Geometry CCSS Regents Exam 0124
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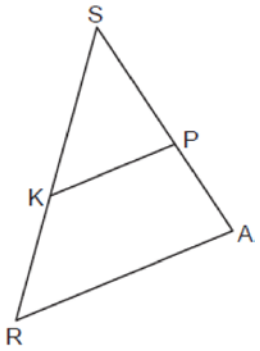
0124geo

1 Which expression is equal to $\sin 30°$?

1) $\tan 30°$
2) $\sin 60°$
3) $\cos 60°$
4) $\cos 30°$

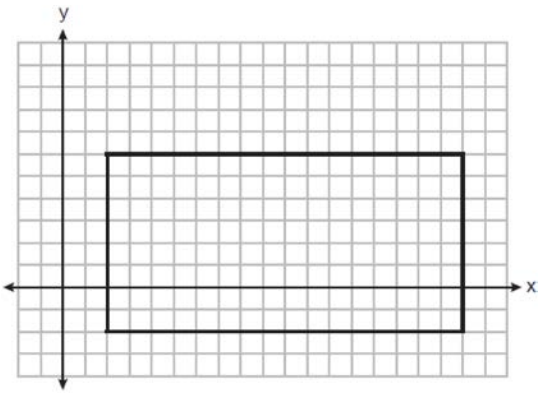
2 In the diagram of $\triangle SRA$ below, $\overline{KP}$ is drawn such that $\angle SKP \cong \angle SRA$.



If $SK = 10$, $SP = 8$, and $PA = 6$, what is the length of $\overline{KR}$, to the *nearest tenth*?

1) 4.8
2) 7.5
3) 8.0
4) 13.3

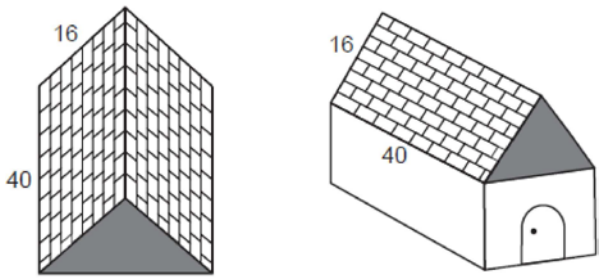
3 A rectangle is graphed on the set of axes below.



A reflection over which line would carry the rectangle onto itself?

1) $y = 2$
2) $y = 10$
3) $y = \frac{1}{2}x - 3$
4) $y = -\frac{1}{2}x + 7$

4 The surface of the roof of a house is modeled by two congruent rectangles with dimensions 40 feet by 16 feet, as shown below.



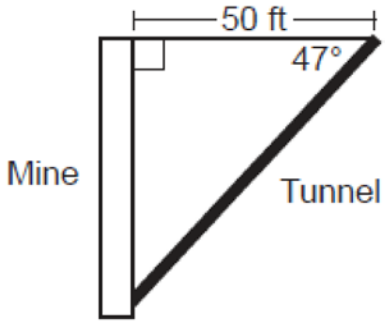
Roofing shingles are sold in bundles. Each bundle covers $33\frac{1}{3}$ square feet. What is the minimum number of bundles that must be purchased to completely cover both rectangular sides of the roof?

1) 20
2) 2
3) 39
4) 4

5 Which equation represents a line that is perpendicular to the line whose equation is $y - 3x = 4$?

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

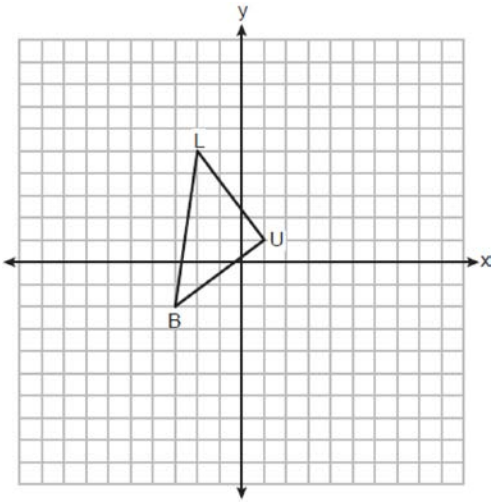
6 A vertical mine shaft is modeled in the diagram below. At a point on the ground 50 feet from the top of the mine, a ventilation tunnel is dug at an angle of 47°.



What is the length of the tunnel, to the *nearest foot*?

1) 47
2) 54
3) 68
4) 73

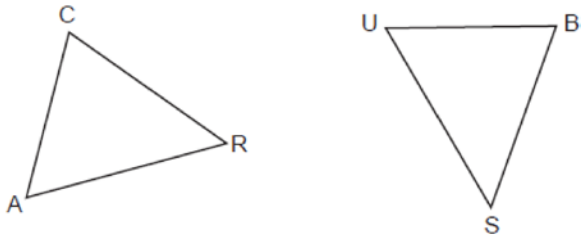
7 On the set of axes below, $\triangle BLU$ has vertices with coordinates $B(-3,-2)$, $L(-2,5)$, and $U(1,1)$.



What is the area of $\triangle BLU$?

1) 11
2) 12.5
3) 14
4) 17.1

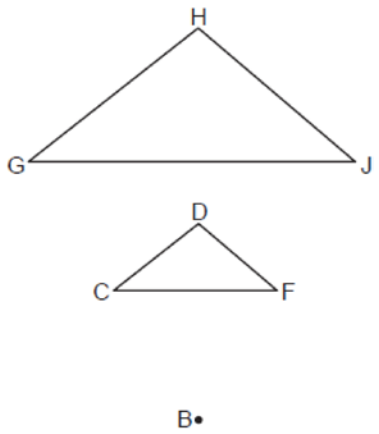
8 In the diagram below, $\triangle CAR$ is mapped onto $\triangle BUS$ after a sequence of rigid motions.



If $AR = 3x + 4$, $RC = 5x - 10$, $CA = 2x + 6$, and $SB = 4x - 4$, what is the length of $\overline{SB}$?

1) 6
2) 16
3) 20
4) 28

9 In the diagram below, $\triangle GHJ$ is dilated by a scale factor of $\frac{1}{2}$ centered at point B to map onto $\triangle CDF$.



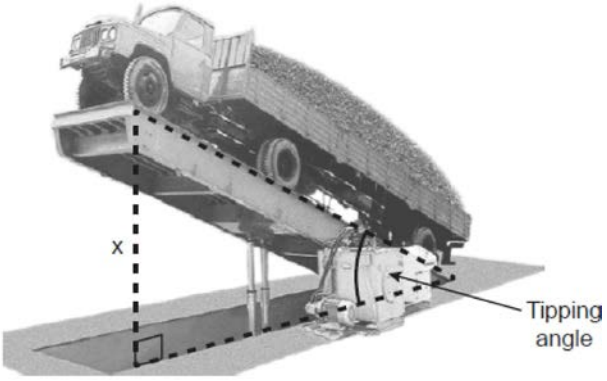
If m$\angle DFC = 40°$, what is m$\angle HJG$?

1) 20º
2) 40º
3) 60º
4) 80º

10 Directed line segment AJ has endpoints whose coordinates are $A(5,7)$ and $J(-10,-8)$. Point E is on $\overline{AJ}$ such that $AE:EJ$ is $2:3$. What are the coordinates of point E?

1) $(1,-1)$
2) $(-5,-3)$
3) $(-4,-2)$
4) $(-1,1)$

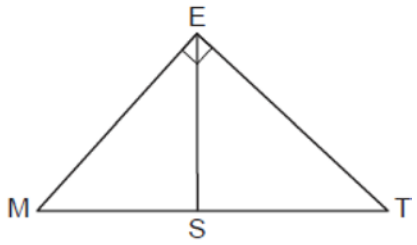
11 A tipping platform is a ramp used to unload trucks, as shown in the diagram below.



The truck is on a 75-foot-long ramp. The ramp is tipped at an angle of 30°. What is the height of the upper end of the ramp, x, to the *nearest tenth of a foot*?

1) 68.7
2) 65.0
3) 43.3
4) 37.5

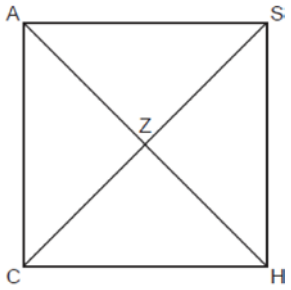
12 In the diagram below of right triangle MET, altitude $\overline{ES}$ is drawn to hypotenuse $\overline{MT}$.



If $ME = 6$ and $SM = 4$, what is MT?

1) 9
2) 8
3) 5
4) 4

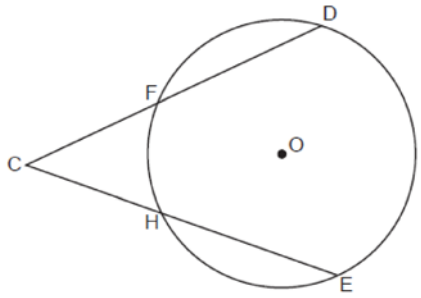
13 In the diagram below of square $CASH$, diagonals $\overline{AH}$ and $\overline{CS}$ intersect at Z.



Which statement is true?

1) $m\angle ACZ > m\angle ZCH$
2) $m\angle ACZ < m\angle ASZ$
3) $m\angle AZC = m\angle SHC$
4) $m\angle AZC = m\angle ZCH$

14 In the diagram below of circle O, secants $\overline{CFD}$ and $\overline{CHE}$ are drawn from external point C.

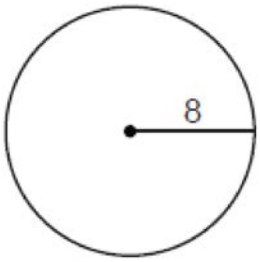


If $m\overset{\frown}{DE} = 136°$ and $m\angle C = 44°$, then $m\overset{\frown}{FH}$ is

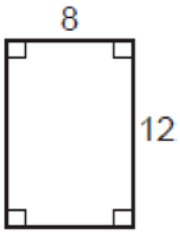
1) 46°
2) 48°
3) 68°
4) 88°

15 A right circular cylinder has a diameter of 8 inches and a height of 12 inches. Which two-dimensional figure shows a cross section that is perpendicular to the base and passes through the center of the base?

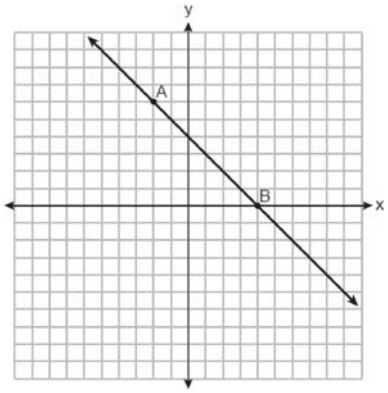
1) 

2) 

3) 

4) 

16 On the set of axes below, $\overleftrightarrow{AB}$ is drawn and passes through $A(-2,6)$ and $B(4,0)$.



If $\overleftrightarrow{CD}$ is the image of $\overleftrightarrow{AB}$ after a dilation with a scale factor of $\frac{1}{2}$ centered at the origin, which equation represents $\overleftrightarrow{CD}$?

1) $y = -x + 4$

2) $y = -x + 2$

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

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

17 In parallelogram $ABCD$ with $\overline{AC} \perp \overline{BD}$, $AC = 12$ and $BD = 16$. What is the perimeter of $ABCD$?

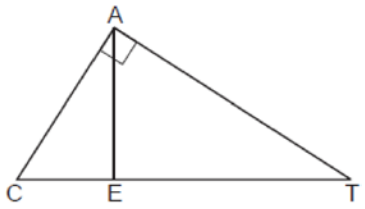
1) 10

2) 24

3) 40

4) 56

18 In the diagram of $\triangle CAT$ below, $m\angle A = 90°$ and altitude $\overline{AE}$ is drawn from vertex A.



Which statement is always true?

1) $\frac{CE}{AE} = \frac{AE}{ET}$
2) $\frac{AE}{CE} = \frac{AE}{ET}$
3) $\frac{AC}{CE} = \frac{AT}{ET}$
4) $\frac{CE}{AC} = \frac{AC}{ET}$

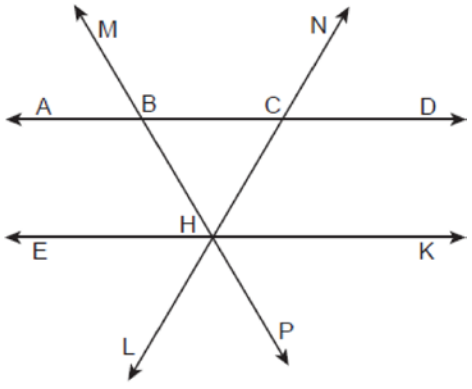
19 A sandbox in the shape of a rectangular prism has a length of 43 inches and a width of 30 inches. Jack uses bags of sand to fill the sandbox to a depth of 9 inches. Each bag of sand has a volume of 0.5 cubic foot. What is the minimum number of bags of sand that must be purchased to fill the sandbox?

1) 14
2) 13
3) 7
4) 4

20 Parallelogram $EATK$ has diagonals $\overline{ET}$ and $\overline{AK}$. Which information is always sufficient to prove $EATK$ is a rhombus?

1) $\overline{EA} \perp \overline{AT}$
2) $\overline{EA} \cong \overline{AT}$
3) $\overline{ET} \cong \overline{AK}$
4) $\overline{ET} \cong \overline{AT}$

21 In the diagram below, $\overleftrightarrow{ABCD} \parallel \overleftrightarrow{EHK}$, and $\overleftrightarrow{MBHP}$ and $\overleftrightarrow{NCHL}$ are drawn such that $\overline{BC} \cong \overline{BH}$.



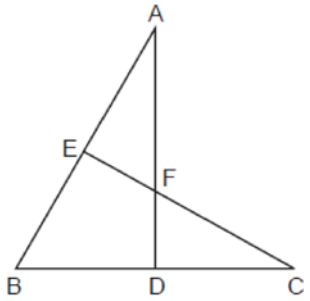
If $m\angle NCD = 62°$, what is $m\angle PHK$?

1) 118°
2) 68°
3) 62°
4) 56°

22 Triangles YEG and POM are two distinct non-right triangles such that $\angle G \cong \angle M$. Which statement is sufficient to prove $\triangle YEG$ is always congruent to $\triangle POM$?

1) $\angle E \cong \angle O$ and $\angle Y \cong \angle P$
2) $\overline{YG} \cong \overline{PM}$ and $\overline{YE} \cong \overline{PO}$
3) There is a sequence of rigid motions that maps $\angle E$ onto $\angle O$ and $\overline{YE}$ onto $\overline{PO}$.
4) There is a sequence of rigid motions that maps point Y onto point P and $\overline{YG}$ onto $\overline{PM}$.

23 In the diagram of triangles ABD and CBE below, sides $\overline{AD}$ and $\overline{CE}$ intersect at F, and $\angle ADB \cong \angle CEB$.



Which statement can *not* be proven?

1) $\triangle ADB \cong \triangle CEB$
2) $\angle EAF \cong \angle DCF$
3) $\triangle ADB \sim \triangle CEB$
4) $\triangle EAF \sim \triangle DCF$

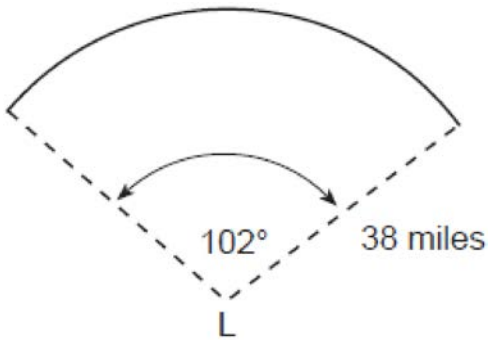
24 A small town is installing a water storage tank in the shape of a cylinder. The tank must be able to hold at least 100,000 gallons of water. The tank must have a height of exactly 30 feet. [1 cubic foot holds 7.48 gallons of water] What should the minimum diameter of the tank be, to the *nearest foot*?

1) 12
2) 24
3) 65
4) 75

25 In isosceles triangle ABC shown below, $\overline{AB} \cong \overline{AC}$, and altitude $\overline{AD}$ is drawn.

The length of $\overline{AD}$ is 12 cm and the length of $\overline{BC}$ is 10 cm. Determine and state, to the *nearest cubic centimeter*, the volume of the solid formed by continuously rotating $\triangle ABC$ about $\overline{AD}$.

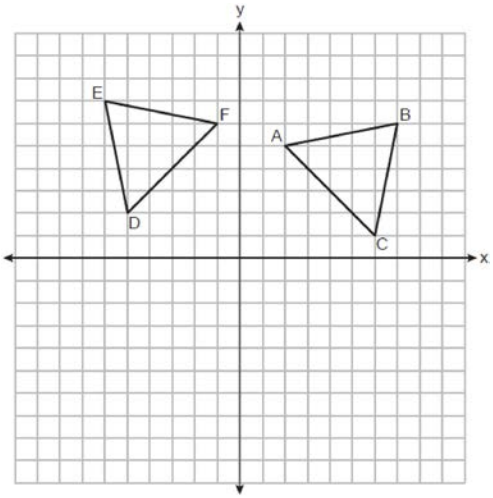
26 The diagram below models the projection of light from a lighthouse, L. The sector has a radius of 38 miles and spans 102°.



Determine and state the area of the sector, to the *nearest square mile*.

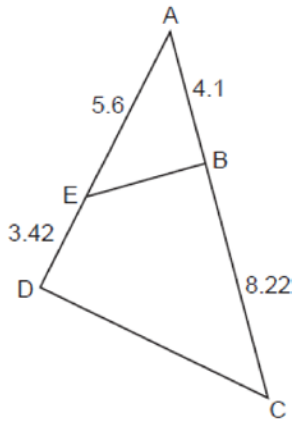
27 Segment CA is drawn below. Using a compass and straightedge, construct isosceles right triangle CAT where $\overline{CA} \perp \overline{CT}$ and $\overline{CA} \cong \overline{CT}$. [Leave all construction marks.]

28 On the set of axes below, congruent triangles ABC and DEF are graphed.



Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle DEF$.

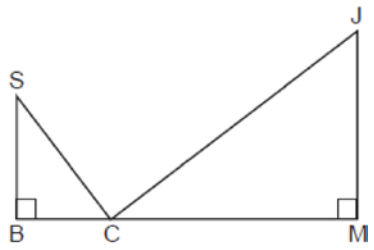
29 In $\triangle ADC$ below, $\overline{EB}$ is drawn such that $AB = 4.1$, $AE = 5.6$, $BC = 8.22$, and $ED = 3.42$.



Is $\triangle ABE$ similar to $\triangle ADC$? Explain why.

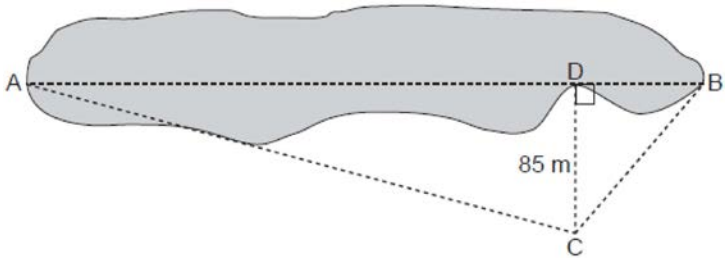
30 Determine and state the coordinates of the center and the length of the radius of the circle represented by the equation $x^2 + 16x + y^2 + 12y - 44 = 0$.

31 In the diagram below, $\triangle SBC \sim \triangle CMJ$ and $\cos J = \frac{3}{5}$.



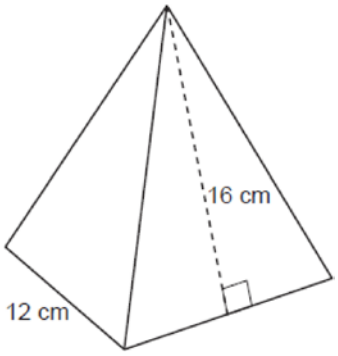
Determine and state $m\angle S$, to the *nearest degree*.

32 Trish is a surveyor who was asked to estimate the distance across a pond. She stands at point C, 85 meters from point D, and locates points A and B on either side of the pond such that A, D, and B are collinear.



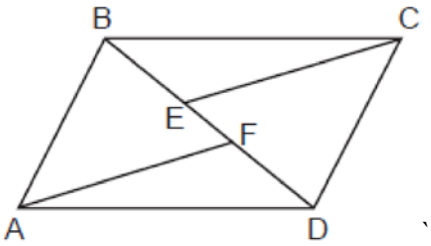
Trish approximates the measure of angle DCB to be 35° and the measure of angle ACD to be 75°. Determine and state the distance across the pond, $\overline{AB}$, to the *nearest meter*.

33 A candle in the shape of a right pyramid is modeled below. Each side of the square base measures 12 centimeters. The slant height of the pyramid measures 16 centimeters.



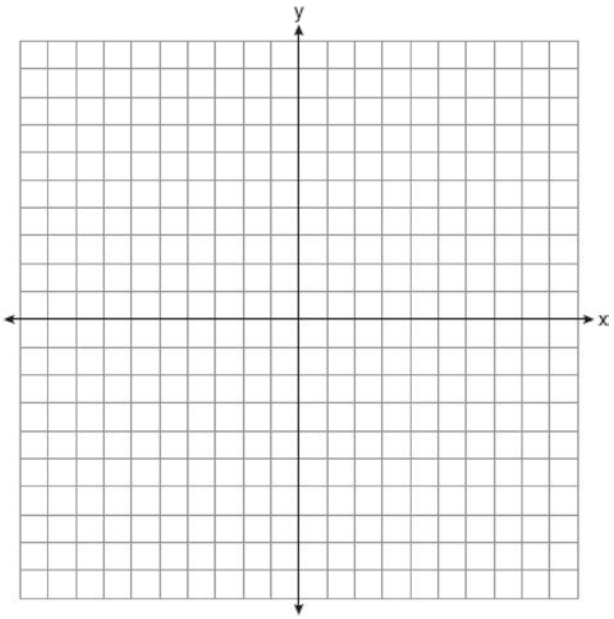
Determine and state the volume of the candle, to the *nearest cubic centimeter*. The wax used to make the candle weighs 0.032 ounce per cubic centimeter. Determine and state the weight of the candle, to the *nearest ounce*.

34 In the diagram of quadrilateral $ABCD$ below, $\overline{AB} \cong \overline{CD}$, and $\overline{AB} \parallel \overline{CD}$. Segments CE and AF are drawn to diagonal $\overline{BD}$ such that $\overline{BE} \cong \overline{DF}$.



Prove: $\overline{CE} \cong \overline{AF}$

35 Quadrilateral $MATH$ has vertices with coordinates $M(-1,7)$, $A(3,5)$, $T(2,-7)$, and $H(-6,-3)$. Prove that quadrilateral $MATH$ is a trapezoid. State the coordinates of point Y such that point A is the midpoint of $\overline{MY}$. Prove that quadrilateral $MYTH$ is a rectangle. [The use of the set of axes below is optional.]



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Answer Section

1 ANS: 3
$90 - 30 = 60$

PTS: 2 REF: 012401geo NAT: G.SRT.C.7 TOP: Cofunctions

2 ANS: 2
$\frac{10}{x} = \frac{8}{6}$

$8x = 60$

$x = 7.5$

PTS: 2 REF: 012402geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

3 ANS: 1 PTS: 2 REF: 012403geo NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself

4 ANS: 3
$2 \times \frac{40 \times 16}{33\frac{1}{3}} = 38.4$

PTS: 2 REF: 012404geo NAT: G.MG.A.3 TOP: Area of Polygons

5 ANS: 1
$y = 3x + 4, m = 3, m_{\perp} = -\frac{1}{3}$

PTS: 2 REF: 012405geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: identify perpendicular lines

6 ANS: 4
$\cos 47 = \frac{50}{x}$

$x \approx 73$

PTS: 2 REF: 012406geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

7 ANS: 2
$7 \times 4 - \frac{1}{2}\left((7)(1) + (3)(4) + (4)(3)\right) = 28 - \frac{7}{2} - 6 - 6 = 12.5$

PTS: 2 REF: 012407geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

8 ANS: 3
$5x - 10 = 4x - 4$ $4(6) - 4 = 20$

$x = 6$

PTS: 2 REF: 012408geo NAT: G.CO.B.6 TOP: Properties of Transformations
KEY: graphics

9 ANS: 2 PTS: 2 REF: 012409geo NAT: G.SRT.A.2
TOP: Dilations

10 ANS: 4

$5+\frac{2}{5}(-10-5)=5+\frac{2}{5}(-15)=5-6=-1 \quad 7+\frac{2}{5}(-8-7)=7+\frac{2}{5}(-15)=7-6=1$

PTS: 2 REF: 012410geo NAT: G.GPE.B.6 TOP: Directed Line Segments

11 ANS: 4

$\sin 30=\frac{x}{75}$

$x=37.5$

PTS: 2 REF: 012411geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

12 ANS: 1

$6^2=4x$

$x=9$

PTS: 2 REF: 012412geo NAT: G.SRT.B.5 TOP: Similarity
KEY: altitude

13 ANS: 3 PTS: 2 REF: 012413geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

14 ANS: 2

$\frac{136-x}{2}=44$

$136-x=88$

$48=x$

PTS: 2 REF: 012414geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: secants drawn from common point, angle

15 ANS: 4 PTS: 2 REF: 012415geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

16 ANS: 2 PTS: 2 REF: 012416geo NAT: G.SRT.A.1
TOP: Line Dilations

17 ANS: 3
The half diagonals have lengths of 6 and 8, so each side of *ABCD* is 10.

PTS: 2 REF: 012417geo NAT: G.CO.C.11 TOP: Parallelograms

18 ANS: 1 PTS: 2 REF: 012418geo NAT: G.SRT.B.5
TOP: Similarity KEY: altitude

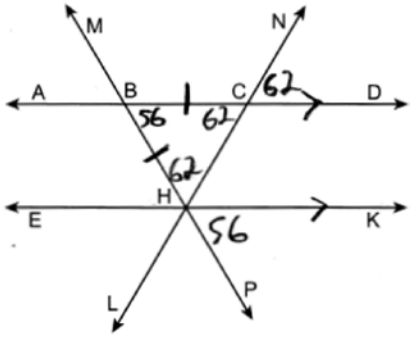
19 ANS: 1

$.5\ \text{ft}^3 \times \frac{1728\ \text{in}^3}{1\ \text{ft}^3} = 864\ \text{in}^3 \quad \frac{43\ \text{in} \times 30\ \text{in} \times 9\ \text{in}}{864\ \text{in}^3} \approx 13.4$

PTS: 2 REF: 012419geo NAT: G.GMD.A.3 TOP: Volume
KEY: prisms

20 ANS: 2 PTS: 2 REF: 012420geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

21 ANS: 4

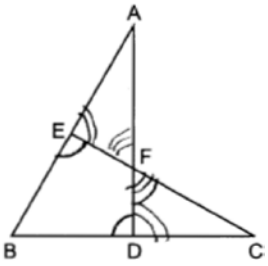


PTS: 2 REF: 012421geo NAT: G.CO.C.9 TOP: Lines and Angles

22 ANS: 3
(3) is AAS, which proves congruency. (1) is AAA, (2) is SSA and (4) is AS.

PTS: 2 REF: 012422geo NAT: G.CO.B.7 TOP: Triangle Congruency

23 ANS: 1



PTS: 2 REF: 012423geo NAT: G.SRT.B.5 TOP: Triangle Proofs
KEY: statements

24 ANS: 2

$$\frac{100000\text{ g}}{7.48\text{ g/ft}^3} = \pi(r^2)(30\text{ ft})$$

$$11.92\text{ ft} \approx r$$

$$23.8 \approx d$$

PTS: 2 REF: 012424geo NAT: G.GMD.A.3 TOP: Volume
KEY: cylinders

25 ANS:

$$\frac{1}{3}\pi \times 5^2 \times 12 = 100\pi \approx 314$$

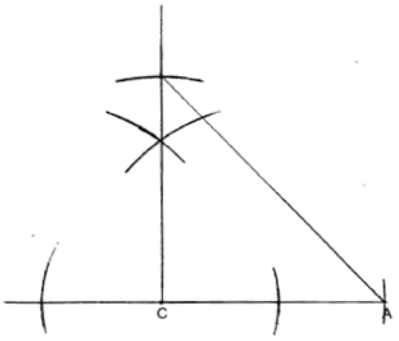
PTS: 2 REF: 012425geo NAT: G.GMD.B.4 TOP: Rotations of Two-Dimensional Objects

26 ANS:

$\frac{102}{360}(\pi)\left(38^2\right) \approx 1285$

PTS: 2 REF: 012426geo NAT: G.C.B.5 TOP: Sectors

27 ANS:



PTS: 2 REF: 012427geo NAT: G.CO.D.12 TOP: Constructions
KEY: polygons

28 ANS:

Rotation of 90º counterclockwise about the origin.

PTS: 2 REF: 012428geo NAT: G.CO.A.2 TOP: Identifying Transformations

29 ANS:

Yes, because of SAS. $\frac{AB}{AD} = \frac{AE}{AC}$

$$\frac{4.1}{3.42+5.6} = \frac{5.6}{4.1+8.22}$$

$$50.512 = 50.512$$

PTS: 2 REF: 012429geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

30 ANS:

$x^2 + 16x + +64 + y^2 + 12y + 36 = 44 + 64 + 36$ $(-8,-6)$; $r = 12$

$$(x+8)^2 + (y+6)^2 = 144$$

PTS: 2 REF: 012430geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

31 ANS:

$\cos J = \frac{3}{5}$ $S \approx 90 - 53 = 37$

$J \approx 53$

PTS: 2 REF: 012431geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

32 ANS:

$\tan 75 = \frac{y}{85}$ $\tan 35 = \frac{x}{85}$ $317.2 + 59.5 \approx 377$

$y \approx 317.2$ $h \approx 59.5$

PTS: 4 REF: 012432geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

33 ANS:

$h = \sqrt{16^2 - \left(\frac{12}{2}\right)^2} = \sqrt{220}$ $V = \frac{1}{3}(12)^2\sqrt{220} \approx 712$ $712 \times 0.32 \approx 23$

PTS: 4 REF: 012433geo NAT: G.MG.A.2 TOP: Density

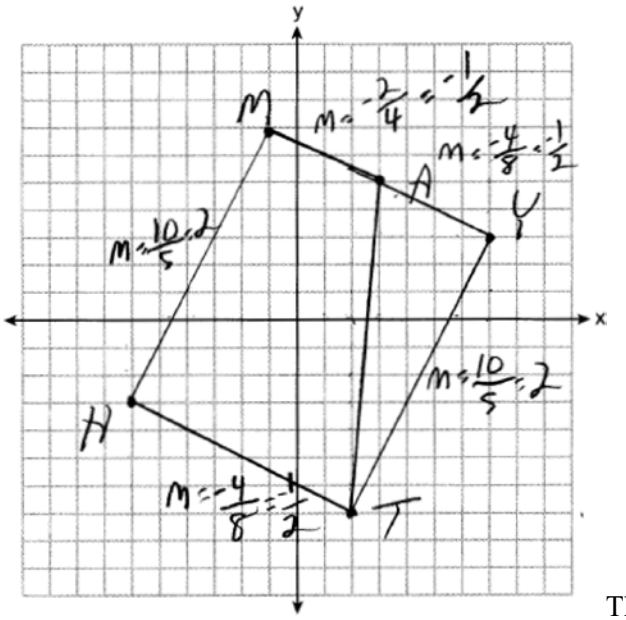
34 ANS:

In quadrilateral $ABCD$, $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{CD}$, segments CE and AF are drawn to diagonal $\overline{BD}$ such that $\overline{BE} \cong \overline{DF}$ (Given); $\angle ABF \cong \angle CDE$ (Parallel lines cut by a transversal form congruent interior angles); $\overline{EF} \cong \overline{FE}$ (Reflexive); $\overline{BE} + \overline{EF} \cong \overline{DF} + \overline{FE}$ (Addition); $\triangle AFB \cong \triangle CED$ (SAS); $\overline{CE} \cong \overline{AF}$ *(CPCTC).*

$\overline{BF} \cong \overline{DE}$

PTS: 4 REF: 012434geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs

35 ANS:



The slope of $\overline{MA}$ and $\overline{TH}$ equals $-\frac{1}{2}$. Distinct lines with equal slope are parallel. $MATH$ is a trapezoid because it has a pair of parallel lines. (7,3). The slope of $\overline{MY}$ and $\overline{TH}$ equals $-\frac{1}{2}$. The slope of $\overline{YT}$ and $\overline{HM}$ equals 2. The slopes of each side are opposite reciprocals and therefore perpendicular. Perpendicular sides form right angles, so $MYTH$ has four right angles and is a rectangle.

PTS: 6 REF: 012435geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane