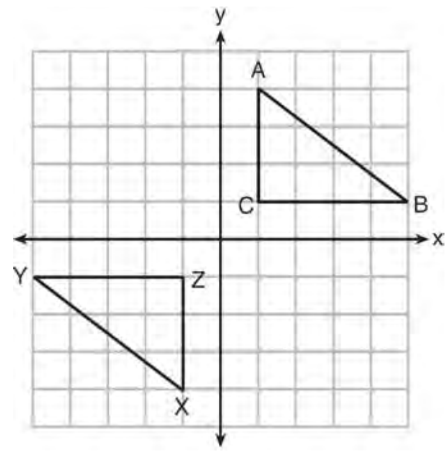
188 Given: D is the image of A after a reflection over $\overleftrightarrow{CH}$.
$\overleftrightarrow{CH}$ is the perpendicular bisector of $\overline{BCE}$
$\triangle ABC$ and $\triangle DEC$ are drawn
Prove: $\triangle ABC \cong \triangle DEC$



189 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 $\triangle ABC \cong \triangle DEF$.

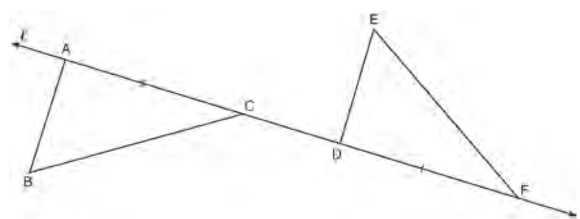


190 In the diagram below, $\triangle ABC$ and $\triangle XYZ$ are graphed.



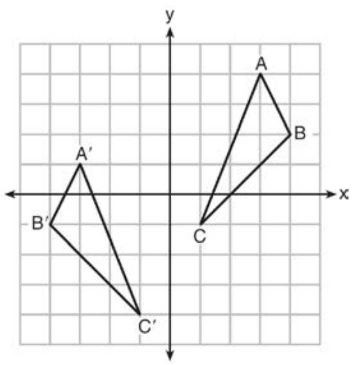
Use the properties of rigid motions to explain why $\triangle ABC \cong \triangle XYZ$.

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



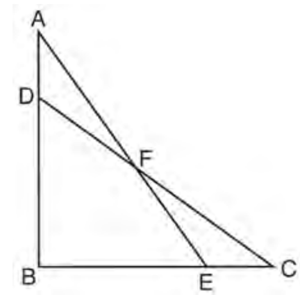
Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ, such that point D is mapped onto point A. Determine and state the location of F'. Explain your answer. Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ. Suppose that E'' is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

192 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.

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

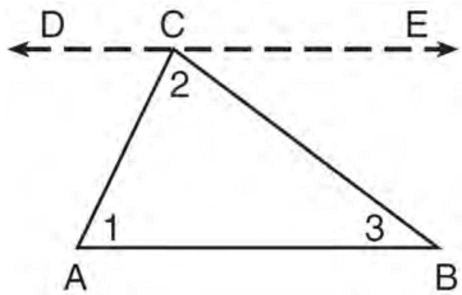


Which statement is needed to prove $\triangle ABE \cong \triangle CBD$ using only SAS ≅ SAS?

1 $\angle CDB \cong \angle AEB$
2 $\angle AFD \cong \angle EFC$
3 $\overline{AD} \cong \overline{CE}$
4 $\overline{AE} \cong \overline{CD}$

G.CO.C.10, G.SRT.B.4: TRIANGLE PROOFS

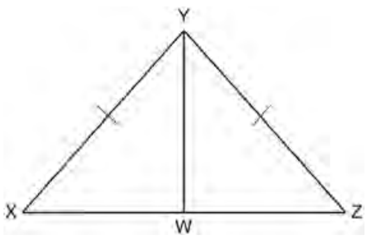
194 Given the theorem, "The sum of the measures of the interior angles of a triangle is 180°," complete the proof for this theorem.



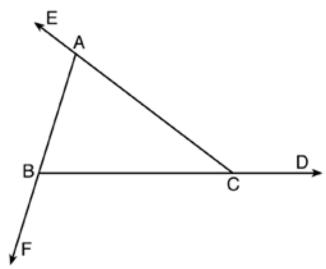
Given: $\triangle ABC$
Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180°$
Fill in the missing reasons below.

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)

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

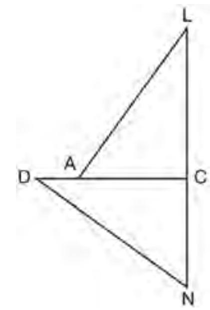


196 Prove the sum of the exterior angles of a triangle is 360°.



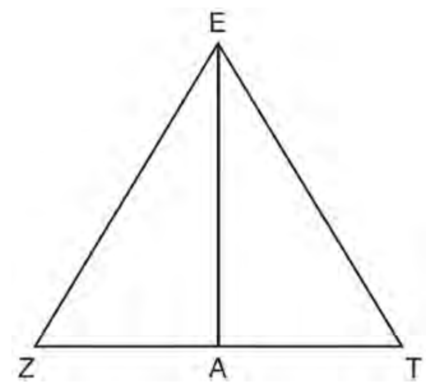
197 Two right triangles must be congruent if
1 an acute angle in each triangle is congruent
2 the lengths of the hypotenuses are equal
3 the corresponding legs are congruent
4 the areas are equal

198 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 $\triangle DNC$.

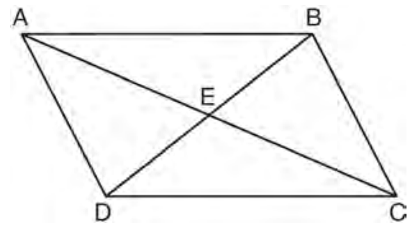
199 Line segment *EA* is the perpendicular bisector of $\overline{ZT}$, and $\overline{ZE}$ and $\overline{TE}$ are drawn.



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*.

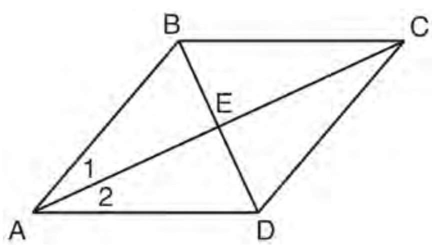
G.CO.C.11, G.SRT.B.5: QUADRILATERAL PROOFS

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



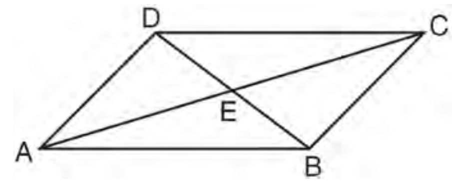
Prove: $\triangle AED \cong \triangle CEB$
Describe a single rigid motion that maps $\triangle AED$ onto $\triangle CEB$.

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



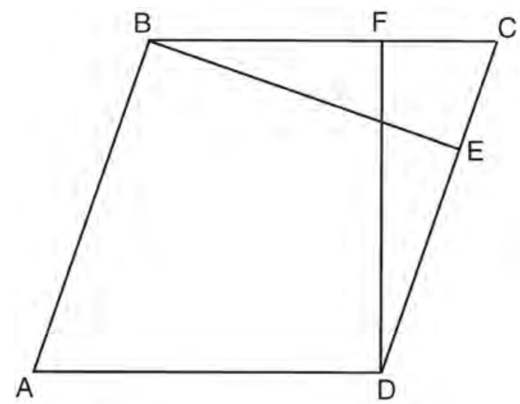
Prove: $\triangle ACD$ is an isosceles triangle and $\triangle AEB$ is a right triangle

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



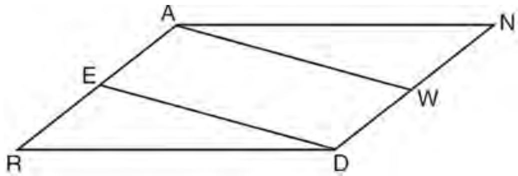
Prove: $\angle ACD \cong \angle CAB$

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



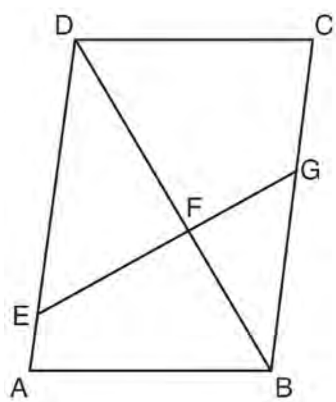
Prove $ABCD$ is a rhombus.

204 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.

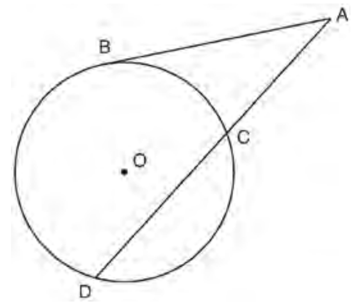
205 Given: Parallelogram $ABCD$, $\overline{EFG}$, and diagonal $\overline{DFB}$



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

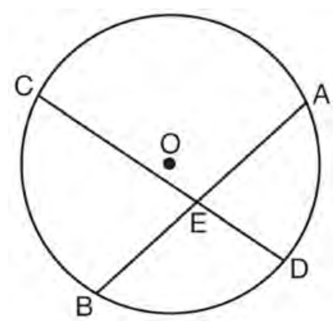
G.SRT.B.5: CIRCLE PROOFS

206 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. ($AC \cdot AD = AB^2$)

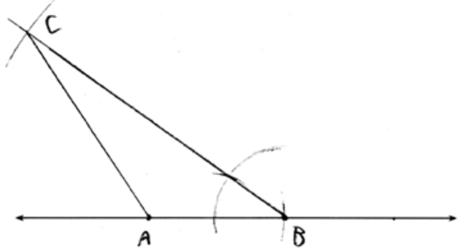
207 Given: Circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E



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

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

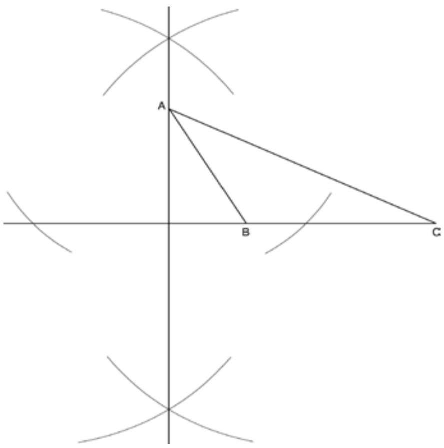
1 ANS:



SAS ≅ SAS

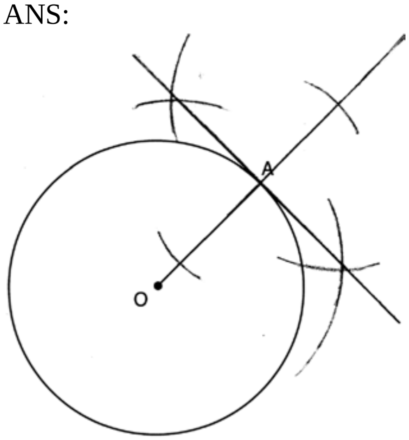
PTS: 4 REF: 011634geo NAT: G.CO.D.12 TOP: Constructions

2 ANS:



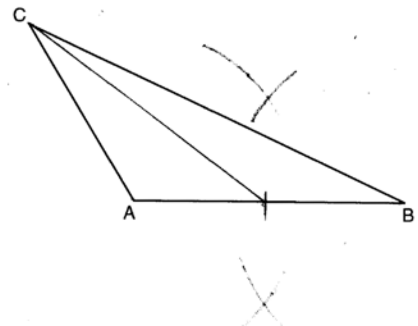
PTS: 2 REF: fall1409geo NAT: G.CO.D.12 TOP: Constructions

3 ANS:



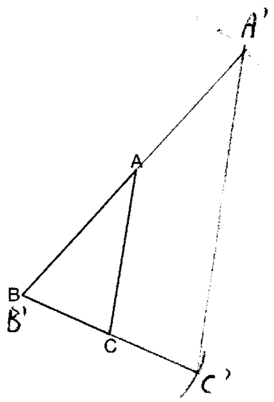
PTS: 2 REF: 061631geo NAT: G.CO.D.12 TOP: Constructions

4 ANS:



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

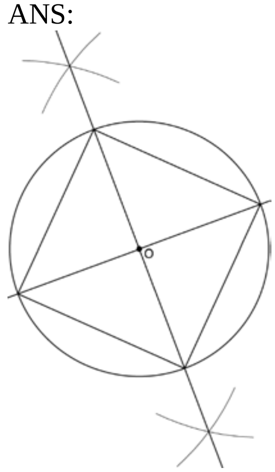
5 ANS:



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

PTS: 4 REF: 081632geo NAT: G.CO.D.12 TOP: Constructions

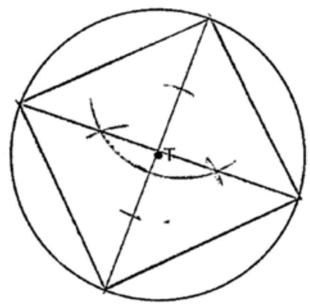
6 ANS:



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.

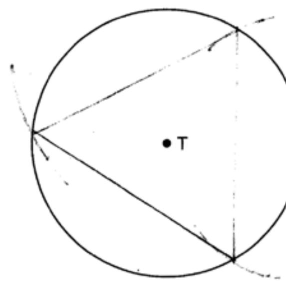
PTS: 4 REF: fall1412geo NAT: G.CO.D.13 TOP: Constructions

7 ANS:



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

8 ANS:



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

9 ANS: 4

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

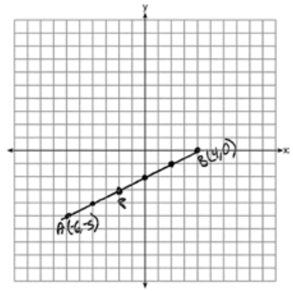
$$-5+\frac{3}{5}(10) \qquad -4+\frac{3}{5}(5)$$

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

$$1 \qquad -1$$

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

10 ANS:



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

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

$-6+4$ $-5+2$

-2 -3

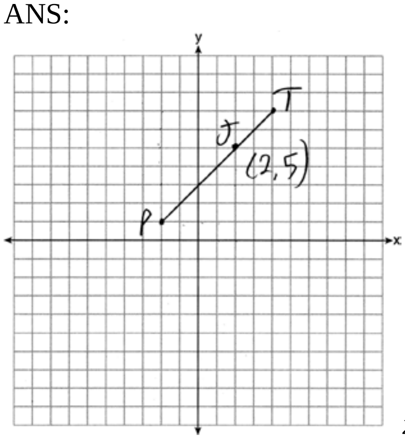
PTS: 2 REF: 061527geo NAT: G.GPE.B.6 TOP: Directed Line Segments

11 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

12 ANS:



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

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

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

13 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

14 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

15 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

16 ANS: 1

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

$1=-4+b$

$5=b$

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

17 ANS: 4

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

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

$-16=b$

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

18 ANS: 1

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

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

19 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

20 ANS: 1

Alternate interior angles

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

21 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

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

23 ANS: 1

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

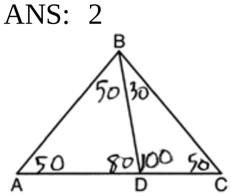
$$f = 10$$

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

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

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

26 ANS: 2



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

27 ANS: 2

$$s^2 + s^2 = 7^2$$

$$2s^2 = 49$$

$$s^2 = 24.5$$

$$s \approx 4.9$$

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

28 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

29 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

30 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 Triangles

31 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

32 ANS: 4

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

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

33 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

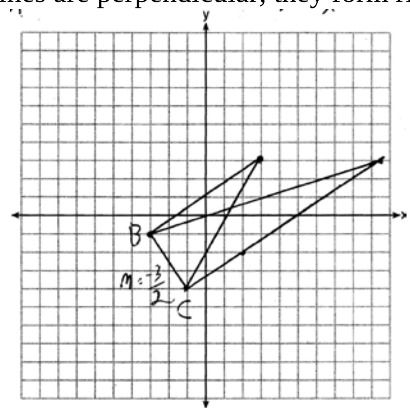
34 ANS:

$\frac{3.75}{5}=\frac{4.5}{6}$ $\overline{AB}$ 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

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



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

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

$-1 = -2 + b$

$1 = b$

$3 = \frac{2}{3}x + 1$

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

$3 = x$

$\frac{-12}{3} = \frac{-2}{3} + b$

$-\frac{10}{3} = b$

$3 = \frac{2}{3}x - \frac{10}{3}$

$9 = 2x - 10$

$19 = 2x$

$9.5 = x$

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

36 ANS: 1

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

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

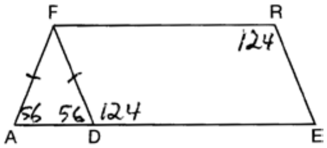
37 ANS: 4 PTS: 2 REF: 061513geo NAT: G.CO.C.11
TOP: Parallelograms

38 ANS:
Opposite angles in a parallelogram are congruent, so m∠O = 118°. The interior angles of a triangle equal 180°. $180 - (118 + 22) = 40$.

PTS: 2 REF: 061526geo NAT: G.CO.C.11 TOP: Parallelograms

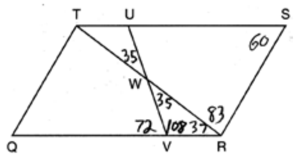
39 ANS: 2 PTS: 2 REF: 081501geo NAT: G.CO.C.11
TOP: Parallelograms

40 ANS: 3



PTS: 2 REF: 081508geo NAT: G.CO.C.11 TOP: Parallelograms

41 ANS: 3



PTS: 2 REF: 011603geo NAT: G.CO.C.11 TOP: Parallelograms

42 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: Parallelograms

43 ANS: 3

(3) Could be a trapezoid.

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

44 ANS: 1

$180-(68\cdot 2)$

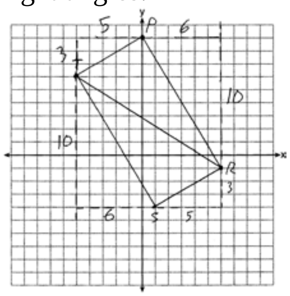
PTS: 2 REF: 081624geo NAT: G.CO.C.11 TOP: Parallelograms

45 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: Polygons in the Coordinate Plane

46 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: Polygons in the Coordinate Plane

47 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: Polygons in the Coordinate Plane

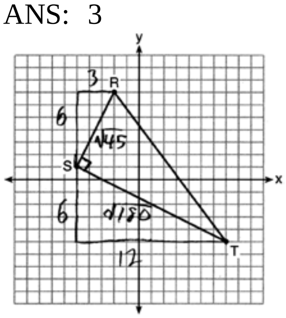
48 ANS: 1
$m_{\overline{TA}} = -1$ $y = mx + b$
$m_{\overline{EM}} = 1$ $1 = 1(2) + b$
$-1 = b$

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

49 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

50 ANS: 3



$\sqrt{45} = 3\sqrt{5}$ $a = \frac{1}{2}\left(3\sqrt{5}\right)\left(6\sqrt{5}\right) = \frac{1}{2}(18)(5) = 45$
$\sqrt{180} = 6\sqrt{5}$

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

51 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

52 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

53 ANS:

$$s = \theta \cdot r \qquad s = \theta \cdot r$$ Yes, both angles are equal.

$$\pi = A \cdot 4 \quad \frac{13\pi}{8} = B \cdot 6.5$$

$$\frac{\pi}{4} = A \qquad \frac{\pi}{4} = B$$

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

54 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

55 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

56 ANS: 3

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

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

57 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

58 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

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

60 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: Properties of Circles

61 ANS: 2

x is $\frac{1}{2}$ the circumference. $\frac{C}{2} = \frac{10\pi}{2} \approx 16$

PTS: 2 REF: 061523geo NAT: G.GMD.A.1 TOP: Properties of Circles

62 ANS: 1

$\frac{1000}{20\pi} \approx 15.9$

PTS: 2 REF: 011623geo NAT: G.MG.A.3 TOP: Properties of Circles

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

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

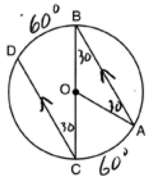
65 ANS: 3

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

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

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

67 ANS:



$180 - 2(30) = 120$

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

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

69 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

70 ANS:
$\frac{3}{8} \cdot 56 = 21$

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

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

72 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

73 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

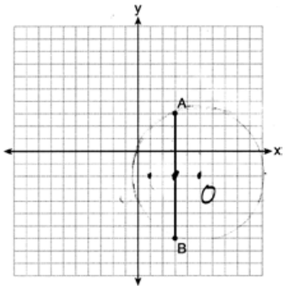
74 ANS: 4

$$x^2 + 6x + 9 + y^2 - 4y + 4 = 23 + 9 + 4$$
$$(x + 3)^2 + (y - 2)^2 = 36$$

PTS: 2 REF: 011617geo NAT: G.GPE.A.1 TOP: Equations of Circles

75 ANS: 2 PTS: 2 REF: 061603geo NAT: G.GPE.A.1
TOP: Equations of Circles

76 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

77 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

78 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

79 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

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

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

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

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

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

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

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

87 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

88 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

89 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

90 ANS: 2

$$V = \frac{1}{3} \cdot 6^2 \cdot 12 = 144$$

PTS: 2 REF: 011607geo NAT: G.GMD.A.3 TOP: Volume

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

92 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.MG.A.1 TOP: Volume

93 ANS:

$$\frac{\pi \cdot 11.25^2 \cdot 33.5}{231} \approx 57.7$$

PTS: 4 REF: 061632geo NAT: G.MG.A.1 TOP: Volume

94 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.MG.A.1 TOP: Volume

95 ANS: 4

$V=\pi\left(\frac{6.7}{2}\right)^2(4\cdot 6.7)\approx 945$

PTS: 2 REF: 081620geo NAT: G.MG.A.3 TOP: Volume

96 ANS: 2

$SA=6\cdot 12^2=864$

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

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

97 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

98 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

99 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

100 ANS:

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

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

101 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

102 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

103 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

104 ANS: 2

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

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

105 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

106 ANS: 2

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

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

107 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

108 ANS: 2

$C = \pi d$ $V = \pi\left(\frac{2.25}{\pi}\right)^2 \cdot 8 \approx 12.8916$ $W = 12.8916 \cdot 752 \approx 9694$

$4.5 = \pi d$

$\frac{4.5}{\pi} = d$

$\frac{2.25}{\pi} = r$

PTS: 2 REF: 081617geo NAT: G.MG.A.2 TOP: Density

109 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

110 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: Similarity

111 ANS: 2 PTS: 2 REF: 061516geo NAT: G.SRT.A.2
TOP: Similarity

112 ANS: 4 PTS: 2 REF: 081506geo NAT: G.SRT.A.2
TOP: Similarity

113 ANS: 4 PTS: 2 REF: 081514geo NAT: G.SRT.A.2
TOP: Similarity

114 ANS: 1

$3^2 = 9$

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

115 ANS: 1

$\frac{4}{6} = \frac{3}{4.5} = \frac{2}{3}$

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

116 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.A.2 TOP: Similarity

117 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

118 ANS: 3

$$\frac{AB}{BC} = \frac{DE}{EF}$$

$$\frac{9}{15} = \frac{6}{10}$$

$$90 = 90$$

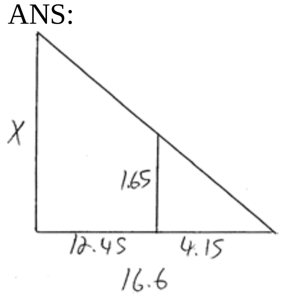
PTS: 2 REF: 061515geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

119 ANS: 4

$$\frac{7}{12} \cdot 30 = 17.5$$

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

120 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

121 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

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

123 ANS:

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

$$x = 164$$

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

124 ANS:

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

$$126 = 126$$

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

125 ANS: 1

$$\frac{6}{8} = \frac{9}{12}$$

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

126 ANS: 4

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

$$3x - 1 = 2x + 6$$

$$x = 7$$

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

127 ANS: 2

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

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

128 ANS: 3

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

$$x = 15$$

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

129 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

130 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

131 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

132 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

133 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

134 ANS: 1 PTS: 2 REF: 061518geo NAT: G.SRT.A.1
TOP: Line Dilations

135 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
136 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
137 ANS: 2 PTS: 2 REF: 011610geo NAT: G.SRT.A.1
TOP: Line Dilations
138 ANS:
$\ell: y = 3x - 4$

$m: y = 3x - 8$

PTS: 2 REF: 011631geo NAT: G.SRT.A.1 TOP: Line Dilations
139 ANS: 4
$3 \times 6 = 18$

PTS: 2 REF: 061602geo NAT: G.SRT.A.1 TOP: Line Dilations
140 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
141 ANS: 1 PTS: 2 REF: 081605geo NAT: G.CO.A.5
TOP: Rotations KEY: grids
142 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

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

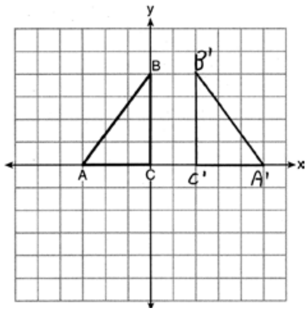
$B(6,-8) - (2,-3) = (4,-5) \rightarrow (5,4) + (2,-3) = B'(7,1)$

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

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

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

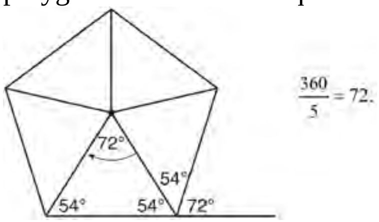
143 ANS:



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

144 ANS: 2

Segments drawn from the center of the regular pentagon bisect each angle of the pentagon, and create five isosceles triangles as shown in the diagram below. Since each exterior angle equals the angles formed by the segments drawn from the center of the regular pentagon, the minimum degrees necessary to carry a regular polygon onto itself are equal to the measure of an exterior angle of the regular polygon.



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

145 ANS: 1

$$\frac{360°}{45°} = 8$$

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

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

147 ANS:

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

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

148 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

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

150 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

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

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

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

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

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

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

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

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

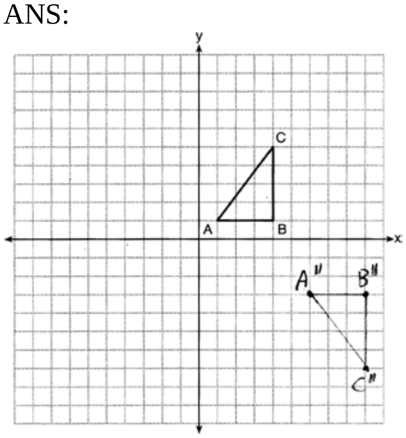
159 ANS: 1 PTS: 2 REF: 081507geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify

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

161 ANS:
$T_{6,0} \circ R_{x\text{-axis}}$

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

162 ANS:



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

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

164 ANS: 4 PTS: 2 REF: 081609geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids
165 ANS: 4 PTS: 2 REF: 061615geo NAT: G.SRT.C.6
TOP: Trigonometric Ratios
166 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
167 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
168 ANS: 4 PTS: 2 REF: 061512geo NAT: G.SRT.C.7
TOP: Cofunctions
169 ANS: 1 PTS: 2 REF: 081504geo NAT: G.SRT.C.7
TOP: Cofunctions
170 ANS: 4 PTS: 2 REF: 011609geo NAT: G.SRT.C.7
TOP: Cofunctions
171 ANS:
$73 + R = 90$ Equal cofunctions are complementary.

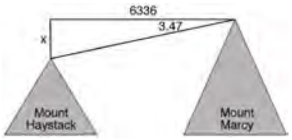
$R = 17$

PTS: 2 REF: 061628geo NAT: G.SRT.C.7 TOP: Cofunctions
172 ANS: 1 PTS: 2 REF: 081606geo NAT: G.SRT.C.7
TOP: Cofunctions
173 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

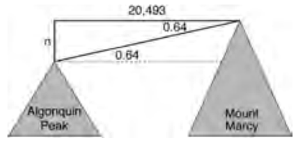
174 ANS:



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

$M \approx 384$

$4960 + 384 = 5344$



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

$A \approx 229$

$5344 - 229 = 5115$

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

175 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

176 ANS:

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

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

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

177 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

178 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

179 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

180 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

181 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

182 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

183 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

184 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

185 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

186 ANS: 3 PTS: 2 REF: 061524geo NAT: G.CO.B.7

TOP: Triangle Congruency

187 ANS:
Reflections are rigid motions that preserve distance.

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

188 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.8 TOP: Triangle Congruency

189 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.8 TOP: Triangle Congruency

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

PTS: 2 REF: 081530geo NAT: G.CO.B.8 TOP: Triangle Congruency

191 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.8 TOP: Triangle Congruency

192 ANS:
Yes. The sequence of transformations consists of a reflection and a translation, which are isometries which preserve distance and congruency.

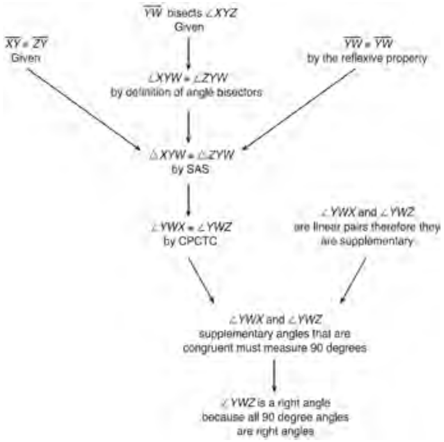
PTS: 2 REF: 011628geo NAT: G.CO.B.8 TOP: Triangle Congruency

193 ANS: 3 PTS: 2 REF: 081622geo NAT: C.CO.B.8
TOP: Triangle Congruency

194 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

195 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

196 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

197 ANS: 3

1) only proves AA; 2) need congruent legs for HL; 3) SAS; 4) only proves product of altitude and base is equal

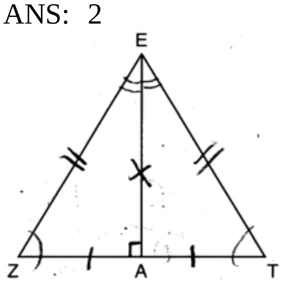
PTS: 2 REF: 061607geo NAT: G.CO.C.10 TOP: Triangle Proofs

198 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.SRT.B.4 TOP: Triangle Proofs

199 ANS: 2



PTS: 2 REF: 061619geo NAT: G.SRT.B.4 TOP: Triangle Proofs

200 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.CO.C.11 TOP: Quadrilateral Proofs

201 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

202 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

203 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.CO.C.11 TOP: Quadrilateral Proofs

204 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.CO.C.11 TOP: Quadrilateral Proofs

205 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.B.5 TOP: Quadrilateral Proofs

206 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

207 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