Geometry Regents Exam 0625
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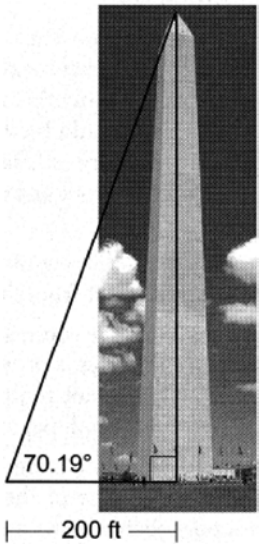
0625geo

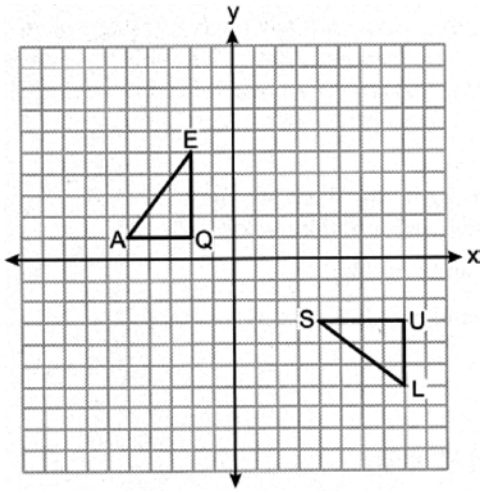
1 The perimeter of a triangle is 18. What is the perimeter of a similar triangle after a dilation with scale factor of 3?
1) 6
2) 18
3) 54
4) 162

2 The Washington Monument, shown below, is in Washington, D.C. At a point on the ground 200 feet from the center of the base of the monument, the angle of elevation to the top of the monument is 70.19°.



What is the height of the monument, to the *nearest foot*?
1) 188
2) 213
3) 555
4) 590

3 On the set of axes below, $\triangle EQA$ and $\triangle SUL$ are graphed.



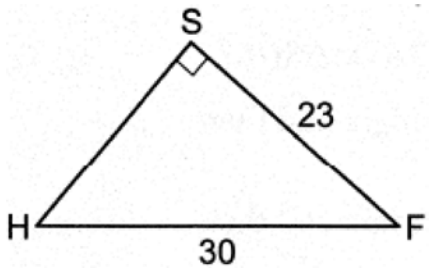
Which sequence of transformations shows that $\triangle EQA \cong \triangle SUL$?
1) Rotate $\triangle EQA$ 90º counterclockwise about the origin and then translate 9 units right and 1 unit down.
2) Rotate $\triangle EQA$ 90º counterclockwise about the origin and then reflect over the line $x = 4$.
3) Reflect $\triangle EQA$ over the x-axis and then rotate clockwise about the origin.
4) Translate $\triangle EQA$ 10 units right and then reflect over the line $x = -1$.

4 If two sides of a triangle have lengths of 2 and 8, the length of the third side could be
1) 10
2) 7
3) 6
4) 4

5 A regular octagon is rotated about its center. Which angle measure will carry the octagon onto itself?
1) 36°
2) 90°
3) 144°
4) 160°

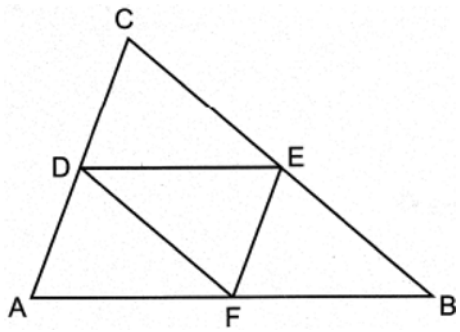
6 An equation of a circle is $x^2 + y^2 - 6x + 2y = 14$. What are the coordinates of the center and the length of the radius of this circle?
1) $(-3, 1)$ and $r = 5$
2) $(3, -1)$ and $r = 5$
3) $(-3, 1)$ and $r = \sqrt{24}$
4) $(3, -1)$ and $r = \sqrt{24}$

7 In $\triangle HSF$ below, $m\angle S = 90°$, $HF = 30$, and $FS = 23$.



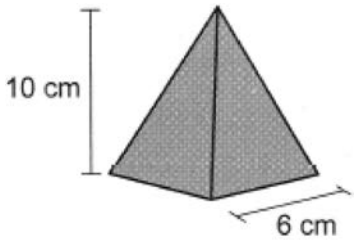
What is $m\angle F$, to the *nearest degree*?
1) 53°
2) 50°
3) 40°
4) 37°

8 In $\triangle CAB$ below, midsegments $\overline{DE}$, $\overline{EF}$, and $\overline{FD}$ are drawn.



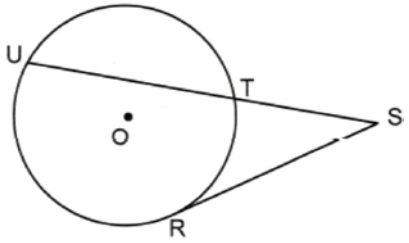
If $CA = 14$, $CB = 20$, and $FB = 9$, what is the perimeter of quadrilateral $DEFA$?
1) 26
2) 32
3) 44
4) 52

9 A candle can be modeled by a pyramid with a square base, as shown below. The height of the candle is 10 cm, and each side of the base measures 6 cm.



If the candle wax burns at a rate of 3.5 cubic centimeters per hour, what is the approximate number of hours this candle could burn?
1) 103
2) 51
3) 34
4) 11

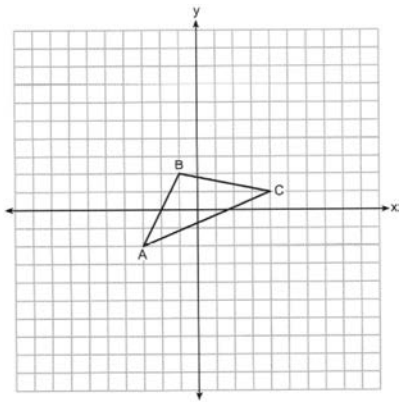
10 In the diagram below, tangent $\overline{SR}$ and secant $\overline{STU}$ are drawn to circle O from external point S.



If $\overset{\frown}{TU} \cong \overset{\frown}{RU}$ and $m\overset{\frown}{TR} = 68°$, what is $m\angle S$?
1) 22º
2) 34º
3) 39º
4) 78º

11 Triangle RST has $m\angle S = 33°$, $RS = 7$, and $ST = 12$. What is the area of $\triangle RST$, to the *nearest tenth*?
1) 22.9
2) 27.3
3) 35.2
4) 45.7

12 Triangle ABC, with vertices whose coordinates are $A(-3,-2)$, $B(-1,2)$, and $C(4,1)$, is graphed on the set of axes below.



Triangle $A'B'C'$, whose vertices have coordinates $A'(-6,-2)$, $B'(-2,2)$, and $C'(8,1)$, is the image of $\triangle ABC$. The transformation that maps $\triangle ABC$ onto $\triangle A'B'C'$ is a

1) dilation
2) translation
3) vertical stretch
4) horizontal stretch

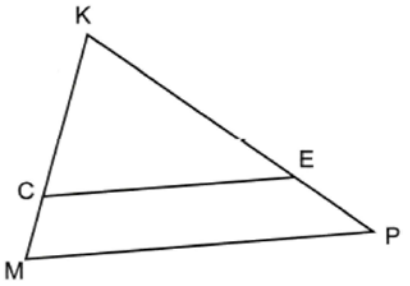
13 Which equation represents a line parallel to the line represented $y = 4x + 6$ and passing through the point $(-3,2)$?

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

14 Which two-dimensional figure is always formed when a plane intersects a right cylinder perpendicular to its base?

1) circle
2) triangle
3) rhombus
4) rectangle

15 In $\triangle KMP$ below, $\overline{CE}$ is drawn parallel to $\overline{MP}$.



If $KC = 8$, $CM = 3$, and $CE = 12$, what is the length of $\overline{MP}$?

1) 24
2) 16.5
3) 15
4) 4.5

16 A parallelogram must be a rectangle if its diagonals

1) are perpendicular
2) bisect each other
3) bisect its angles
4) are congruent

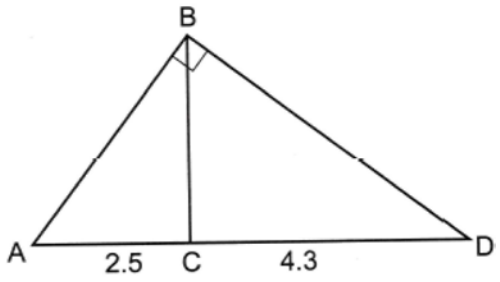
17 Point O divides $\overline{COA}$ such that $CO:OA = 1:4$. If C has coordinates $(-2,-9)$ and A has coordinates $(3,6)$, the coordinates of O are

1) $(2,3)$
2) $(1,0)$
3) $(0,-3)$
4) $(-1,-6)$

18 A spherical balloon is fully inflated with helium to a diameter of 1.7 feet. If helium costs \$0.80 per cubic foot, what is the cost to completely fill the balloon with helium?

1) \$2.06
2) \$2.42
3) \$3.22
4) \$16.46

19 In right triangle ABD below, altitude $\overline{BC}$ is drawn to hypotenuse $\overline{AD}$, $AC = 2.5$, and $CD = 4.3$.

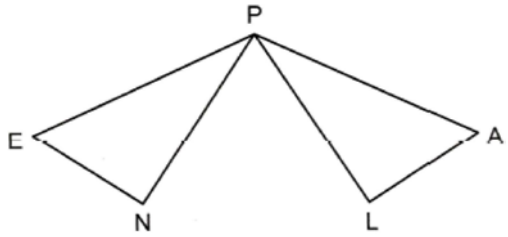


What is the length of $\overline{BA}$, to the *nearest tenth*?
1) 3.3
2) 3.4
3) 4.1
4) 5.4

20 Trapezoid $ZOYD$ has parallel sides $\overline{ZO}$ and $\overline{DY}$. If $m\angle Z = 141°$ and $m\angle Y = 73°$, what is $m\angle D$?
1) 39°
2) 73°
3) 107°
4) 141°

21 Triangle ABC is translated 5 units to the left and 2 units up to map onto $\triangle PQR$. Which statement is *not* always true?
1) $\triangle PQR \cong \triangle ABC$
2) $\angle A \cong \angle Q$
3) $BQ = \sqrt{29}$
4) $RQ = CB$

22 In the diagram below, congruent triangles PEN and PAL are drawn.



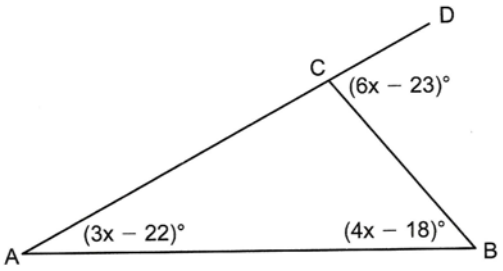
Which rigid motion maps $\triangle PEN$ onto $\triangle PAL$?
1) a point reflection of $\triangle PEN$ through P
2) a reflection of $\triangle PEN$ over the angle bisector of $\angle EPA$
3) a rotation of $\triangle PEN$ about point P, mapping $\overline{PE}$ onto $\overline{PA}$
4) a translation of $\triangle PEN$ along $\overline{EA}$, mapping point E onto A

23 A cone has a height of 8 inches and volume of 75.4 cubic inches. What is the diameter of the cone, to the *nearest inch*?
1) 9
2) 2
3) 3
4) 6

24 The line represented by the equation $5x - 2y = 10$ is transformed by a dilation centered at $(2,0)$ with a scale factor of 2. The image of the line
1) is the original line
2) passes through the point $(4,0)$
3) passes through the point $(0,-10)$
4) is perpendicular to the original line

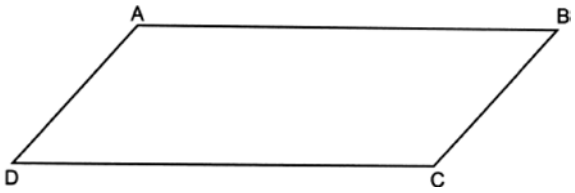
25 In the year 2020, the village of Depew, New York had an area of 5.1 square miles and a population of 15,069. In the same year, the village of Lancaster, New York had an area of 2.7 square miles and a population of 10,087. Which village had the larger population density in 2020? Justify your answer.

26 In $\triangle ABC$ below, $\overline{AC}$ is extended through C to D, $m\angle A = (3x - 22)°$, $m\angle B = (4x - 18)°$, and $m\angle BCD = (6x - 23)°$.

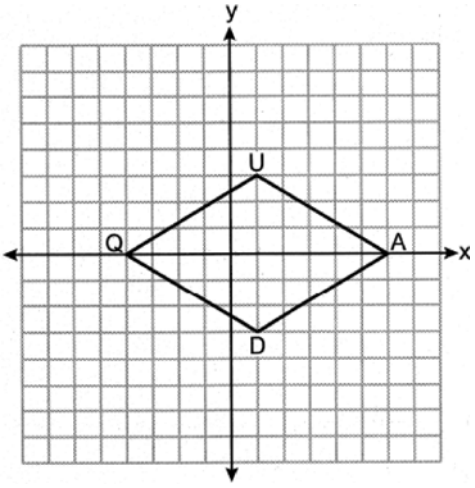


Determine and state $m\angle ACB$.

27 Parallelogram $ABCD$ is shown below. Using a compass and straightedge, construct the altitude from point A to side $\overline{DC}$. [Leave all construction marks.]



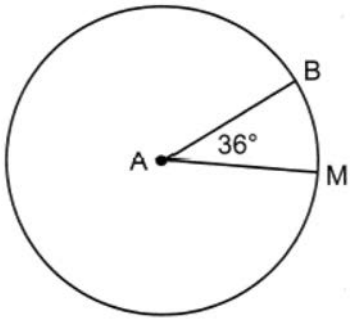
28 Quadrilateral $QUAD$ is graphed on the set of axes below.



Determine and state the area of quadrilateral $QUAD$.

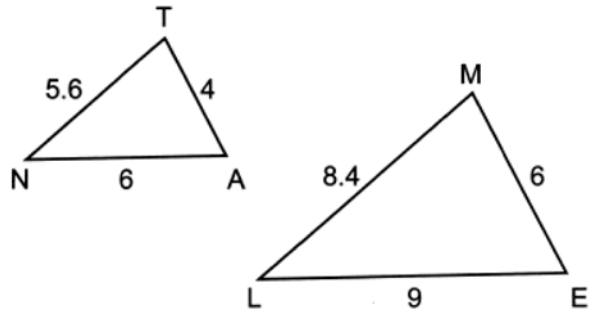
29 In a right triangle, the acute angles have the relationship $\sin(3x - 7)° = \cos(x + 1)°$. Determine and state the value of x.

30 In circle A below, $m\angle BAM = 36°$.



If $AB = 20$, determine and state the length of $\overset{\frown}{MB}$. [Leave your answer in terms of π.]

31 In triangles ANT and ELM below, $AN = 6$, $NT = 5.6$, $TA = 4$, $EL = 9$, $LM = 8.4$, and $ME = 6$.



Explain why $\triangle ANT \sim \triangle ELM$.

32 A store sells colored craft sand in the three different containers below.

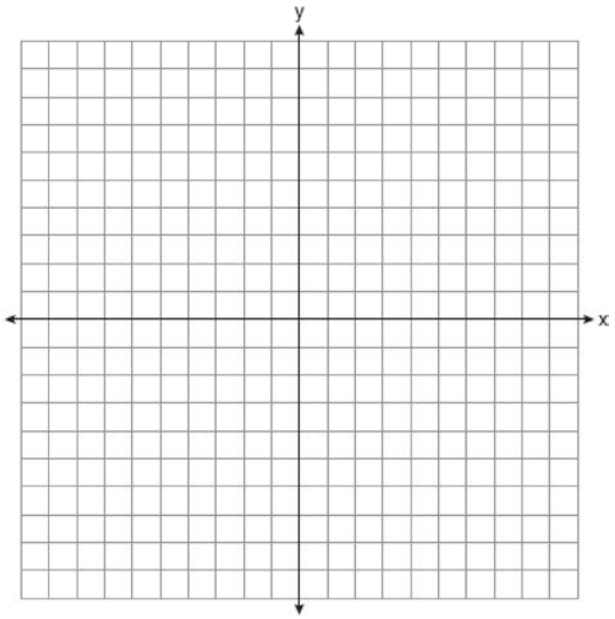
Container 1: A square prism with a base length of 4 inches and a height of 7.5 inches.

Container 2: A cylinder with a diameter of 5 inches and a height of 6 inches.

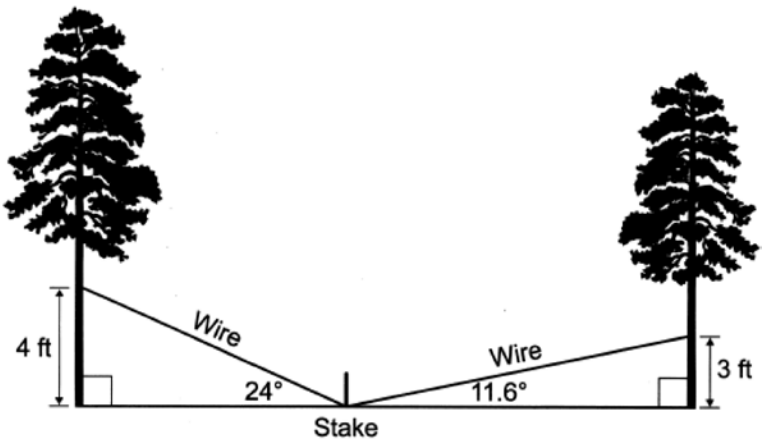
Container 3: A cone with a diameter of 7.5 inches and a height of 8.5 inches.

If the containers are filled to the top, which container will hold the most sand? Justify your answer.

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$. Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus. [The use of the set of axes below is optional.]

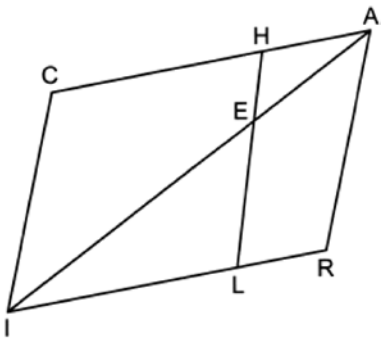


34 A park ranger needs to secure two different trees with wire. A wire is to be attached from a stake in the ground to each tree. The wire is attached at two different heights and two different angles of elevation, as indicated in the model below.



The park ranger has 20 feet of wire. Does the park ranger have enough wire to secure both trees? Justify your answer.

35 Given: Quadrilateral $CARI$ with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



Prove: $HA \bullet EL = LI \bullet EH$

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Answer Section

1 ANS: 3 PTS: 2 REF: 062501geo NAT: G.SRT.A.2
TOP: Dilations

2 ANS: 3

$\tan 70.19 = \frac{h}{200}$

$h \approx 555$

PTS: 2 REF: 062502geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

3 ANS: 1 PTS: 2 REF: 062503geo NAT: G.CO.A.5
TOP: Compositions of Transformations

4 ANS: 2
$2 + 7 > 8$

PTS: 2 REF: 062504geo NAT: G.CO.C.10 TOP: Triangle Inequality Theorem

5 ANS: 2
$\frac{360°}{8} = 45°$ 90º is a multiple of 45º

PTS: 2 REF: 062505geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

6 ANS: 4
$x^2 - 6x + 9 + y^2 + 2y + 1 = 14 + 9 + 1$

$(x-3)^2 + (y+1)^2 = 24$

PTS: 2 REF: 062506geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

7 ANS: 3

$\cos F = \frac{23}{30}$

$F \approx 40°$

PTS: 2 REF: 062507geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

8 ANS: 2
$\frac{14}{2} + 9 + \frac{14}{2} + 9 = 32$

PTS: 2 REF: 062508geo NAT: G.CO.C.10 TOP: Midsegments

9 ANS: 3

$\frac{\frac{1}{3}(6^2)(10)}{3.5} \approx 34.3$

PTS: 2 REF: 062509geo NAT: G.GMD.A.3 TOP: Volume
KEY: pyramids

10 ANS: 3

$$\frac{\frac{360-68}{2}-68}{2}=39$$

PTS: 2 REF: 062510geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: secant and tangent drawn from common point, angle

11 ANS: 1

$$\frac{1}{2}(7)(12)\sin(33)\approx 22.9$$

PTS: 2 REF: 062511geo NAT: G.SRT.D.9 TOP: Using Trigonometry to Find Area
KEY: basic

12 ANS: 4 PTS: 2 REF: 062512geo NAT: G.CO.A.2
TOP: Identifying Transformations

13 ANS: 1

$m=4$

PTS: 2 REF: 062513geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: write equation of parallel line

14 ANS: 4 PTS: 2 REF: 062514geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

15 ANS: 2

$$\frac{8}{12}=\frac{11}{x}$$

$$8x=132$$

$$x=16.5$$

PTS: 2 REF: 062515geo NAT: G.SRT.B.4 TOP: Side Splitter Theorem

16 ANS: 4 PTS: 2 REF: 062516geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

17 ANS: 4

$$-2+\frac{1}{5}(3--2)=-2+\frac{1}{5}(5)=-2+1=-1\quad -9+\frac{1}{5}(6--9)=-9+\frac{1}{5}(15)=-9+3=-6$$

PTS: 2 REF: 062517geo NAT: G.GPE.B.6 TOP: Directed Line Segments

18 ANS: 1

$$\frac{4}{3}\pi\left(\frac{1.7}{2}\right)^3\times.8\approx 2.06$$

PTS: 2 REF: 062518geo NAT: G.GMD.A.3 TOP: Volume
KEY: spheres

19 ANS: 3

$x^2 = 2.5 \times (2.5 + 4.3)$

$x \approx 4.1$

PTS: 2 REF: 062519geo NAT: G.SRT.B.4 TOP: Similarity

20 ANS: 1

$180 - 141 = 39$

PTS: 2 REF: 062520geo NAT: G.CO.C.11 TOP: Trapezoids

21 ANS: 2 PTS: 2 REF: 062521geo NAT: G.CO.B.6
TOP: Properties of Transformations

22 ANS: 2 PTS: 2 REF: 062522geo NAT: G.CO.A.2
TOP: Identifying Transformations

23 ANS: 4

$75.4 = \frac{1}{3}\pi r^2(8)$

$r \approx 3$

PTS: 2 REF: 062523geo NAT: G.GMD.A.3 TOP: Volume
KEY: cones

24 ANS: 1

$5(2) - 2(0) = 10$

PTS: 2 REF: 062524geo NAT: G.SRT.A.1 TOP: Line Dilations

25 ANS:

Lancaster $\frac{10087}{2.7} > \frac{15069}{5.1}$

PTS: 2 REF: 062525geo NAT: G.MG.A.2 TOP: Density

26 ANS:

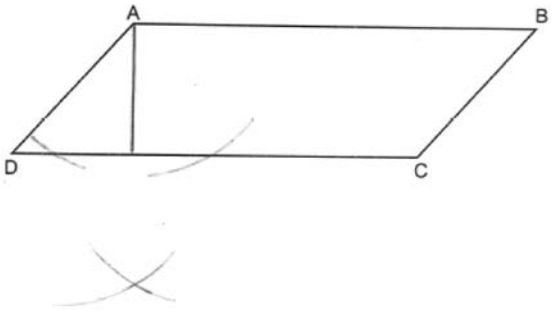
$3x - 22 + 4x - 18 = 6x - 23$ $180 - (6(17) - 23) = 180 - (102 - 23) = 180 - 79 = 101$

$7x - 40 = 6x - 23$

$x = 17$

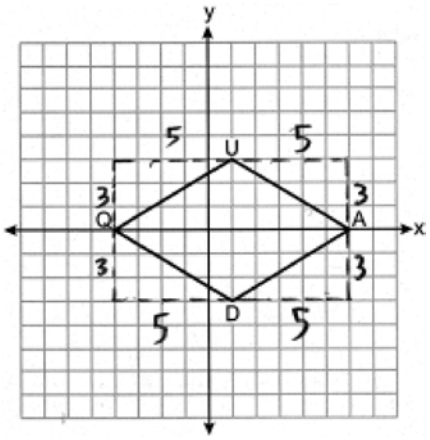
PTS: 2 REF: 062526geo NAT: G.CO.C.10 TOP: Exterior Angle Theorem

27 ANS:



PTS: 2 REF: 062527geo NAT: G.CO.D.12 TOP: Constructions
KEY: parallel and perpendicular lines

28 ANS:



$(10 \times 6) - 4\left(\frac{1}{2}(5)(3)\right) = 60 - 30 = 30$

PTS: 2 REF: 062528geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

29 ANS:

$3x - 7 + x + 1 = 90$

$4x - 6 = 90$

$4x = 96$

$x = 24$

PTS: 2 REF: 062529geo NAT: G.SRT.C.7 TOP: Cofunctions

30 ANS:

$40\pi\left(\frac{36}{360}\right) = 4\pi$

PTS: 2 REF: 062530geo NAT: G.C.B.5 TOP: Arc Length

31 ANS:

$\frac{5.6}{6} = \frac{8.4}{9} \rightarrow 50.4 = 50.4$ $\frac{4}{6} = \frac{6}{9} \rightarrow 36 = 36$ $\frac{4}{5.6} = \frac{6}{8.4} \rightarrow 33.6 = 33.6$ The corresponding sides are proportional.

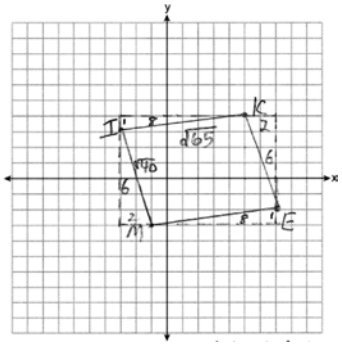
PTS: 2 REF: 062531geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

32 ANS:

The cone: 1) $4 \times 4 \times 7.5 = 120$; 2) $\pi(2.5)^2(6) \approx 118$; 3) $\frac{1}{3}\pi(3.75)^2(8.5) \approx 125$

PTS: 4 REF: 062532geo NAT: G.GMD.A.3 TOP: Volume
KEY: cones

33 ANS:



$m_{\overline{MI}} = \frac{-3-3}{-1--3} = \frac{-6}{2} = -3$; $m_{\overline{KE}} = \frac{4--2}{5-7} = \frac{6}{-2} = -3$; $m_{\overline{IK}} = \frac{4-3}{5--3} = \frac{1}{8}$; $m_{\overline{ME}} = \frac{-2--3}{7--1} = \frac{1}{8}$. Because opposite side of Quadrilateral *MIKE* have the same slope, the sides are parallel. The opposite sides of a parallelogram are parallel, so *MIKE* is a parallelogram. $MI = \sqrt{6^2 + 2^2} = \sqrt{40}$; $IK = \sqrt{8^2 + 1^2} = \sqrt{65}$. Because two sides of Quadrilateral *MIKE* have different lengths, they are not congruent. All the sides of a rhombus are congruent, so *MIKE* is not a rhombus.

PTS: 4 REF: 062533geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane

34 ANS:

$\sin 24 = \frac{4}{x}$. $\sin 11.6 = \frac{3}{y}$ No, because $9.8 + 14.9 > 20$.

$x \approx 9.8$ $y \approx 14.9$

PTS: 4 REF: 062534geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

35 ANS:

1) Quadrilateral *CARI* with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn (Given); 2) Quadrilateral *CARI* is a parallelogram (Opposite sides of a parallelogram are congruent); 3) $\overline{CA} \parallel \overline{RI}$ and $\overline{CI} \parallel \overline{RA}$ (Opposite sides of a parallelogram are parallel); 4) $\angle AHE \cong \angle ILE$ and $\angle HAE \cong \angle LIE$ (Parallel lines cut by a transversal create congruent alternate interior angles); 5) $\triangle HAE \sim \triangle LIE$ (AA); 6) $\frac{HA}{EH} = \frac{LI}{EL}$ (Corresponding sides of similar triangles are proportional); 7) $HA \bullet EL = LI \bullet EH$ (The product of the means equals the product of the extremes).

PTS: 6 REF: 062535geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs