Geometry CCSS Regents Exam 0120
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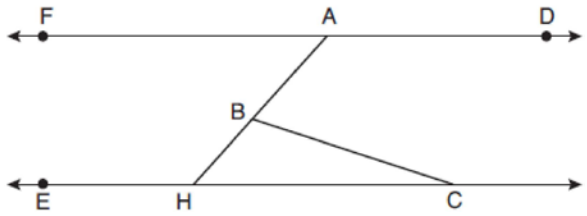
0120geo

1 In the diagram below, $\overline{FAD} \parallel \overline{EHC}$, and $\overline{ABH}$ and $\overline{BC}$ are drawn.



If $m\angle FAB = 48°$ and $m\angle ECB = 18°$, what is $m\angle ABC$?
1) 18º 2) 48º 3) 66º 4) 114º

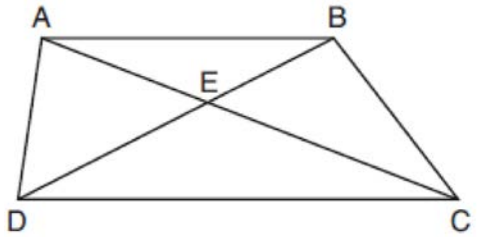
2 A cone has a volume of 108π and a base diameter of 12. What is the height of the cone?
1) 27 2) 9 3) 3 4) 4

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

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

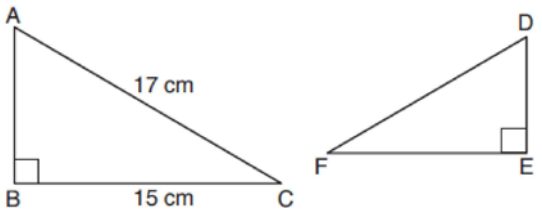
5 The endpoints of directed line segment PQ have coordinates of $P(-7,-5)$ and $Q(5,3)$. What are the coordinates of point A, on $\overline{PQ}$, that divide $\overline{PQ}$ into a ratio of 1:3?
1) $A(-1,-1)$ 2) $A(2,1)$ 3) $A(3,2)$ 4) $A(-4,-3)$

6 In trapezoid $ABCD$ below, $\overline{AB} \parallel \overline{CD}$.



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

7 Kayla was cutting right triangles from wood to use for an art project. Two of the right triangles she cut are shown below.



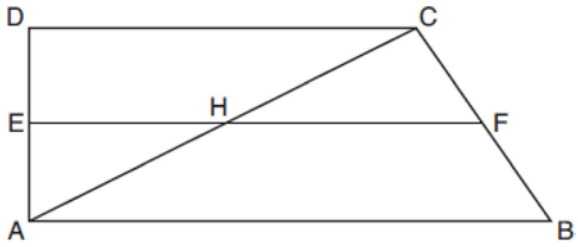
If $\triangle ABC \sim \triangle DEF$, with right angles B and E, $BC = 15$ cm, and $AC = 17$ cm, what is the measure of $\angle F$, to the *nearest degree*?

1) 28° 2) 41° 3) 62° 4) 88°

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

1) $k = \frac{1}{2}$ 2) $k = 2$ 3) $k = \frac{1}{4}$ 4) $k = 4$

9 In quadrilateral $ABCD$ below, $\overline{AB} \parallel \overline{CD}$, and E, H, and F are the midpoints of $\overline{AD}$, $\overline{AC}$, and $\overline{BC}$, respectively.



If $AB = 24$, $CD = 18$, and $AH = 10$, then FH is

1) 9 2) 10 3) 12 4) 21

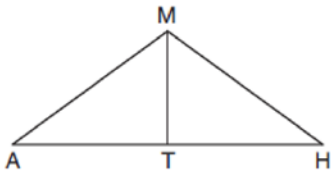
10 Jaden is comparing two cones. The radius of the base of cone A is twice as large as the radius of the base of cone B. The height of cone B is twice the height of cone A. The volume of cone A is

1) twice the volume of cone B 2) four times the volume of cone B 3) equal to the volume of cone B
4) equal to half the volume of cone B

11 A regular hexagon is rotated about its center. Which degree measure will carry the regular hexagon onto itself?

1) 45° 2) 90° 3) 120° 4) 135°

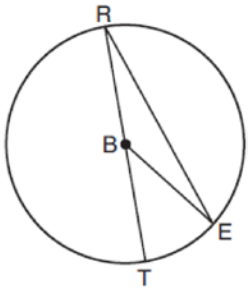
12 In triangle MAH below, $\overline{MT}$ is the perpendicular bisector of $\overline{AH}$.



Which statement is *not* always true?

1) $\triangle MAH$ is isosceles. 2) $\triangle MAT$ is isosceles. 3) $\overline{MT}$ bisects $\angle AMH$. 4) $\angle A$ and $\angle TMH$ are complementary.

13 In circle B below, diameter $\overline{RT}$, radius $\overline{BE}$, and chord $\overline{RE}$ are drawn.



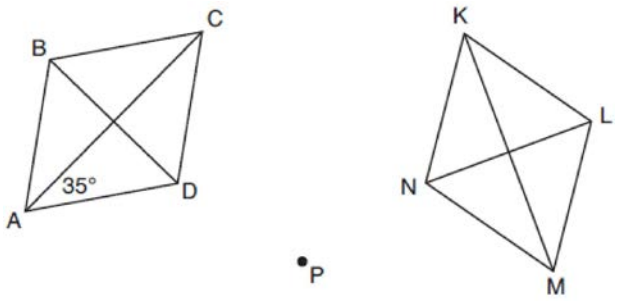
If m$\angle TRE = 15°$ and $BE = 9$, then the area of sector EBR is

1) 3.375π 2) 6.75π 3) 33.75π 4) 37.125π

14 Lou has a solid clay brick in the shape of a rectangular prism with a length of 8 inches, a width of 3.5 inches, and a height of 2.25 inches. If the clay weighs 1.055 oz/in^3, how much does Lou's brick weigh, to the *nearest ounce*?

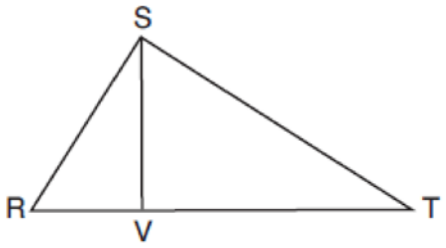
1) 66 2) 64 3) 63 4) 60

15 Rhombus *ABCD* can be mapped onto rhombus *KLMN* by a rotation about point *P*, as shown below.



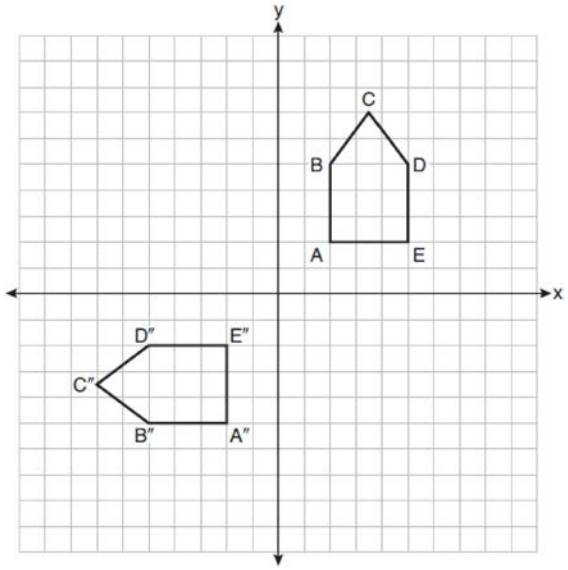
What is the measure of $\angle KNM$ if the measure of $\angle CAD = 35$?
1) 35° 2) 55° 3) 70° 4) 110°

16 In right triangle *RST* below, altitude $\overline{SV}$ is drawn to hypotenuse $\overline{RT}$.



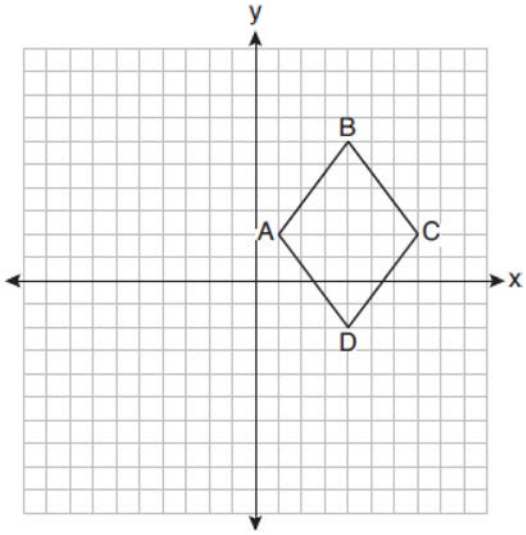
If $RV = 4.1$ and $TV = 10.2$, what is the length of $\overline{ST}$, to the *nearest tenth*?
1) 6.5 2) 7.7 3) 11.0 4) 12.1

17 On the set of axes below, pentagon *ABCDE* is congruent to *A″B″C″D″E″*.



Which describes a sequence of rigid motions that maps *ABCDE* onto *A″B″C″D″E″*?
1) a rotation of 90° counterclockwise about the origin followed by a reflection over the *x*-axis 2) a rotation of 90° counterclockwise about the origin followed by a translation down 7 units 3) a reflection over the *y*-axis followed by a reflection over the *x*-axis 4) a reflection over the *x*-axis followed by a rotation of 90° counterclockwise about the origin

18 On the set of axes below, rhombus *ABCD* has vertices whose coordinates are *A*(1,2), *B*(4,6), *C*(7,2), and *D*(4,–2).



What is the area of rhombus *ABCD*?
1) 20 2) 24 3) 25 4) 48

19 Which figure(s) below can have a triangle as a two-dimensional cross section?

I. cone
II. cylinder
III. cube
IV. square pyramid

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

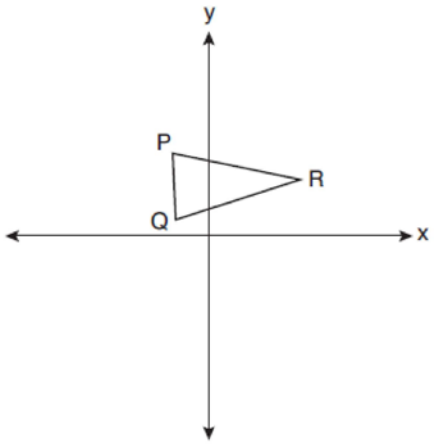
20 What is an equation of a circle whose center is at $(2,-4)$ and is tangent to the line $x = -2$?

1) $(x-2)^2+(y+4)^2=4$ 2) $(x-2)^2+(y+4)^2=16$ 3) $(x+2)^2+(y-4)^2=4$ 4) $(x+2)^2+(y-4)^2=16$

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

1) 11° 2) 13° 3) 44° 4) 52°

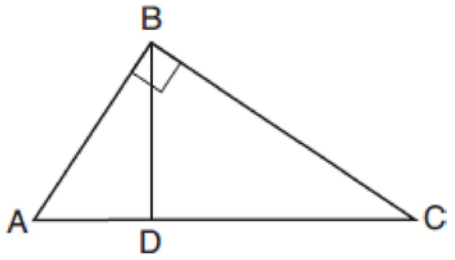
22 Triangle *PQR* is shown on the set of axes below.



Which quadrant will contain point *R″*, the image of point *R*, after a 90° clockwise rotation centered at $(0,0)$ followed by a reflection over the *x*-axis?

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

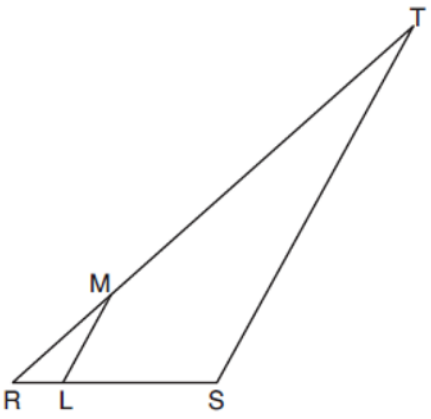
23 In the diagram below of right triangle ABC, altitude $\overline{BD}$ is drawn.



Which ratio is always equivalent to $\cos A$?

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

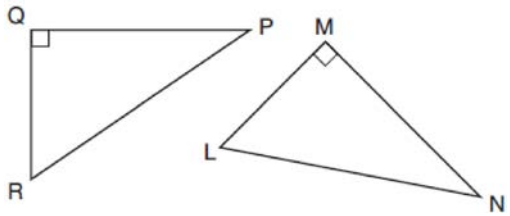
24 In the diagram below of $\triangle RST$, L is a point on $\overline{RS}$, and M is a point on $\overline{RT}$, such that $LM \parallel ST$.



If $RL = 2$, $LS = 6$, $LM = 4$, and $ST = x + 2$, what is the length of $\overline{ST}$?

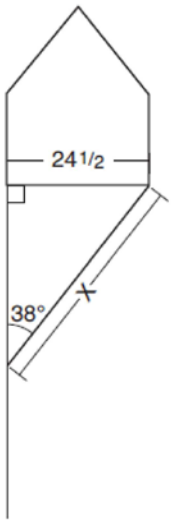
1) 10 2) 12 3) 14 4) 16

25 In the diagram below, right triangle PQR is transformed by a sequence of rigid motions that maps it onto right triangle NML.



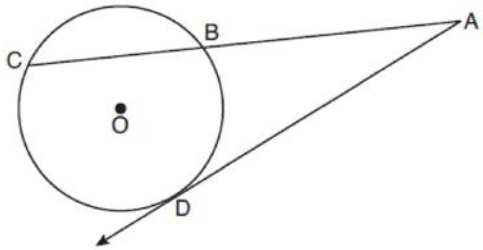
Write a set of three congruency statements that would show ASA congruency for these triangles.

26 Diego needs to install a support beam to hold up his new birdhouse, as modeled below. The base of the birdhouse is $24\frac{1}{2}$ inches long. The support beam will form an angle of 38° with the vertical post. Determine and state the approximate length of the support beam, x, to the *nearest inch*.



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

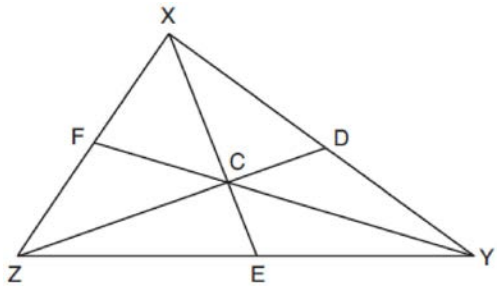
28 In the diagram below of circle O, secant $\overline{ABC}$ and tangent $\overline{AD}$ are drawn.



If $CA = 12.5$ and $CB = 4.5$, determine and state the length of $\overline{DA}$.

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

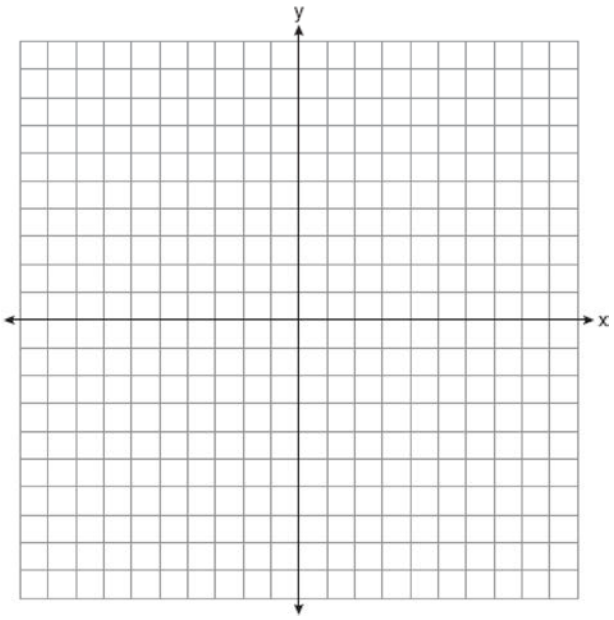
30 In $\triangle XYZ$, shown below, medians $\overline{XE}$, $\overline{YF}$, and $\overline{ZD}$ intersect at C.



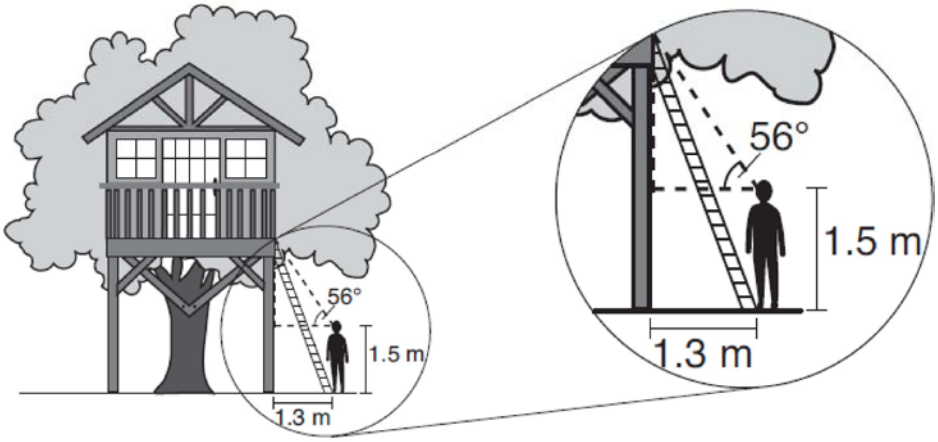
If $CE = 5$, $YF = 21$, and $XZ = 15$, determine and state the perimeter of triangle CFX.

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

32 Quadrilateral *NATS* has coordinates $N(-4,-3)$, $A(1,2)$, $T(8,1)$, and $S(3,-4)$. Prove quadrilateral *NATS* is a rhombus. [The use of the set of axes below is optional.]

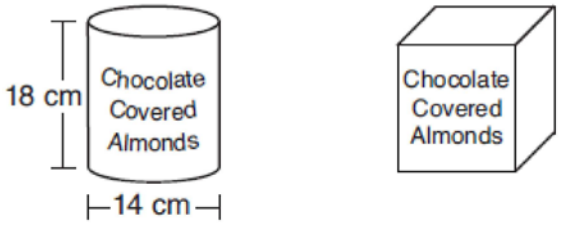


33 David has just finished building his treehouse and still needs to buy a ladder to be attached to the ledge of the treehouse and anchored at a point on the ground, as modeled below. David is standing 1.3 meters from the stilt supporting the treehouse. This is the point on the ground where he has decided to anchor the ladder. The angle of elevation from his eye level to the bottom of the treehouse is 56 degrees. David's eye level is 1.5 meters above the ground.



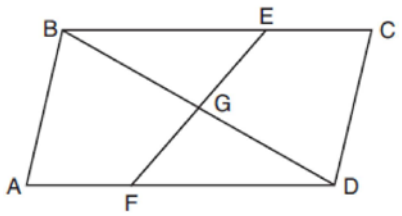
Determine and state the minimum length of a ladder, to the *nearest tenth of a meter*, that David will need to buy for his treehouse.

34 A manufacturer is designing a new container for their chocolate-covered almonds. Their original container was a cylinder with a height of 18 cm and a diameter of 14 cm. The new container can be modeled by a rectangular prism with a square base and will contain the same amount of chocolate-covered almonds.



If the new container's height is 16 cm, determine and state, to the *nearest tenth of a centimeter*, the side length of the new container if both containers contain the same amount of almonds. A store owner who sells the chocolate-covered almonds displays them on a shelf whose dimensions are 80 cm long and 60 cm wide. The shelf can only hold one layer of new containers when each new container sits on its square base. Determine and state the maximum number of new containers the store owner can fit on the shelf.

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



Prove: $\overline{FG} \cong \overline{EG}$

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Answer Section

1 ANS: 3
$180 - (48 + 66) = 180 - 114 = 66$

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

2 ANS: 2

$$108\pi = \frac{6^2 \pi h}{3}$$

$$\frac{324\pi}{36\pi} = h$$

$$9 = h$$

PTS: 2 REF: 012002geo NAT: G.GMD.A.3 TOP: Volume
KEY: cones

3 ANS: 2 PTS: 2 REF: 012003geo NAT: G.SRT.B.5
TOP: Similarity KEY: basic

4 ANS: 1 PTS: 2 REF: 012004geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

5 ANS: 4
$-7 + \frac{1}{4}(5 - -7) = -7 + \frac{1}{4}(12) = -7 + 3 = -4$ $-5 + \frac{1}{4}(3 - -5) = -5 + \frac{1}{4}(8) = -5 + 2 = -3$

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

6 ANS: 3

$$\frac{6.5}{10.5} = \frac{5.2}{x}$$

$$x = 8.4$$

PTS: 2 REF: 012006geo NAT: G.CO.C.11 TOP: Trapezoids

7 ANS: 1

$$\cos C = \frac{15}{17}$$

$$C \approx 28$$

PTS: 2 REF: 012007geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

8 ANS: 1
$y = \frac{1}{2}x + 4$ $\frac{2}{4} = \frac{1}{2}$

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

PTS: 2 REF: 012008geo NAT: G.SRT.A.1 TOP: Line Dilations

9 ANS: 3

$\frac{1}{2} \times 24 = 12$

PTS: 2 REF: 012009geo NAT: G.CO.C.10 TOP: Midsegments

10 ANS: 1

$\frac{\frac{1}{3}\pi(2)^2\left(\frac{1}{2}\right)}{\frac{1}{3}\pi(1)^2(1)} = 2$

PTS: 2 REF: 012010geo NAT: G.GMD.A.3 TOP: Volume
KEY: cones

11 ANS: 3

$(6-2)180 = 720 \quad \frac{720}{6} = 120$

PTS: 2 REF: 012011geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

12 ANS: 2 PTS: 2 REF: 012012geo NAT: G.CO.C.10
TOP: Medians, Altitudes and Bisectors

13 ANS: 3

$\frac{150}{360} \cdot 9^2\pi = 33.75\pi$

PTS: 2 REF: 012013geo NAT: G.C.B.5 TOP: Sectors

14 ANS: 1

$8 \times 3.5 \times 2.25 \times 1.055 = 66.465$

PTS: 2 REF: 012014geo NAT: G.MG.A.2 TOP: Density

15 ANS: 4

$90 - 35 = 55 \quad 55 \times 2 = 110$

PTS: 2 REF: 012015geo NAT: G.CO.B.6 TOP: Properties of Transformations
KEY: basic

16 ANS: 4

$x^2 = 10.2 \times 14.3$

$x \approx 12.1$

PTS: 2 REF: 012016geo NAT: G.SRT.B.5 TOP: Similarity
KEY: leg

17 ANS: 2 PTS: 1 REF: 012017geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify

18 ANS: 2

Create two congruent triangles by drawing $\overline{BD}$, which has a length of 8. Each triangle has an area of $\frac{1}{2}(8)(3) = 12$.

PTS: 2 REF: 012018geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

19 ANS: 4 PTS: 2 REF: 012019geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

20 ANS: 2

The line $x = -2$ will be tangent to the circle at $(-2,-4)$. A segment connecting this point and $(2,-4)$ is a radius of the circle with length 4.

PTS: 2 REF: 012020geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: other

21 ANS: 3

$4x + 3x + 13 = 90$ $4(11) < 3(11) + 13$

$7x = 77$ $44 < 46$

$x = 11$

PTS: 2 REF: 012021geo NAT: G.SRT.C.7 TOP: Cofunctions

22 ANS: 1 PTS: 2 REF: 012022geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids

23 ANS: 2

$\triangle ABC \sim \triangle BDC$

$\cos A = \frac{AB}{AC} = \frac{BD}{BC}$

PTS: 2 REF: 012023geo NAT: G.SRT.C.6 TOP: Trigonometric Ratios

24 ANS: 4

$\frac{2}{4} = \frac{8}{x+2}$ $14 + 2 = 16$

$2x + 4 = 32$

$x = 14$

PTS: 2 REF: 012024geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

25 ANS:

$\angle Q \cong \angle M$ $\angle P \cong \angle N$ $\overline{QP} \cong \overline{MN}$

PTS: 2 REF: 012025geo NAT: G.CO.B.7 TOP: Triangle Congruency

26 ANS:

$$\sin 38 = \frac{24.5}{x}$$

$$x \approx 40$$

PTS: 2 REF: 012026geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: graphics

27 ANS:

$$8 \times 3 \times \frac{1}{12} \times 43 = 86$$

PTS: 2 REF: 012027geo NAT: G.MG.A.2 TOP: Density

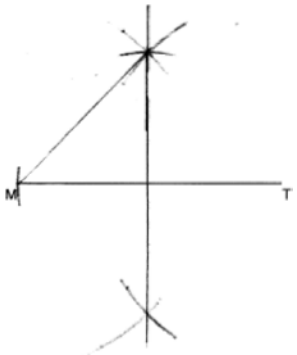
28 ANS:

$$x^2 = 8 \times 12.5$$

$$x = 10$$

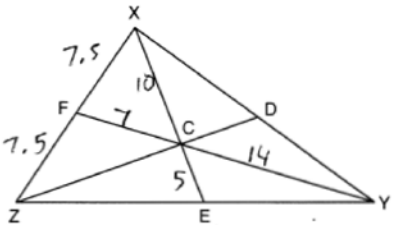
PTS: 2 REF: 012028geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: secant and tangent drawn from common point, length

29 ANS:



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

30 ANS:



$7.5 + 7 + 10 = 24.5$

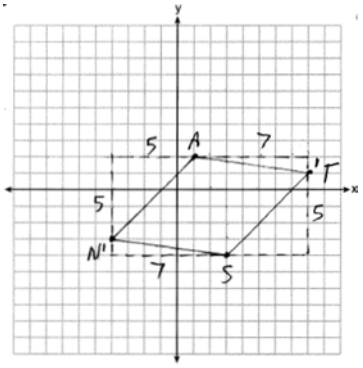
PTS: 2 REF: 012030geo NAT: G.CO.C.10
TOP: Centroid, Orthocenter, Incenter and Circumcenter

31 ANS:

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

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

32 ANS:



$\overline{AN} \cong \overline{AT} \cong \overline{TS} \cong \overline{SN}$ Quadrilateral *NATS* is a rhombus

$\sqrt{5^2 + 5^2} = \sqrt{7^2 + 1^2} = \sqrt{5^2 + 5^2} = \sqrt{7^2 + 1^2}$

$\sqrt{50} = \sqrt{50} = \sqrt{50} = \sqrt{50}$

because all four sides are congruent.

PTS: 4 REF: 012032geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

33 ANS:

$\tan 56 = \frac{x}{1.3}$ $\sqrt{(1.3\tan 56)^2 + 1.5^2} \approx 3.7$

$x = 1.3\tan 56$

PTS: 4 REF: 012033geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: advanced

34 ANS:

$(7^2)18\pi = 16x^2$ $\frac{80}{13.2} \approx 6.1$ $\frac{60}{13.2} \approx 4.5$ $6 \times 4 = 24$

$13.2 \approx x$

PTS: 4 REF: 012034geo NAT: G.GMD.A.3 TOP: Volume
KEY: cylinders

35 ANS:

Quadrilateral *ABCD*, *E* and *F* are points on $\overline{BC}$ and $\overline{AD}$, respectively, and $\overline{BGD}$ and $\overline{EGF}$ are drawn such that $\angle ABG \cong \angle CDG$, $\overline{AB} \cong \overline{CD}$, and $\overline{CE} \cong \overline{AF}$ (given); $\overline{BD} \cong \overline{BD}$ (reflexive); $\triangle ABD \cong \triangle CDB$ (SAS); $\overline{BC} \cong \overline{DA}$ (CPCTC); $\overline{BE} + \overline{CE} \cong \overline{AF} + \overline{DF}$ (segment addition); $\overline{BE} \cong \overline{DF}$ (segment subtraction); $\angle BGE \cong \angle DGF$ (vertical angles are congruent); $\angle CBD \cong \angle ADB$ (CPCTC); $\triangle EBG \cong \triangle FDG$ (AAS); $\overline{FG} \cong \overline{EG}$ (CPCTC).

PTS: 6 REF: 012035geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs