JMAP
REGENTS BY COMMON CORE STATE STANDARD: TOPIC

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

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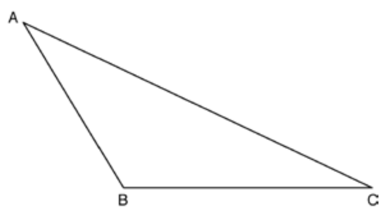
Geometry Regents Exam Questions by Common Core State Standard: Topic

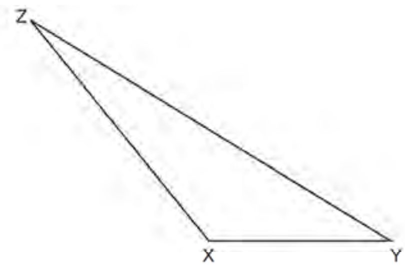
TOOLS OF GEOMETRY

G.CO.12-13: CONSTRUCTIONS

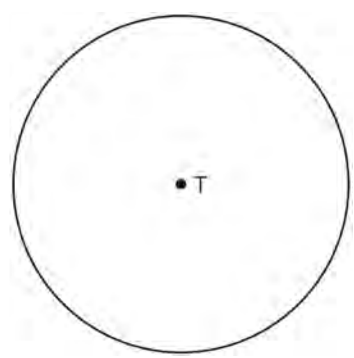
1 Using a compass and straightedge, construct an altitude of triangle *ABC* below. [Leave all construction marks.]



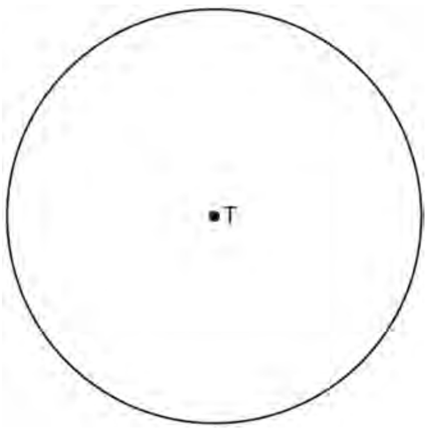
2 Triangle *XYZ* is shown below. Using a compass and straightedge, on the line below, construct and label $\triangle ABC$, such that $\triangle ABC \cong \triangle XYZ$. [Leave all construction marks.] Based on your construction, state the theorem that justifies why $\triangle ABC$ is congruent to $\triangle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



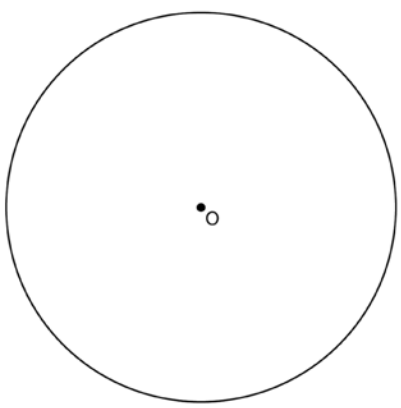
3 Construct an equilateral triangle inscribed in circle *T* shown below. [Leave all construction marks.]



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



5 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.

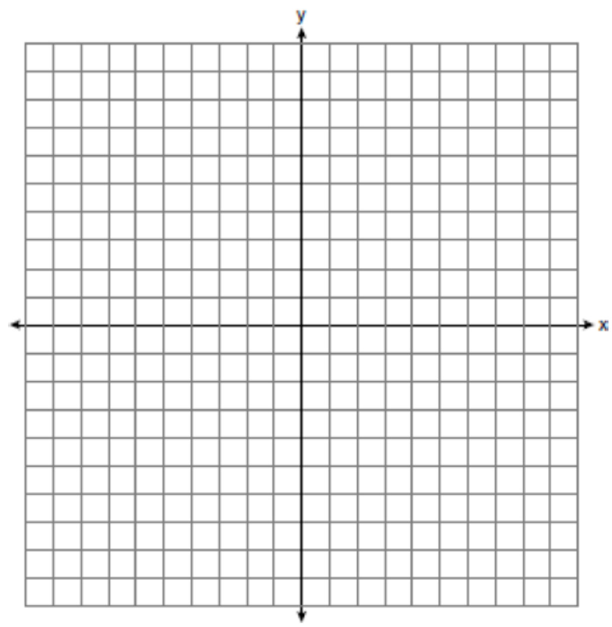
LINES AND ANGLES

G.GPE.6: DIRECTED LINE SEGMENTS

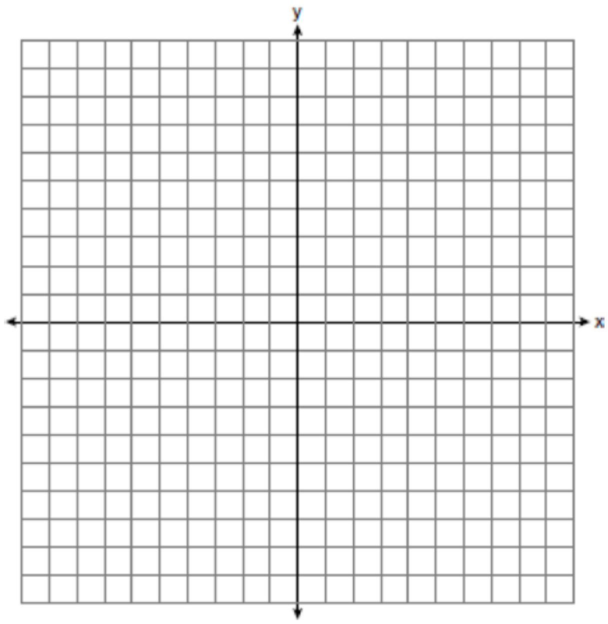
6 What are the coordinates of the point on the directed line segment from $K(-5,-4)$ to $L(5,1)$ that partitions the segment into a ratio of 3 to 2?

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

7 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.]



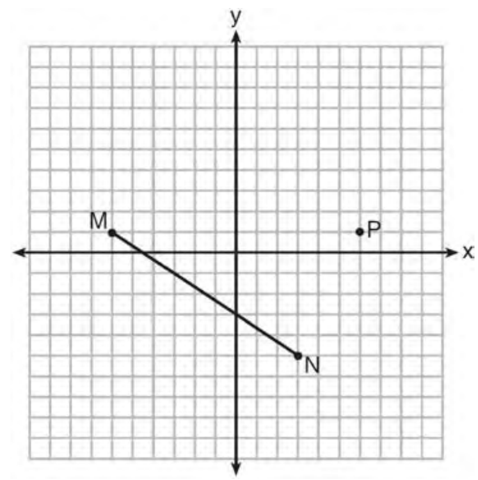
8 Directed line segment PT has endpoints whose coordinates are $P(-2,1)$ and $T(4,7)$. Determine the coordinates of point J that divides the segment in the ratio 2 to 1. [The use of the set of axes below is optional.]



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

G.GPE.5: PARALLEL AND PERPENDICULAR LINES

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

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

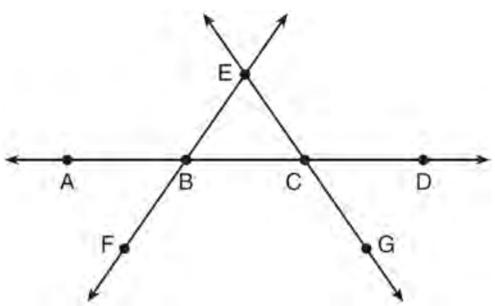
1 $y = -\frac{1}{2}x + 6$
2 $y = \frac{1}{2}x + 6$
3 $y = -2x + 6$
4 $y = 2x + 6$

12 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 $y = 2x - 16$

G.CO.9: BISECTORS, PARALLEL LINES & TRANSVERSALS

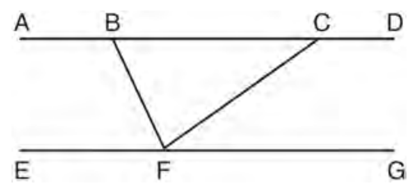
13 In the diagram below, $\overleftrightarrow{FE}$ bisects $\overline{AC}$ at B, and $\overleftrightarrow{GE}$ bisects $\overline{BD}$ at C.



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.

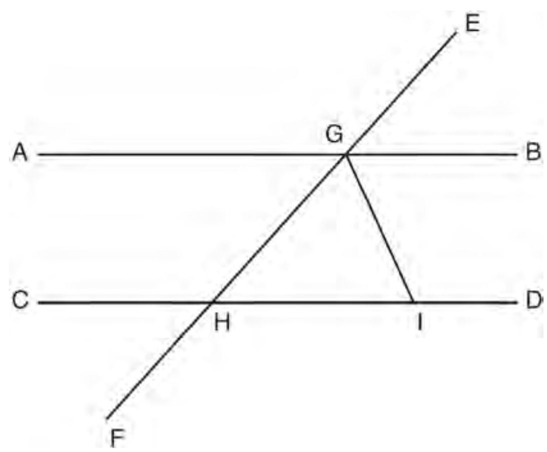
14 Steve drew line segments $ABCD$, EFG, BF, and CF as shown in the diagram below. Scalene $\triangle BFC$ is formed.



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 $\angle CBF \cong \angle GFC$

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

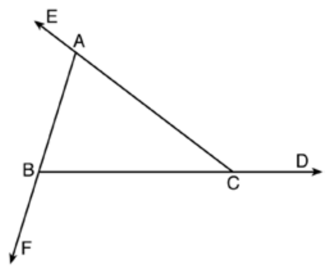


If $m\angle EGB = 50°$ and $m\angle DIG = 115°$, explain why $\overline{AB} \parallel \overline{CD}$.

TRIANGLES

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

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



G.SRT.8: PYTHAGOREAN THEOREM

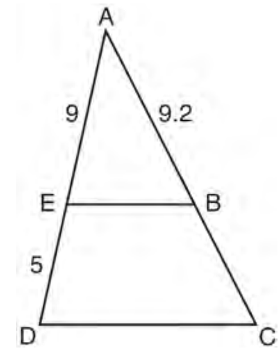
17 The aspect ratio (the ratio of screen width to height) of a rectangular flat-screen television is $16:9$. The length of the diagonal of the screen is the television's screen size. Determine and state, to the *nearest inch*, the screen size (diagonal) of this flat-screen television with a screen height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

G.SRT.5: ISOSCELES TRIANGLE THEOREM

18 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.5: SIDE SPLITTER THEOREM

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

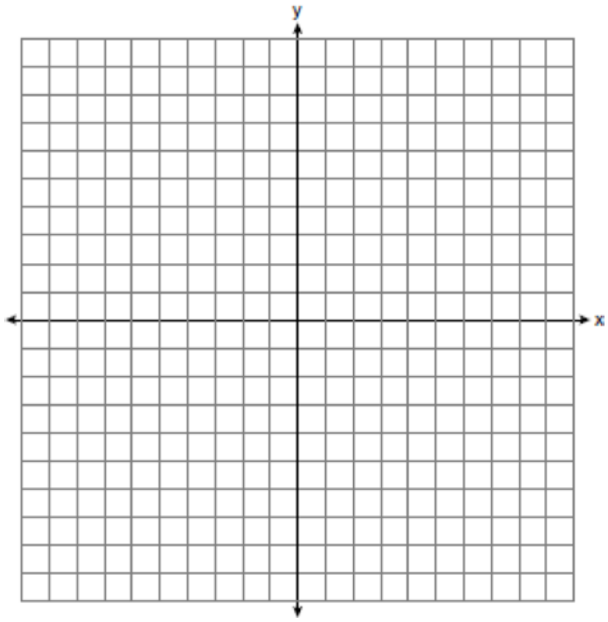


What is the length of $\overline{AC}$, to the *nearest tenth*?
1 5.1
2 5.2
3 14.3
4 14.4

G.GPE.4: TRIANGLES IN THE COORDINATE PLANE

20 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

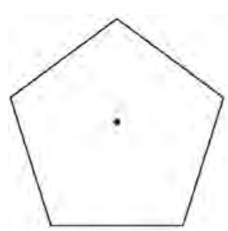
21 Triangle ABC has vertices with $A(x,3)$, $B(-3,-1)$, and $C(-1,-4)$. Determine and state a value of x that would make triangle ABC a right triangle. Justify why $\triangle ABC$ is a right triangle. [The use of the set of axes below is optional.]



POLYGONS

G.CO.3: MAPPING A POLYGON ONTO ITSELF

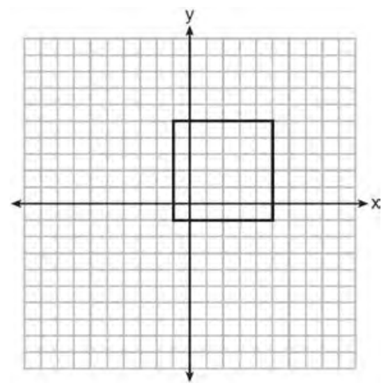
22 A regular pentagon is shown in the diagram below.



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

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

24 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 $x + y = 4$

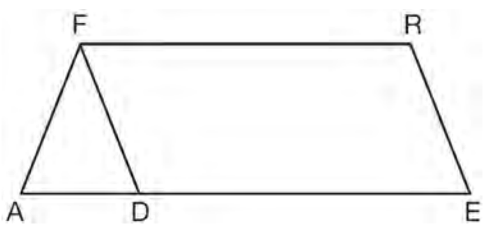
G.CO.11: PARALLELOGRAMS

25 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

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

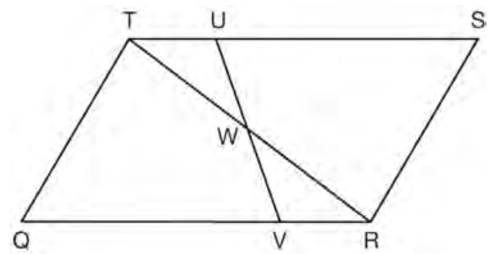
27 In the diagram of parallelogram $FRED$ shown below, $\overline{ED}$ is extended to A, and $\overline{AF}$ is drawn such that $\overline{AF} \cong \overline{DF}$.



If $m\angle R = 124°$, what is $m\angle AFD$?

1 124°
2 112°
3 68°
4 56°

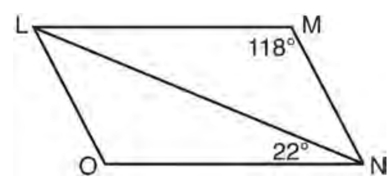
28 In parallelogram $QRST$ shown below, diagonal $\overline{TR}$ is drawn, U and V are points on $\overline{TS}$ and $\overline{QR}$, respectively, and $\overline{UV}$ intersects $\overline{TR}$ at W.



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

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



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

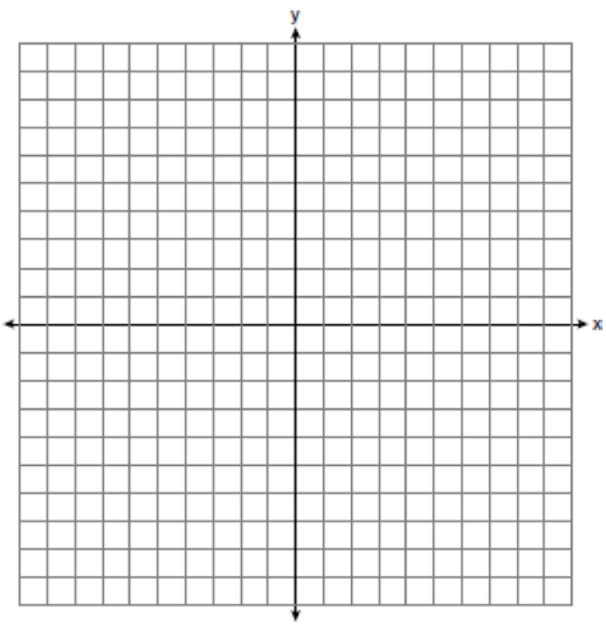
G.GPE.4, 7: POLYGONS IN THE COORDINATE PLANE

30 The endpoints of one side of a regular pentagon are $(-1,4)$ and $(2,3)$. What is the perimeter of the pentagon?

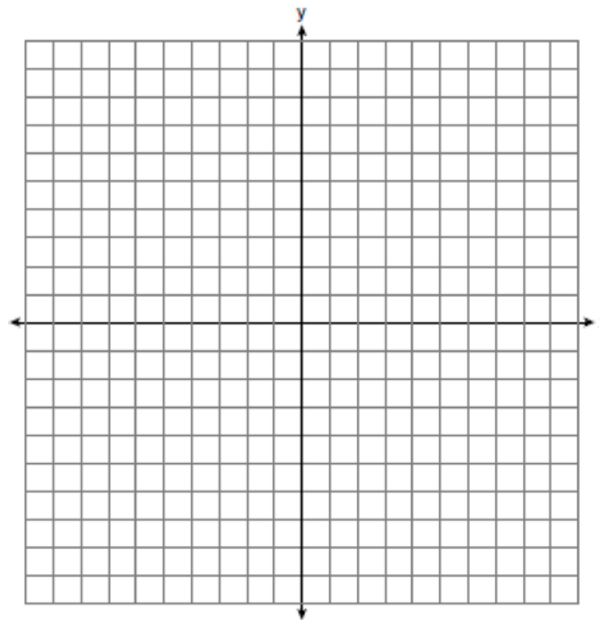
1 $\sqrt{10}$
2 $5\sqrt{10}$
3 $5\sqrt{2}$
4 $25\sqrt{2}$

31 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

32 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.]



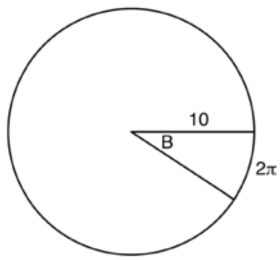
33 In rhombus $MATH$, the coordinates of the endpoints of the diagonal $\overline{MT}$ are $M(0,-1)$ and $T(4,6)$. Write an equation of the line that contains diagonal $\overline{AH}$. [Use of the set of axes below is optional.] Using the given information, explain how you know that your line contains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



CONICS

G.C.5: ARC LENGTH

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

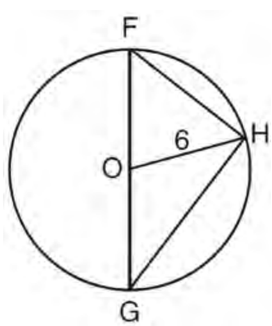


What is the measure of angle B, in radians?

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

G.C.5: SECTORS

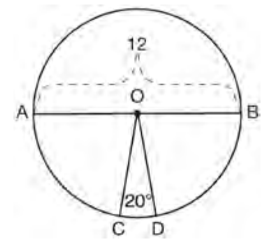
35 Triangle FGH is inscribed in circle O, the length of radius $\overline{OH}$ is 6, and $\overline{FH} \cong \overline{OG}$.



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

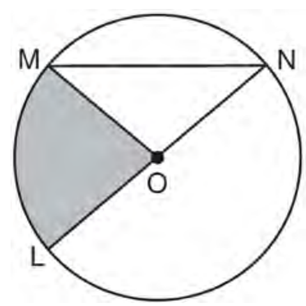
1 2π
2 $\frac{3}{2}\pi$
3 6π
4 24π

36 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 $\overparen{AB} \cong \overparen{BD}$, find the area of sector BOD in terms of π.

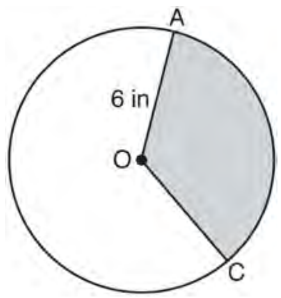
37 In the diagram below of circle O, the area of the shaded sector LOM is 2π cm^2.



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

1 10º
2 20º
3 40º
4 80º

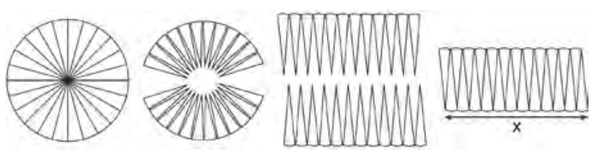
38 In the diagram below of circle O, the area of the shaded sector AOC is 12π in^2 and the length of $\overline{OA}$ is 6 inches. Determine and state $m\angle AOC$.



G.GMD.1, G.MG.3, G.GPE.4, G.C.1: PROPERTIES OF CIRCLES

39 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

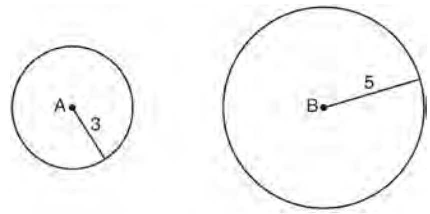
40 A circle with a radius of 5 was divided into 24 congruent sectors. The sectors were then rearranged, as shown in the diagram below.



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

41 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

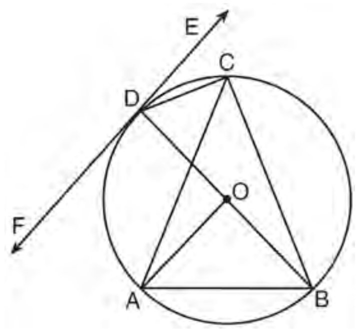
42 As shown in the diagram below, circle A has a radius of 3 and circle B has a radius of 5.



Use transformations to explain why circles A and B are similar.

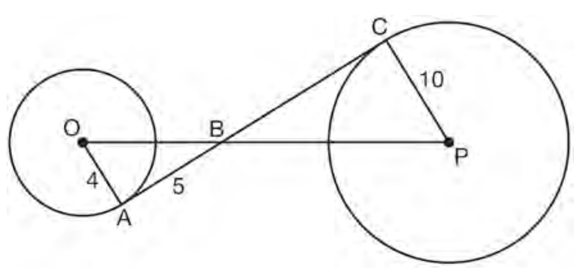
G.C.2, G.SRT.5: CHORDS, SECANTS AND TANGENTS

43 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."



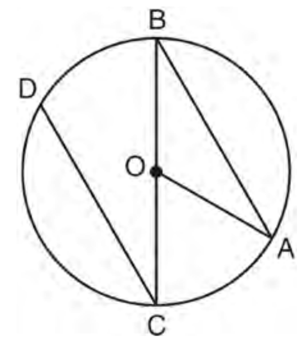
Which angle is Sam referring to?
1 $\angle AOB$
2 $\angle BAC$
3 $\angle DCB$
4 $\angle FDB$

44 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 $PC = 10$.



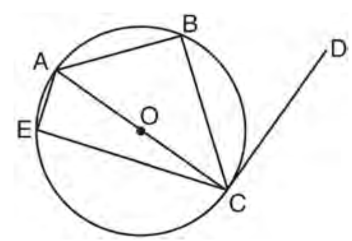
What is the length of $\overline{BC}$?
1 6.4
2 8
3 12.5
4 16

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



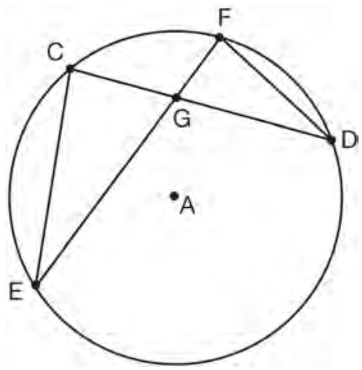
If m$\angle BCD = 30°$, determine and state m$\angle AOB$.

46 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 $\angle CBA \cong \angle AEC$

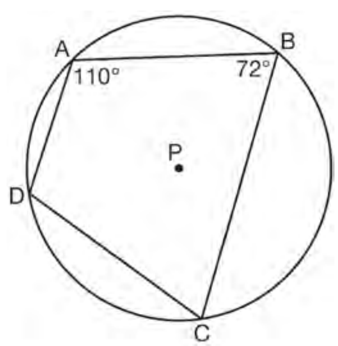
47 In the diagram of circle A shown below, chords $\overline{CD}$ and $\overline{EF}$ intersect at G, and chords $\overline{CE}$ and $\overline{FD}$ are drawn.



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

G.SRT.8, G.C.3: INSCRIBED QUADRILATERALS

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



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

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

G.GPE.1: EQUATIONS OF CIRCLES

50 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

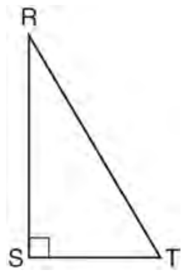
51 The equation of a circle is $x^2 + y^2 + 6y = 7$. What are the coordinates of the center and the length of the radius of the circle?
1 center $(0,3)$ and radius 4
2 center $(0,-3)$ and radius 4
3 center $(0,3)$ and radius 16
4 center $(0,-3)$ and radius 16

52 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

MEASURING IN THE PLANE AND SPACE

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

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



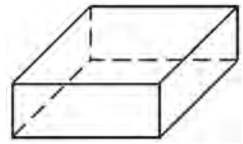
1 a pyramid with a square base
2 an isosceles triangle
3 a right triangle
4 a cone

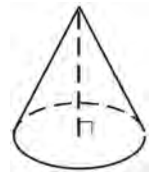
54 If the rectangle below is continuously rotated about side *w*, which solid figure is formed?

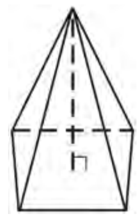
1 pyramid
2 rectangular prism
3 cone
4 cylinder

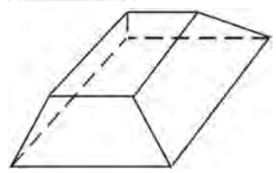
G.GMD.4: CROSS-SECTIONS OF THREE-DIMENSIONAL OBJECTS

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

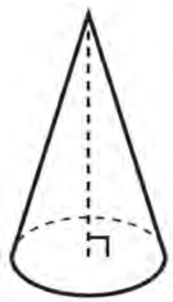
1 

2 

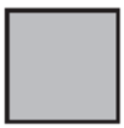
3 

4 

56 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 

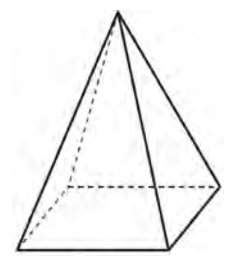
4 

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

57 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

58 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

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

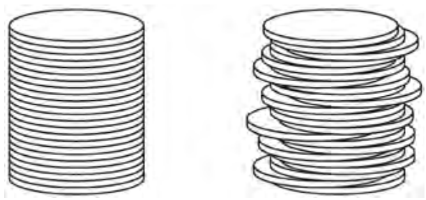


If the altitude of the pyramid measures 12 inches, its volume, in cubic inches, is
1 72
2 144
3 288
4 432

60 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

G.GMD.1: CAVALERI’S PRINCIPLE

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



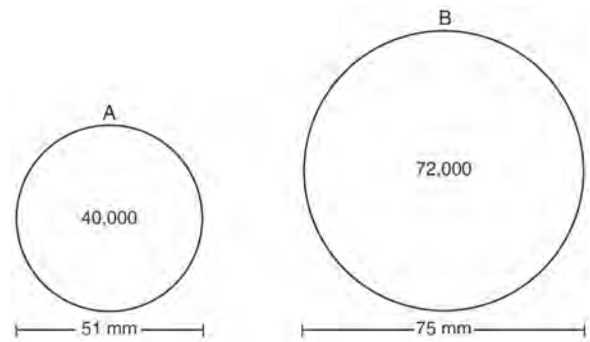
Use Cavelieri’s principle to explain why the volumes of these two stacks of quarters are equal.

G.MG.3: SURFACE AND LATERAL AREA

62 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.2: DENSITY

63 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.

64 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

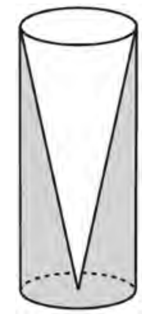
65 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*. State which type of wood the cube is made of, using the density table below.

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

66 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.

67 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.

68 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?

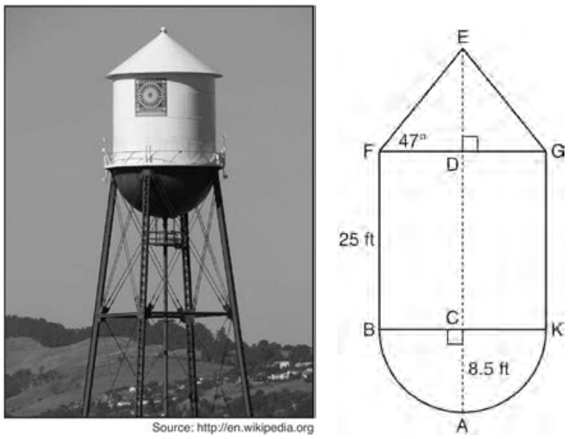


Walter goes to a hobby store to buy the wax for his candles. The wax costs $0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles? If Walter spent a total of $37.83 for the molds and charges $1.95 for each candle, what is Walter's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

69 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

70 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

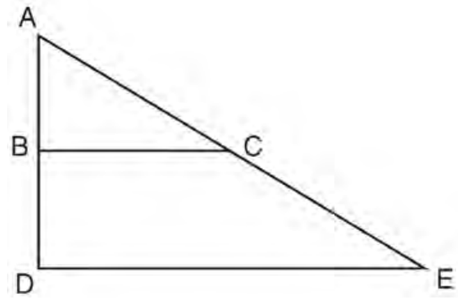
71 The water tower in the picture below is modeled by the two-dimensional figure beside it. The water tower is composed of a hemisphere, a cylinder, and a cone. Let C be the center of the hemisphere and let D be the center of the base of the cone.



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

G.SRT.2, 5: TRIANGLE SIMILARITY

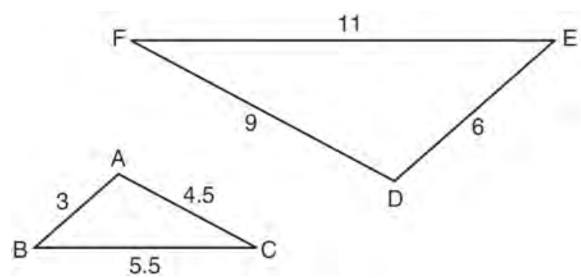
72 The image of $\triangle ABC$ after a dilation of scale factor k centered at point A is $\triangle ADE$, as shown in the diagram below.



Which statement is always true?

1 $2AB = AD$
2 $\overline{AD} \perp \overline{DE}$
3 $\overline{AC} = \overline{CE}$
4 $\overline{BC} \parallel \overline{DE}$

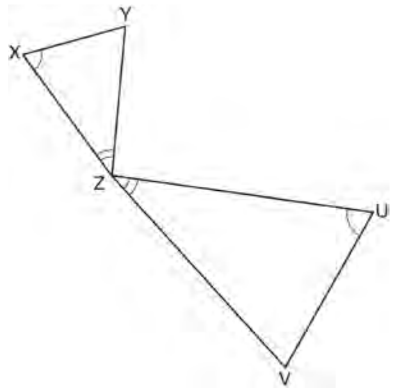
73 In the diagram below, $\triangle DEF$ is the image of $\triangle ABC$ after a clockwise rotation of 180° and a dilation where $AB = 3$, $BC = 5.5$, $AC = 4.5$, $DE = 6$, $FD = 9$, and $EF = 11$.



Which relationship must always be true?

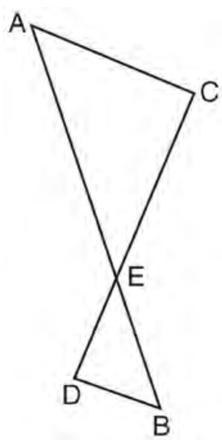
1 $\dfrac{\mathrm{m}\angle A}{\mathrm{m}\angle D} = \dfrac{1}{2}$
2 $\dfrac{\mathrm{m}\angle C}{\mathrm{m}\angle F} = \dfrac{2}{1}$
3 $\dfrac{\mathrm{m}\angle A}{\mathrm{m}\angle C} = \dfrac{\mathrm{m}\angle F}{\mathrm{m}\angle D}$
4 $\dfrac{\mathrm{m}\angle B}{\mathrm{m}\angle E} = \dfrac{\mathrm{m}\angle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

74 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 $\triangle UVZ$.

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



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

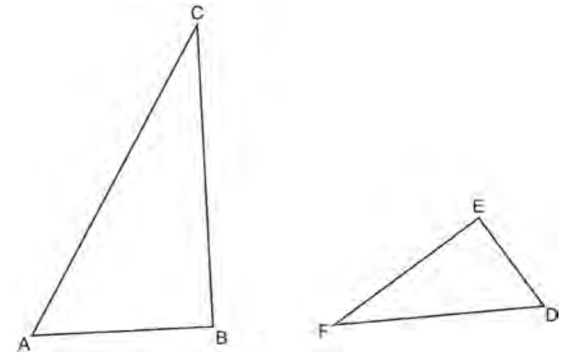
1 $\frac{CE}{DE} = \frac{EB}{EA}$

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

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

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

76 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?

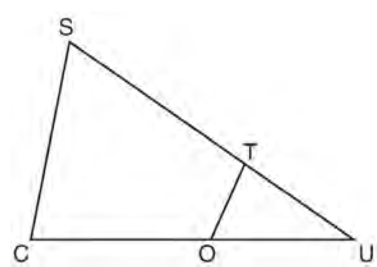
1 $\angle CAB \cong \angle DEF$

2 $\frac{AB}{CB} = \frac{FE}{DE}$

3 $\triangle ABC \sim \triangle DEF$

4 $\frac{AB}{DE} = \frac{FE}{CB}$

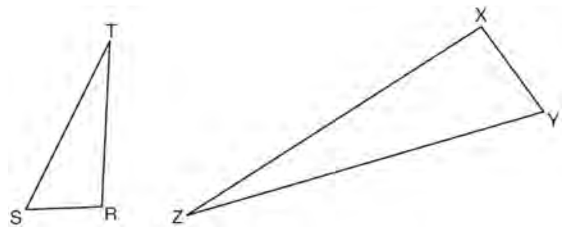
77 In $\triangle SCU$ shown below, points T and O are on $\overline{SU}$ and $\overline{CU}$, respectively. Segment OT is drawn so that $\angle C \cong \angle OTU$.



If $TU = 4$, $OU = 5$, and $OC = 7$, what is the length of $\overline{ST}$?

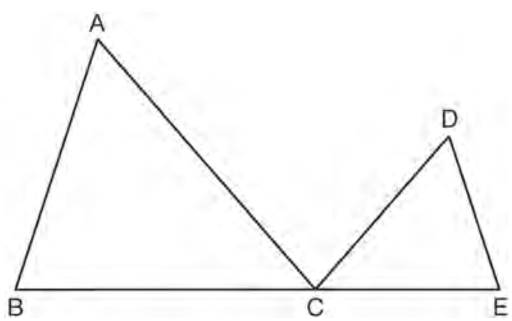
1 5.6
2 8.75
3 11
4 15

78 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.



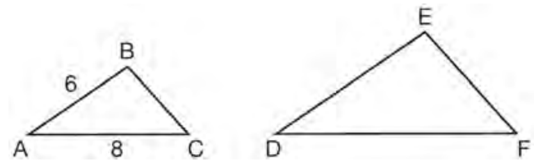
79 The ratio of similarity of $\triangle BOY$ to $\triangle GRL$ is $1:2$. If $BO = x + 3$ and $GR = 3x - 1$, then the length of $\overline{GR}$ is
1 5
2 7
3 10
4 20

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



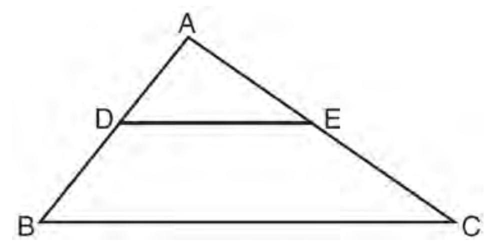
If $AC = 12$, $DC = 7$, $DE = 5$, and the perimeter of $\triangle ABC$ is 30, what is the perimeter of $\triangle DEC$?
1 12.5
2 14.0
3 14.8
4 17.5

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



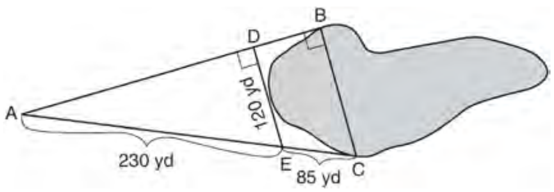
If $AB = 6$ and $AC = 8$, which statement will justify similarity by SAS?
1 $DE = 9$, $DF = 12$, and $\angle A \cong \angle D$
2 $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$
3 $DE = 36$, $DF = 64$, and $\angle C \cong \angle F$
4 $DE = 15$, $DF = 20$, and $\angle C \cong \angle F$

82 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 $AC = 15$

83 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.

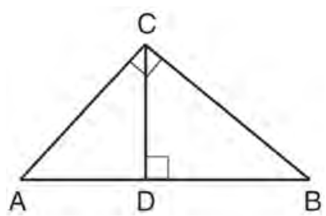


Use the surveyor's information to determine and state the distance from point B to point C, to the *nearest yard*.

84 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*.

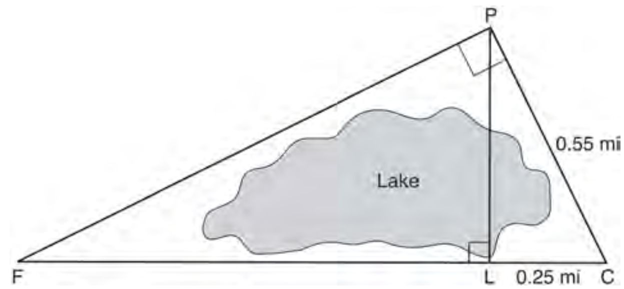
G.SRT.5: RIGHT TRIANGLE SIMILARITY

85 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 $AB = 17$

86 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.

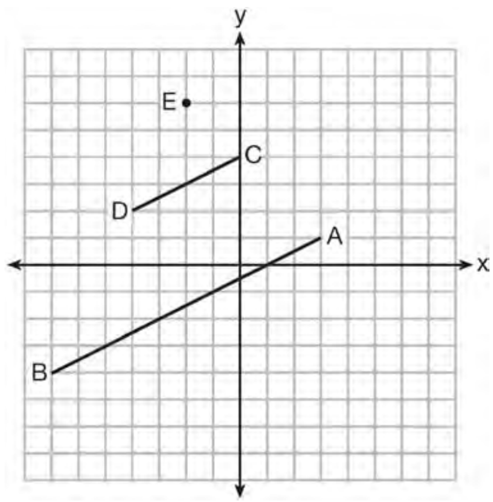


If the path from the park ranger station to the campground is 0.55 mile, determine and state, to the *nearest hundredth of a mile*, the distance between the park ranger station and the lifeguard chair. Gerald believes the distance from the first aid station to the campground is at least 1.5 miles. Is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

TRANSFORMATIONS

G.SRT.1: LINE DILATIONS

87 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 $\frac{EA}{EC}$

88 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

89 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 $3x - 2y = 5$

90 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 $y = 3x - 6$

91 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 $y = 2x + 1$

92 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

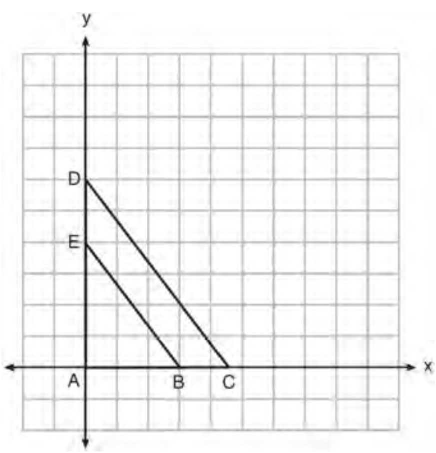
1 $y = 3x - 8$
2 $y = 3x - 4$
3 $y = 3x - 2$
4 $y = 3x - 1$

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

G.SRT.2: POLYGON DILATIONS

94 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 $3(m\angle C') = m\angle C$

95 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 $E(0,4)$.

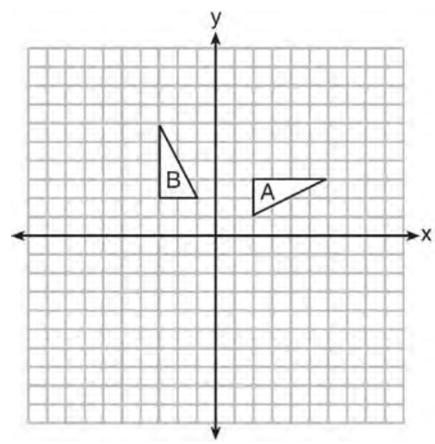


The ratio of the lengths of $\overline{BE}$ to $\overline{CD}$ is
1 $\frac{2}{3}$
2 $\frac{3}{2}$
3 $\frac{3}{4}$
4 $\frac{4}{3}$

96 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.

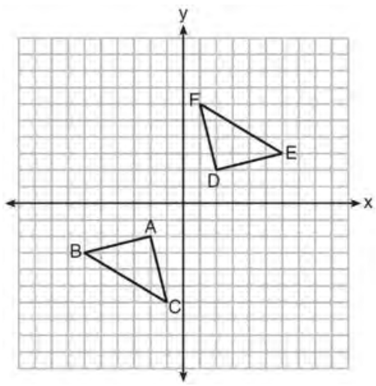
G.CO.5: IDENTIFYING TRANSFORMATIONS

97 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

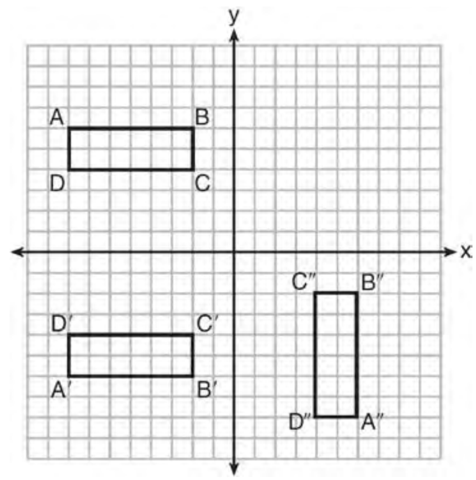
98 Triangle ABC and triangle DEF are graphed on the set of axes below.



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

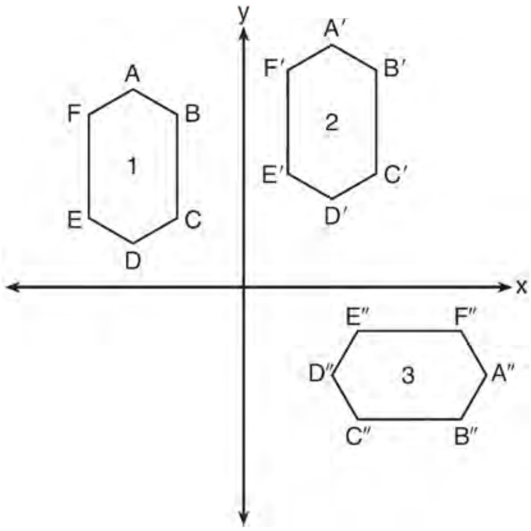
99 A sequence of transformations maps rectangle $ABCD$ onto rectangle $A''B''C''D''$, as shown in the diagram below.



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

100 In the diagram below, congruent figures 1, 2, and 3 are drawn.

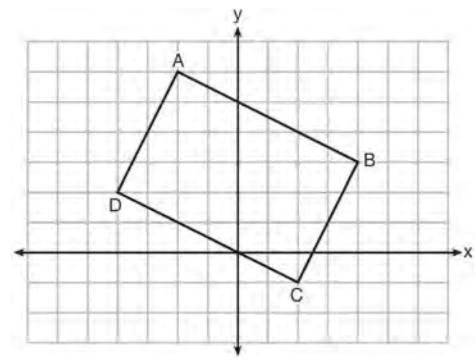


Which sequence of transformations maps figure 1 onto figure 2 and then figure 2 onto figure 3?

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

G.CO.6: PROPERTIES OF TRANSFORMATIONS

101 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 $B'(-3,4)$

102 Which transformation would result in the perimeter of a triangle being different from the perimeter of its image?

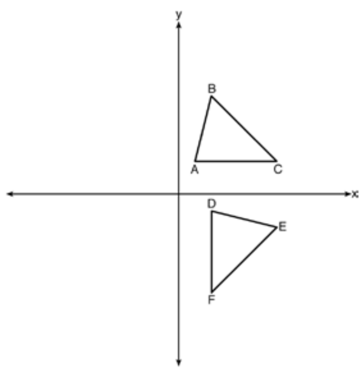
1 $(x,y) \to (y,x)$
2 $(x,y) \to (x,-y)$
3 $(x,y) \to (4x,4y)$
4 $(x,y) \to (x+2,y-5)$

103 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

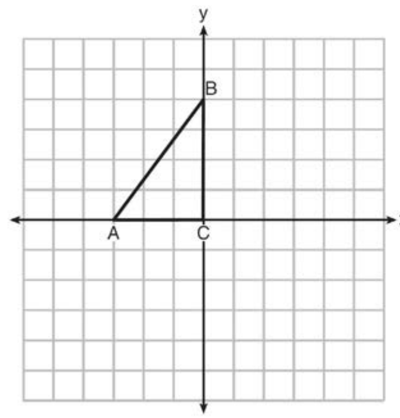
104 The vertices of $\triangle JKL$ have coordinates $J(5,1)$, $K(-2,-3)$, and $L(-4,1)$. Under which transformation is the image $\triangle J'K'L'$ *not* congruent to $\triangle JKL$?
1 a translation of two units to the right and two units down
2 a counterclockwise rotation of 180 degrees around the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

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

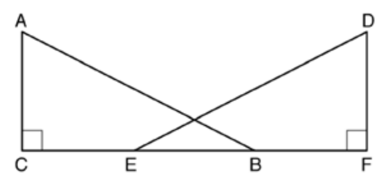


Which statement is true?
1 $\overline{BC} \cong \overline{DE}$
2 $\overline{AB} \cong \overline{DF}$
3 $\angle C \cong \angle E$
4 $\angle A \cong \angle D$

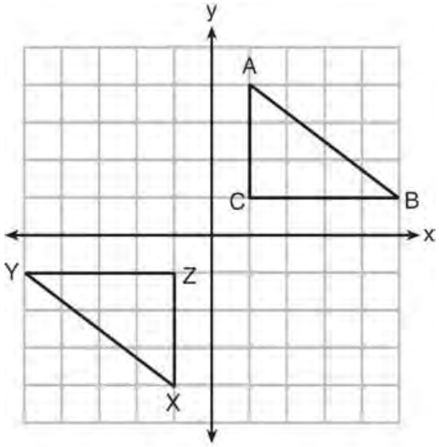
106 Triangle *ABC* is graphed on the set of axes below. Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a reflection over the line $x = 1$.



107 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 $\triangle ABC \cong \triangle DEF$.

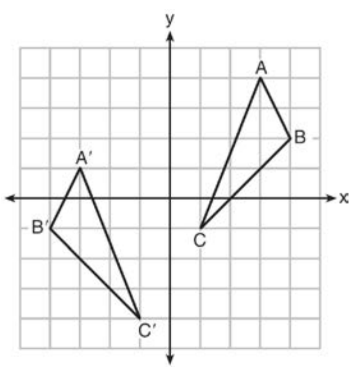


108 In the diagram below, $\triangle ABC$ and $\triangle XYZ$ are graphed.



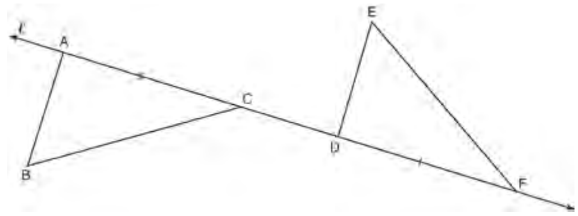
Use the properties of rigid motions to explain why $\triangle ABC \cong \triangle XYZ$.

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



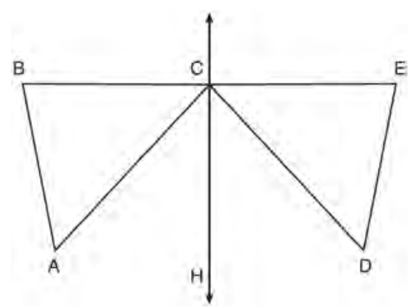
Is $\triangle A'B'C'$ congruent to $\triangle ABC$? Use the properties of rigid motion to explain your answer.

110 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.

111 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: $\triangle ABC \cong \triangle DEC$

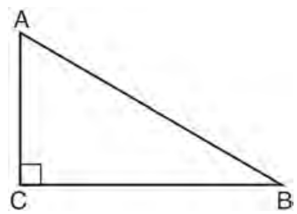


TRIGONOMETRY

G.SRT.7: COFUNCTIONS

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

113 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 $\sin A = \cos B$

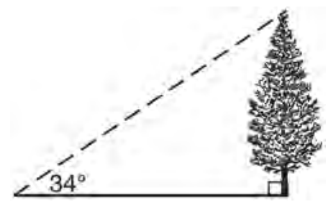
114 In $\triangle ABC$, the complement of $\angle B$ is $\angle A$. Which statement is always true?
1 $\tan\angle A = \tan\angle B$
2 $\sin\angle A = \sin\angle B$
3 $\cos\angle A = \tan\angle B$
4 $\sin\angle A = \cos\angle B$

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

116 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.

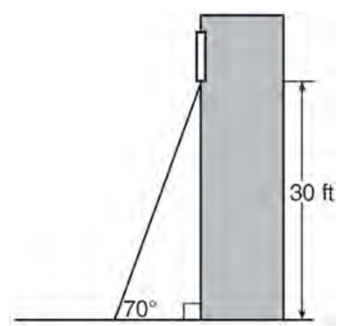
G.SRT.8: USING TRIGONOMETRY TO FIND A SIDE

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

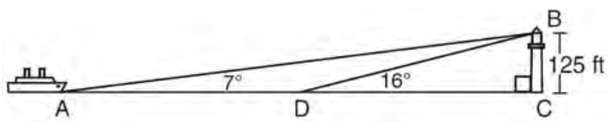


If the point is 20 feet from the base of the tree, what is the height of the tree, to the *nearest tenth of a foot*?
1 29.7
2 16.6
3 13.5
4 11.2

118 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.

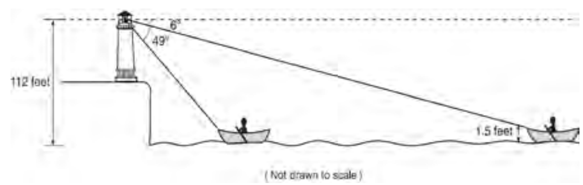


119 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point *A*, the angle of elevation from the ship to the light was 7°. A short time later, at point *D*, the angle of elevation was 16°.



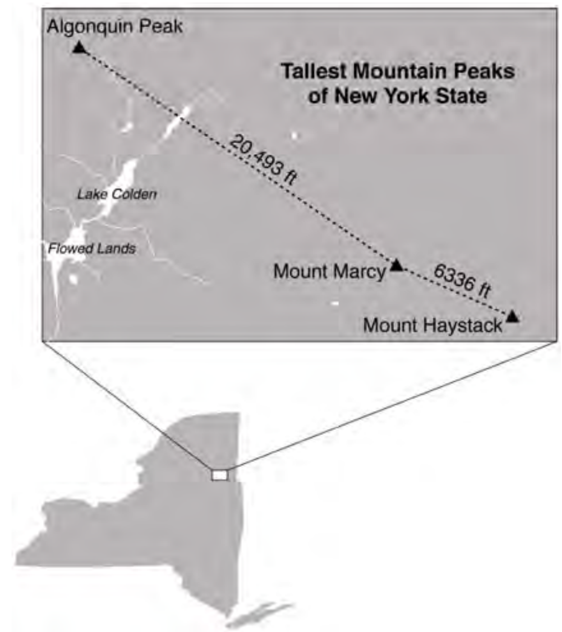
To the *nearest foot*, determine and state how far the ship traveled from point *A* to point *D*.

120 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.



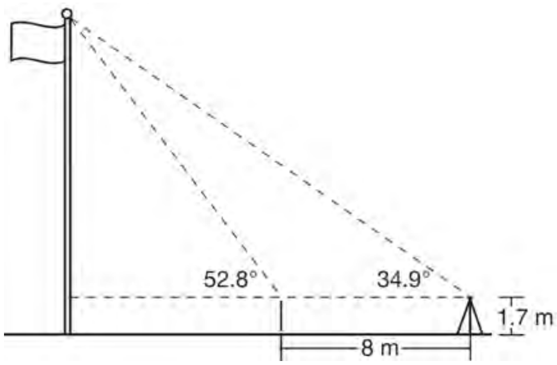
At 5:00, the observer in the lighthouse measured the angle of depression to the front of the canoe to be 6°. Five minutes later, the observer measured and saw the angle of depression to the front of the canoe had increased by 49°. Determine and state, to the *nearest foot per minute*, the average speed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

121 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.

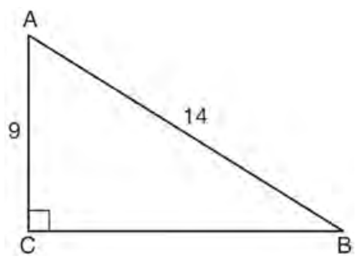
122 Cathy wants to determine the height of the flagpole shown in the diagram below. She uses a survey instrument to measure the angle of elevation to the top of the flagpole, and determines it to be 34.9°. She walks 8 meters closer and determines the new measure of the angle of elevation to be 52.8°.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

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

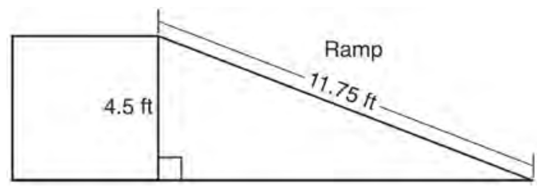
123 In the diagram of right triangle *ABC* shown below, $AB = 14$ and $AC = 9$.



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

124 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

125 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.

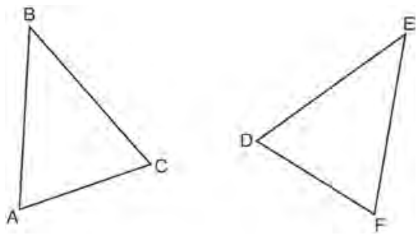


Determine and state, to the *nearest degree*, the angle of elevation formed by the ramp and the ground.

LOGIC

G.CO.7: TRIANGLE CONGRUENCY

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

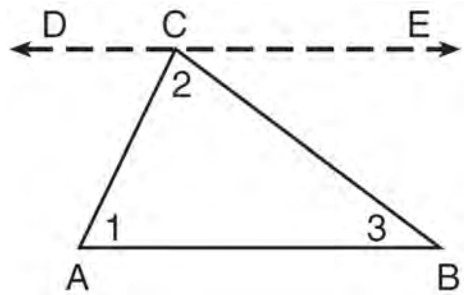


1 $AB = DE$ and $BC = EF$
2 $\angle D \cong \angle A$, $\angle B \cong \angle E$, $\angle C \cong \angle F$
3 There is a sequence of rigid motions that maps $\overline{AB}$ onto $\overline{DE}$, $\overline{BC}$ onto $\overline{EF}$, and $\overline{AC}$ onto $\overline{DF}$.
4 There is a sequence of rigid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

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

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

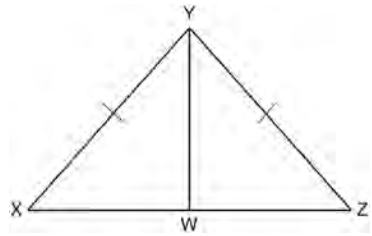
128 Given the theorem, "The sum of the measures of the interior angles of a triangle is 180°," complete the proof for this theorem.



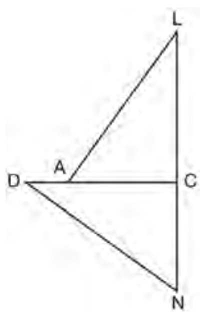
Given: $\triangle ABC$
Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180°$
Fill in the missing reasons below.

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) ______

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



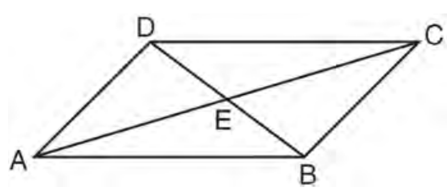
130 In the diagram of $\triangle LAC$ and $\triangle DNC$ below, $\overline{LA} \cong \overline{DN}$, $\overline{CA} \cong \overline{CN}$, and $\overline{DAC} \perp \overline{LCN}$.



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

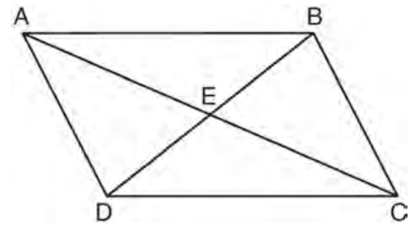
G.CO.11: QUADRILATERAL PROOFS

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



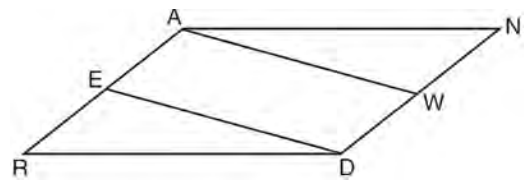
Prove: $\angle ACD \cong \angle CAB$

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



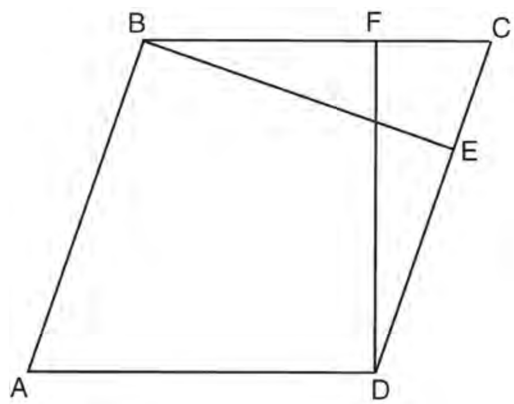
Prove: $\triangle AED \cong \triangle CEB$
Describe a single rigid motion that maps $\triangle AED$ onto $\triangle CEB$.

133 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.

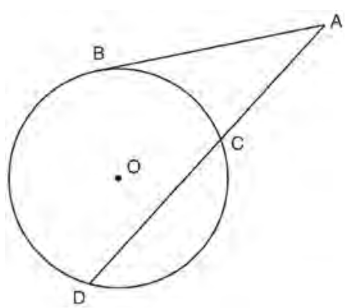
134 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$.



Prove $ABCD$ is a rhombus.

G.SRT.4: SIMILARITY PROOFS

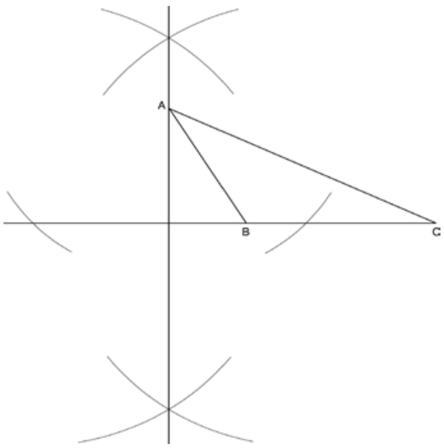
135 In the diagram below, secant $\overline{ACD}$ and tangent $\overline{AB}$ are drawn from external point A to circle O.



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

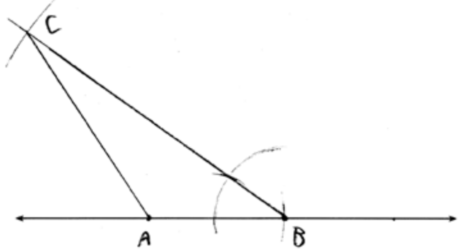
Geometry Regents Exam Questions by Common Core State Standard: Topic
Answer Section

1 ANS:



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

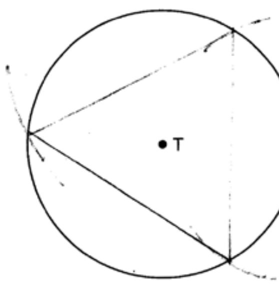
2 ANS:



SAS ≅ SAS

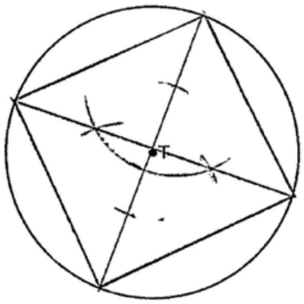
PTS: 4 REF: 011634geo NAT: G.CO.12 TOP: Constructions

3 ANS:



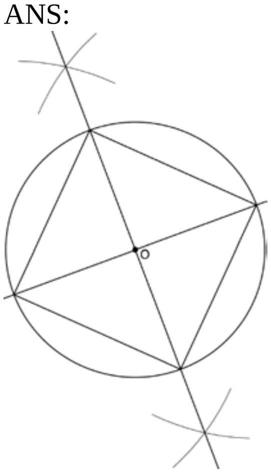
PTS: 2 REF: 081526geo NAT: G.CO.13 TOP: Constructions

4 ANS:



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

5 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.13 TOP: Constructions

6 ANS: 4

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

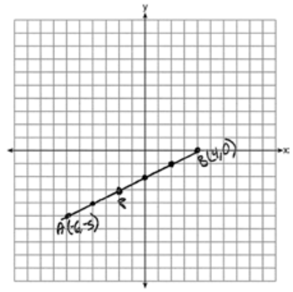
$$-5+\frac{3}{5}(10) \quad -4+\frac{3}{5}(5)$$

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

$$1 \quad -1$$

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

7 ANS:



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

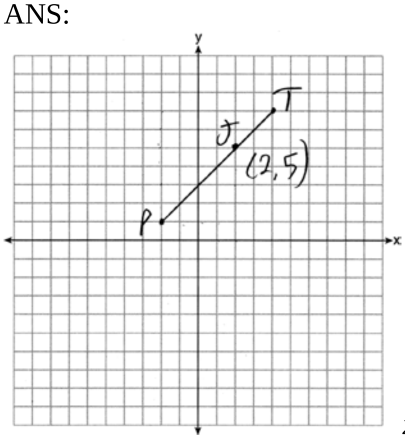
$-6+\frac{2}{5}(10)$ $-5+\frac{2}{5}(5)$

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

-2 -3

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

8 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.6 TOP: Directed Line Segments

9 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.6 TOP: Directed Line Segments

10 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.5 TOP: Parallel and Perpendicular Lines

11 ANS: 1

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

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

PTS: 2 REF: 061509geo NAT: G.GPE.5 TOP: Parallel and Perpendicular Lines

12 ANS: 4

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

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

$-16 = b$

PTS: 2 REF: 011602geo NAT: G.GPE.5 TOP: Parallel and Perpendicular Lines

13 ANS: 1 PTS: 2 REF: 011606geo NAT: G.CO.9
TOP: Bisectors, Parallel Lines and Transversals

14 ANS: 1

Alternate interior angles

PTS: 2 REF: 061517geo NAT: G.CO.9
TOP: Bisectors, Parallel Lines and Transversals

15 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.9
TOP: Bisectors, Parallel Lines and Transversals

16 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.10 TOP: Interior and Exterior Angles of Triangles

17 ANS:

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

$x \approx 36.6$

PTS: 4 REF: 011632geo NAT: G.SRT.8 TOP: Pythagorean Theorem

18 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.5 TOP: Isosceles Triangles

19 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.5 TOP: Side Splitter Theorem

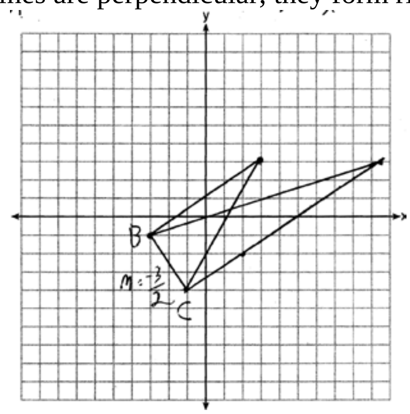
20 ANS: 1

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

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

21 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 $-4 = \frac{2}{3}(-1) + b$

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

$-1 = -2 + b$

$1 = b$

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

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

$3 = x$

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

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

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

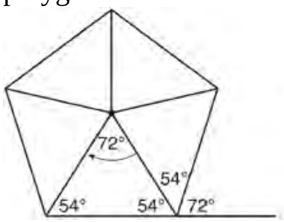
$9 = 2x - 10$

$19 = 2x$

$9.5 = x$

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

22 ANS: 2
Segments drawn from the center of the regular pentagon bisect each angle of the pentagon, and create five isosceles triangles as shown in the diagram below. Since each exterior angle equals the angles formed by the segments drawn from the center of the regular pentagon, the minimum degrees necessary to carry a regular polygon onto itself are equal to the measure of an exterior angle of the regular polygon.



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

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

23 ANS: 1
$\frac{360°}{45°} = 8$

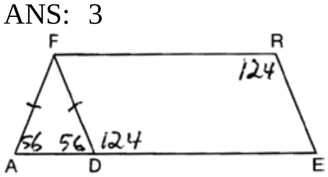
PTS: 2 REF: 061510geo NAT: G.CO.3 TOP: Mapping a Polygon onto Itself

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

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

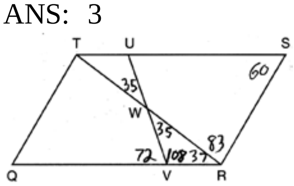
26 ANS: 4 PTS: 2 REF: 061513geo NAT: G.CO.11
TOP: Parallelograms

27 ANS: 3



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

28 ANS: 3



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

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

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

30 ANS: 2
$\sqrt{(-1-2)^2 + (4-3)^2} = \sqrt{10}$

PTS: 2 REF: 011615geo NAT: G.GPE.7 TOP: Polygons in the Coordinate Plane

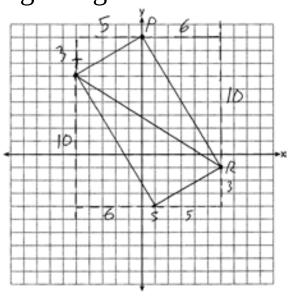
31 ANS: 4

$$\frac{-2-1}{-1--3}=\frac{-3}{2}\quad \frac{3-2}{0-5}=\frac{1}{-5}\quad \frac{3-1}{0--3}=\frac{2}{3}\quad \frac{2--2}{5--1}=\frac{4}{6}=\frac{2}{3}$$

PTS: 2 REF: 081522geo NAT: G.GPE.4 TOP: Polygons in the Coordinate Plane

32 ANS:

$m_{\overline{TS}}=\dfrac{-10}{6}=-\dfrac{5}{3}$ $m_{\overline{SR}}=\dfrac{3}{5}$ Since the slopes of $\overline{TS}$ and $\overline{SR}$ are opposite reciprocals, they are perpendicular and form a right angle. $\triangle RST$ is a right triangle because $\angle S$ is a right angle. $P(0,9)$ $m_{\overline{RP}}=\dfrac{-10}{6}=-\dfrac{5}{3}$ $m_{\overline{PT}}=\dfrac{3}{5}$ Since the slopes of all four adjacent sides ($\overline{TS}$ and $\overline{SR}$, $\overline{SR}$ and $\overline{RP}$, $\overline{PT}$ and $\overline{TS}$, $\overline{RP}$ and $\overline{PT}$) are opposite reciprocals, they are perpendicular and form right angles. Quadrilateral *RSTP* is a rectangle because it has four right angles.



PTS: 6 REF: 061536geo NAT: G.GPE.4 TOP: Polygons in the Coordinate Plane

33 ANS:

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

PTS: 4 REF: fall1411geo NAT: G.GPE.4 TOP: Polygons in the Coordinate Plane

34 ANS: 3

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

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

35 ANS: 3

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

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

36 ANS:

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

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

37 ANS: 3

$$\frac{x}{360}\cdot 3^2\pi = 2\pi$$
$$x = 80$$

PTS: 2 REF: 011612geo NAT: G.C.5 TOP: Sectors

38 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.5 TOP: Sectors

39 ANS: 1

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

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

40 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.1 TOP: Properties of Circles

41 ANS: 3

$$r = \sqrt{(7-3)^2+(1--2)^2} = \sqrt{16+9} = 5$$

PTS: 2 REF: 061503geo NAT: G.GPE.4 TOP: Properties of Circles

42 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.1 TOP: Properties of Circles

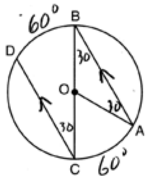
43 ANS: 3 PTS: 2 REF: 011621geo NAT: G.C.2
TOP: Chords, Secants and Tangents

44 ANS: 3

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

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

45 ANS:



$180 - 2(30) = 120$

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

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

47 ANS: 1 PTS: 2 REF: 061508geo NAT: G.SRT.5
TOP: Chords, Secants and Tangents

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

49 ANS: 2

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

PTS: 2 REF: 081511geo NAT: G.SRT.8 TOP: Inscribed Quadrilaterals

50 ANS: 3

$$\begin{aligned} x^2 + 4x + 4 + y^2 - 6y + 9 &= 12 + 4 + 9 \\ (x+2)^2 + (y-3)^2 &= 25 \end{aligned}$$

PTS: 2 REF: 081509geo NAT: G.GPE.1 TOP: Equations of Circles

51 ANS: 2

$$\begin{aligned} x^2 + y^2 + 6y + 9 &= 7 + 9 \\ x^2 + (y+3)^2 &= 16 \end{aligned}$$

PTS: 2 REF: 061514geo NAT: G.GPE.1 TOP: Equations of Circles

52 ANS: 4

$$\begin{aligned} x^2 + 6x + 9 + y^2 - 4y + 4 &= 23 + 9 + 4 \\ (x+3)^2 + (y-2)^2 &= 36 \end{aligned}$$

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

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

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

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

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

57 ANS: 2

$14 \times 16 \times 10 = 2240 \quad \frac{2240 - 1680}{2240} = 0.25$

PTS: 2 REF: 011604geo NAT: G.GMD.3 TOP: Volume

58 ANS: 4

$$2592276 = \frac{1}{3} \cdot s^2 \cdot 146.5$$

$$230 \approx s$$

PTS: 2 REF: 081521geo NAT: G.GMD.3 TOP: Volume

59 ANS: 2

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

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

60 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.1 TOP: Volume

61 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.1 TOP: Cavalieri’s Principle

62 ANS: 2

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

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

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

63 ANS:

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

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

64 ANS: 3

$V = 12 \cdot 8.5 \cdot 4 = 408$

$W = 408 \cdot 0.25 = 102$

PTS: 2 REF: 061507geo NAT: G.MG.2 TOP: Density

65 ANS:

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

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

66 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.2 TOP: Density

67 ANS:

$r = 25\text{ cm}\left(\frac{1\text{ m}}{100\text{ cm}}\right) = 0.25\text{ m}$ $V = \pi(0.25\text{ m})^2(10\text{ m}) = 0.625\pi\text{ m}^3$ $W = 0.625\pi\text{ m}^3\left(\frac{380\text{ K}}{1\text{ m}^3}\right) \approx 746.1\,K$

$$n = \frac{\$50,000}{\left(\frac{\$4.75}{\text{K}}\right)(746.1\text{ K})} = 14.1 \quad 15\text{ trees}$$

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

68 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.2 TOP: Density

69 ANS: 2

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

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

70 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.2 TOP: Density

71 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.2 TOP: Density

72 ANS: 4 PTS: 2 REF: 081506geo NAT: G.SRT.2
TOP: Triangle Similarity

73 ANS: 4 PTS: 2 REF: 081514geo NAT: G.SRT.2
TOP: Triangle Similarity

74 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.2 TOP: Triangle Similarity

75 ANS: 2 PTS: 2 REF: 081519geo NAT: G.SRT.5
TOP: Triangle Similarity

76 ANS: 3

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

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

$90 = 90$

PTS: 2 REF: 061515geo NAT: G.SRT.5 TOP: Triangle Similarity

77 ANS: 3

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

$x = 15$

PTS: 2 REF: 011624geo NAT: G.SRT.5 TOP: Triangle Similarity

78 ANS:

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

$126 = 126$

PTS: 2 REF: 081529geo NAT: G.SRT.5 TOP: Triangle Similarity

79 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.5 TOP: Triangle Similarity

80 ANS: 4

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

PTS: 2 REF: 061521geo NAT: G.SRT.5 TOP: Triangle Similarity

81 ANS: 1

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

PTS: 2 REF: 011613geo NAT: G.SRT.5 TOP: Triangle Similarity

82 ANS: 4

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

PTS: 2 REF: 081517geo NAT: G.SRT.5 TOP: Triangle Similarity

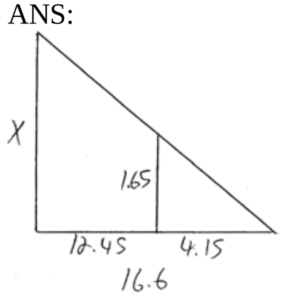
83 ANS:

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

$$x=164$$

PTS: 2 REF: 081527geo NAT: G.SRT.5 TOP: Triangle Similarity

84 ANS:



$$\frac{1.65}{4.15}=\frac{x}{16.6}$$

$$4.15x=27.39$$

$$x=6.6$$

PTS: 2 REF: 061531geo NAT: G.SRT.5 TOP: Triangle Similarity

85 ANS: 2

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

PTS: 2 REF: 011622geo NAT: G.SRT.5 TOP: Right Triangle Similarity

86 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.5 TOP: Right Triangle Similarity

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

88 ANS: 2 PTS: 2 REF: 011610geo NAT: G.SRT.1
TOP: Line Dilations

89 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.1 TOP: Line Dilations

90 ANS: 2
The line $y=2x-4$ does not pass through the center of dilation, so the dilated line will be distinct from $y=2x-4$. Since a dilation preserves parallelism, the line $y=2x-4$ and its image will be parallel, with slopes of 2. To obtain the y-intercept of the dilated line, the scale factor of the dilation, $\frac{3}{2}$, can be applied to the y-intercept, $(0,4)$. Therefore, $\left(0\cdot\frac{3}{2},-4\cdot\frac{3}{2}\right)\rightarrow(0,-6)$. So the equation of the dilated line is $y=2x-6$.

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

91 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.1 TOP: Line Dilations

92 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.1 TOP: Line Dilations

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

$m: y=3x-8$

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

94 ANS: 2 PTS: 2 REF: 061516geo NAT: G.SRT.2
TOP: Polygon Dilations

95 ANS: 1

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

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

96 ANS: 1

$3^2=9$

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

97 ANS: 2 PTS: 2 REF: 081513geo NAT: G.CO.5
TOP: Identifying Transformations

98 ANS: 1 PTS: 2 REF: 011608geo NAT: G.CO.5
TOP: Identifying Transformations

99 ANS: 1 PTS: 2 REF: 081507geo NAT: G.CO.5
TOP: Identifying Transformations

100 ANS: 4 PTS: 2 REF: 061504geo NAT: G.CO.5
TOP: Identifying Transformations

101 ANS: 4 PTS: 2 REF: 011611geo NAT: G.CO.6
TOP: Properties of Transformations

102 ANS: 3 PTS: 2 REF: 011605geo NAT: G.CO.6
TOP: Properties of Transformations

103 ANS: 3 PTS: 2 REF: 081502geo NAT: G.CO.6
TOP: Properties of Transformations

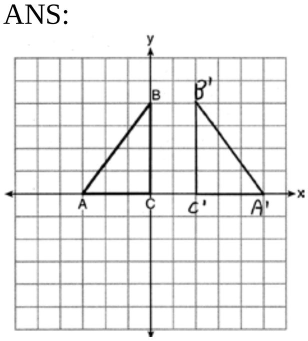
104 ANS: 4 PTS: 2 REF: 061502geo NAT: G.CO.6
TOP: Properties of Transformations

105 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.6 TOP: Properties of Transformations

106 ANS:



PTS: 2 REF: 011625geo NAT: G.CO.6 TOP: Properties of Transformations

107 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.6 TOP: Properties of Transformations

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

PTS: 2 REF: 081530geo NAT: G.CO.6 TOP: Properties of Transformations

109 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.6 TOP: Properties of Transformations

110 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.6 TOP: Properties of Transformations

111 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.6 TOP: Properties of Transformations

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

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

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

115 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.7 TOP: Cofunctions

116 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.7 TOP: Cofunctions

117 ANS: 3

$\tan 34 = \frac{T}{20}$

$T \approx 13.5$

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

118 ANS:

$\sin 70 = \frac{30}{L}$

$L \approx 32$

PTS: 2 REF: 011629geo NAT: G.SRT.8 TOP: Using Trigonometry to Find a Side

119 ANS:

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

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

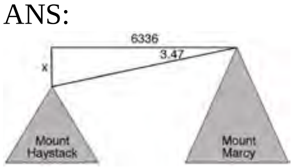
PTS: 4 REF: 081532geo NAT: G.SRT.8 TOP: Using Trigonometry to Find a Side

120 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.8 TOP: Using Trigonometry to Find a Side

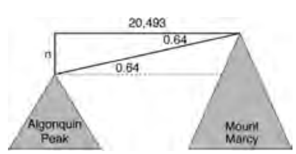
121 ANS:



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

$M \approx 384$

$4960 + 384 = 5344$



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

$A \approx 229$

$5344 - 229 = 5115$

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

122 ANS:

$$\tan 52.8 = \frac{h}{x} \qquad x\tan 52.8 = x\tan 34.9 + 8\tan 34.9 \qquad \tan 52.8 \approx \frac{h}{9} \qquad 11.86 + 1.7 \approx 13.6$$

$$h = x\tan 52.8 \qquad x\tan 52.8 - x\tan 34.9 = 8\tan 34.9 \qquad x \approx 11.86$$

$$\tan 34.9 = \frac{h}{x+8} \qquad x(\tan 52.8 - \tan 34.9) = 8\tan 34.9$$

$$h = (x+8)\tan 34.9 \qquad x = \frac{8\tan 34.9}{\tan 52.8 - \tan 34.9}$$

$$x \approx 9$$

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

123 ANS: 3

$$\cos A = \frac{9}{14}$$

$$A \approx 50°$$

PTS: 2 REF: 011616geo NAT: G.SRT.8 TOP: Using Trigonometry to Find an Angle

124 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. $\tan x = \dfrac{69}{102}$

$$x \approx 34.1$$

PTS: 2 REF: fall1401geo NAT: G.SRT.8 TOP: Using Trigonometry to Find an Angle

125 ANS:

$$\sin x = \frac{4.5}{11.75}$$

$$x \approx 23$$

PTS: 2 REF: 061528geo NAT: G.SRT.8 TOP: Using Trigonometry to Find an Angle

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

TOP: Triangle Congruency

127 ANS:

Reflections are rigid motions that preserve distance.

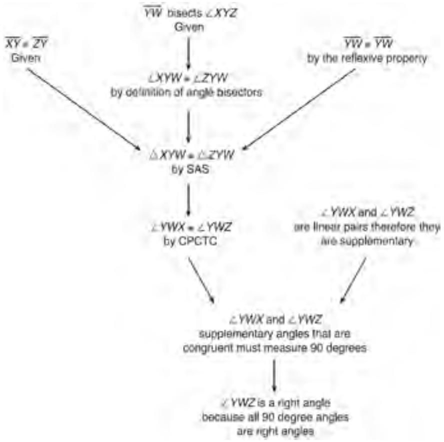
PTS: 2 REF: 061530geo NAT: G.CO.7 TOP: Triangle Congruency

128 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.10 TOP: Triangle Proofs

129 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.10 TOP: Triangle Proofs

130 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.4 TOP: Triangle Proofs

131 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.11 TOP: Quadrilateral Proofs

132 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.11 TOP: Quadrilateral Proofs

133 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.11 TOP: Quadrilateral Proofs

134 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.11 TOP: Quadrilateral Proofs

135 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.4 TOP: Circle Proofs