Geometry CCSS Regents Exam 0623
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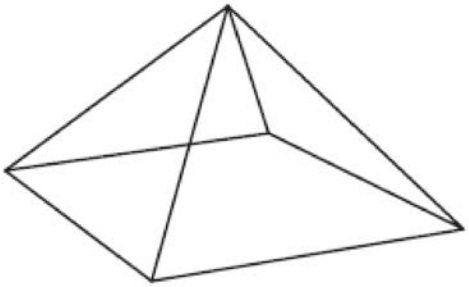
0623geo

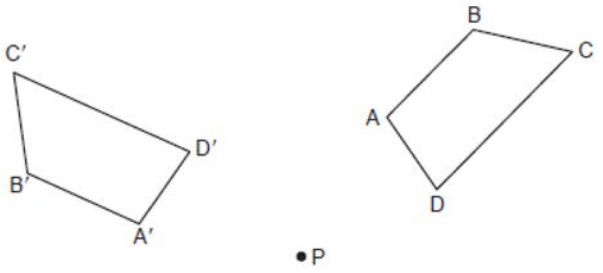
1 A square pyramid is intersected by a plane passing through the vertex and perpendicular to the base.



Which two-dimensional shape describes this cross section?

1) square
2) triangle
3) pentagon
4) rectangle

2 Trapezoid $ABCD$ is drawn such that $\overline{AB} \parallel \overline{DC}$. Trapezoid $A'B'C'D'$ is the image of trapezoid $ABCD$ after a rotation of 110° counterclockwise about point P.



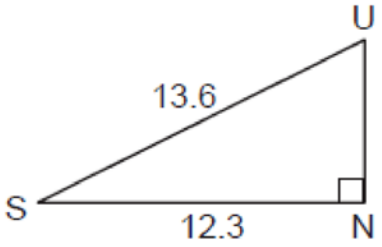
Which statement is always true?

1) $\angle A \cong \angle D'$
2) $\overline{AC} \cong \overline{B'D'}$
3) $\overline{A'B'} \parallel \overline{D'C'}$
4) $\overline{B'A'} \cong \overline{C'D'}$

3 What is the volume of a right circular cone that has a height of 7.2 centimeters and a radius of 2.5 centimeters, to the *nearest tenth of a cubic centimeter*?

1) 37.7
2) 47.1
3) 113.1
4) 141.4

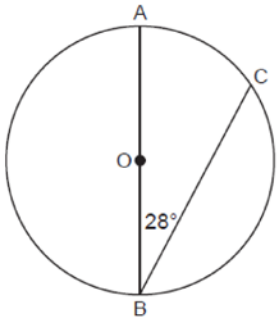
4 In the diagram below of right triangle SUN, where $\angle N$ is a right angle, $SU = 13.6$ and $SN = 12.3$.



What is $\angle S$, to the *nearest degree*?

1) 25°
2) 42°
3) 48°
4) 65°

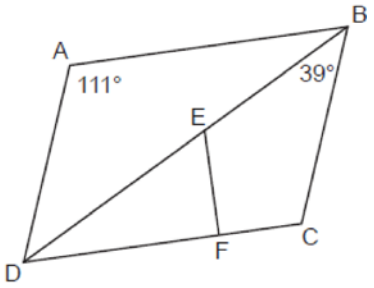
5 In the diagram below of Circle O, diameter $\overline{AOB}$ and chord $\overline{CB}$ are drawn, and $m\angle B = 28°$.



What is $m\overset{\frown}{BC}$?

1) 56°
2) 124°
3) 152°
4) 166°

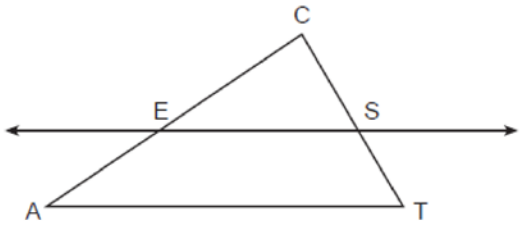
6 In the diagram below of parallelogram $ABCD$, diagonal $\overline{BED}$ and $\overline{EF}$ are drawn, $\overline{EF} \perp \overline{DFC}$, $m\angle DAB = 111°$, and $m\angle DBC = 39°$.



What is $m\angle DEF$?

1) 30°
2) 51°
3) 60°
4) 120°

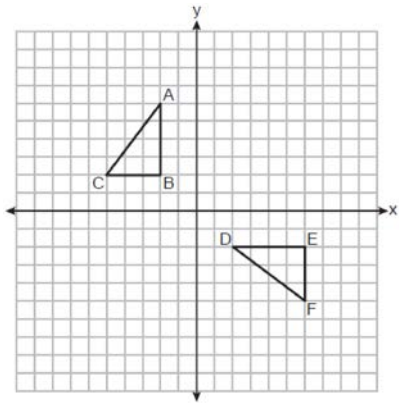
7 In the diagram below of $\triangle ACT$, $\overleftrightarrow{ES}$ is drawn parallel to $\overline{AT}$ such that E is on $\overline{CA}$ and S is on $\overline{CT}$.



Which statement is always true?

1) $\frac{CE}{CA} = \frac{CS}{ST}$
2) $\frac{CE}{ES} = \frac{EA}{AT}$
3) $\frac{CE}{EA} = \frac{CS}{ST}$
4) $\frac{CE}{ST} = \frac{EA}{CS}$

8 On the set of axes below, congruent triangles ABC and DEF are drawn.



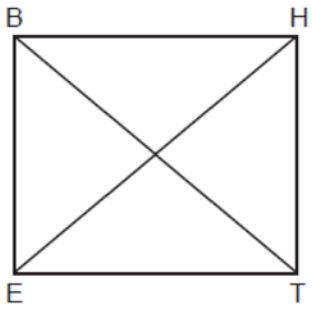
Which sequence of transformations maps $\triangle ABC$ onto $\triangle DEF$?

1) A counterclockwise rotation of 90 degrees about the origin, followed by a translation 8 units to the right.
2) A counterclockwise rotation of 90 degrees about the origin, followed by a reflection over the y-axis.
3) A counterclockwise rotation of 90 degrees about the origin, followed by a translation 4 units down.
4) A clockwise rotation of 90 degrees about the origin, followed by a reflection over the x-axis.

9 An equation of circle M is $x^2 + y^2 + 6x - 2y + 1 = 0$. What are the coordinates of the center and the length of the radius of circle M?

1) center $(3,-1)$ and radius 9
2) center $(3,-1)$ and radius 3
3) center $(-3,1)$ and radius 9
4) center $(-3,1)$ and radius 3

10 Parallelogram *BETH*, with diagonals $\overline{BT}$ and $\overline{HE}$, is drawn below.



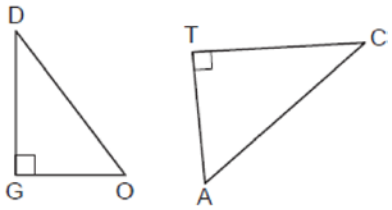
What additional information is sufficient to prove that *BETH* is a rectangle?

1) $\overline{BT} \perp \overline{HE}$
2) $\overline{BE} \parallel \overline{HT}$
3) $\overline{BT} \cong \overline{HE}$
4) $\overline{BE} \cong \overline{ET}$

11 A gardener wants to buy enough mulch to cover a rectangular garden that is 3 feet by 10 feet. One bag contains 2 cubic feet of mulch and costs $3.66. How much will the minimum number of bags cost to cover the garden with mulch 3 inches deep?

1) $3.66
2) $10.98
3) $14.64
4) $29.28

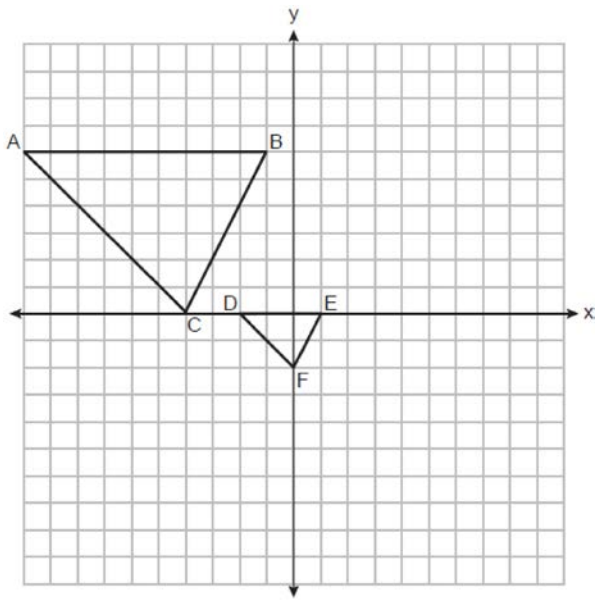
12 In the diagram below, $\triangle DOG \sim \triangle CAT$, where $\angle G$ and $\angle T$ are right angles.



Which expression is always equivalent to $\sin D$?

1) $\cos A$
2) $\sin A$
3) $\tan A$
4) $\cos C$

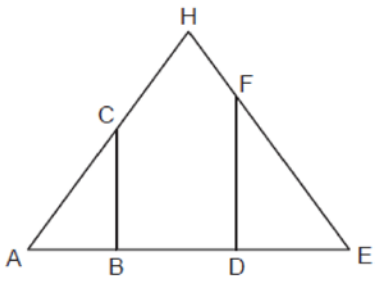
13 On the set of axes below, $\triangle DEF$ is the image of $\triangle ABC$ after a dilation of scale factor $\frac{1}{3}$.



The center of dilation is at

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

14 In the diagram below of isosceles triangle AHE with the vertex angle at H, $\overline{CB} \perp \overline{AE}$ and $\overline{FD} \perp \overline{AE}$.



Which statement is always true?

1) $\frac{AH}{AC} = \frac{EH}{EF}$
2) $\frac{AC}{EF} = \frac{AB}{ED}$
3) $\frac{AB}{ED} = \frac{CB}{FE}$
4) $\frac{AD}{AB} = \frac{BE}{DE}$

15 Rectangle $ABCD$ has two vertices at coordinates $A(-1,-3)$ and $B(6,5)$. The slope of $\overline{BC}$ is

1) $-\frac{7}{8}$
2) $\frac{7}{8}$
3) $-\frac{8}{7}$
4) $\frac{8}{7}$

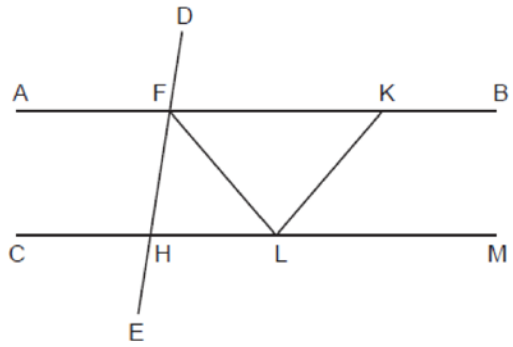
16 In right triangle ABC, $m\angle A = 90°$, $m\angle B = 18°$, and $AC = 8$. To the *nearest tenth*, the length of $\overline{BC}$ is

1) 2.5
2) 8.4
3) 24.6
4) 25.9

17 The measure of one of the base angles of an isosceles triangle is 42°. The measure of an exterior angle at the vertex of the triangle is

1) 42°
2) 84°
3) 96°
4) 138°

18 In the diagram below, $\overline{AFKB} \parallel \overline{CHLM}$, $\overline{FH} \cong \overline{LH}$, $\overline{FL} \cong \overline{KL}$, and $\overline{LF}$ bisects $\angle HFK$.



Which statement is always true?

1) $2(m\angle HLF) = m\angle CHE$
2) $2(m\angle FLK) = m\angle LKB$
3) $m\angle AFD = m\angle BKL$
4) $m\angle DFK = m\angle KLF$

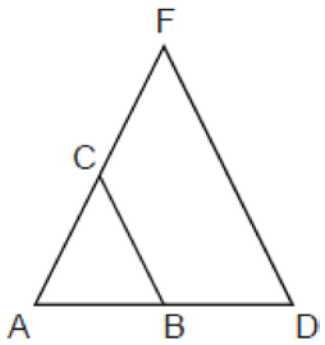
19 The line whose equation is $6x + 3y = 3$ is dilated by a scale factor of 2 centered at the point $(0,0)$. An equation of its image is

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

20 Which figure will *not* carry onto itself after a 120-degree rotation about its center?

1) equilateral triangle
2) regular hexagon
3) regular octagon
4) regular nonagon

21 Triangle ADF is drawn and $\overline{BC} \parallel \overline{DF}$.



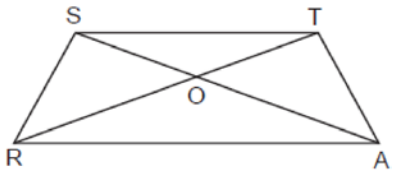
Which statement must be true?

1) $\frac{AB}{BC} = \frac{BD}{DF}$
2) $BC = \frac{1}{2}DF$
3) $AB:AD = AC:CF$
4) $\angle ACB \cong \angle AFD$

22 In $\triangle ABC$, M is the midpoint of $\overline{AB}$ and N is the midpoint of $\overline{AC}$. If $MN = x + 13$ and $BC = 5x - 1$, what is the length of $\overline{MN}$?

1) 3.5
2) 9
3) 16.5
4) 22

23 In the diagram below of isosceles trapezoid $STAR$, diagonals $\overline{AS}$ and $\overline{RT}$ intersect at O and $\overline{ST} \parallel \overline{RA}$, with nonparallel sides $\overline{SR}$ and $\overline{TA}$.



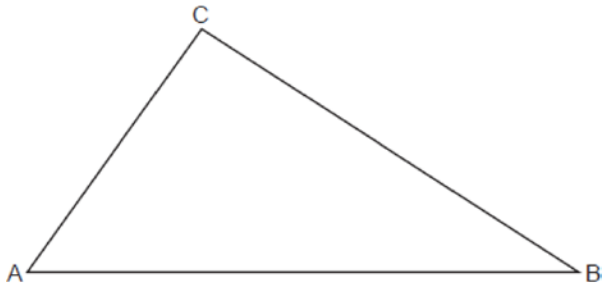
Which pair of triangles are *not* always similar?

1) $\triangle STO$ and $\triangle ARO$
2) $\triangle SOR$ and $\triangle TOA$
3) $\triangle SRA$ and $\triangle ATS$
4) $\triangle SRT$ and $\triangle TAS$

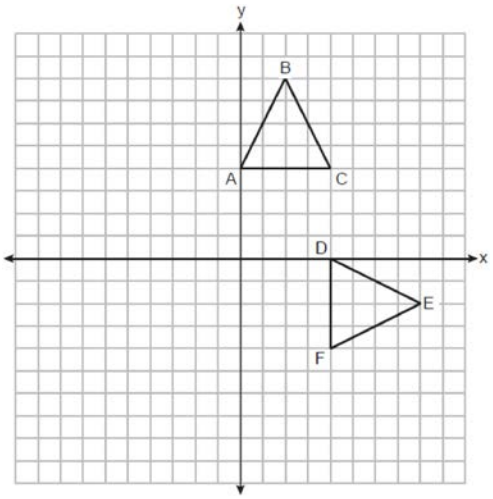
24 The endpoints of $\overline{AB}$ are $A(0,4)$ and $B(-4,6)$. Which equation of a line represents the perpendicular bisector of $\overline{AB}$?

1) $y = -\frac{1}{2}x + 4$
2) $y = -2x + 1$
3) $y = 2x + 8$
4) $y = 2x + 9$

25 In $\triangle ABC$ below, use a compass and straightedge to construct the altitude from C to $\overline{AB}$. [Leave all construction marks.]

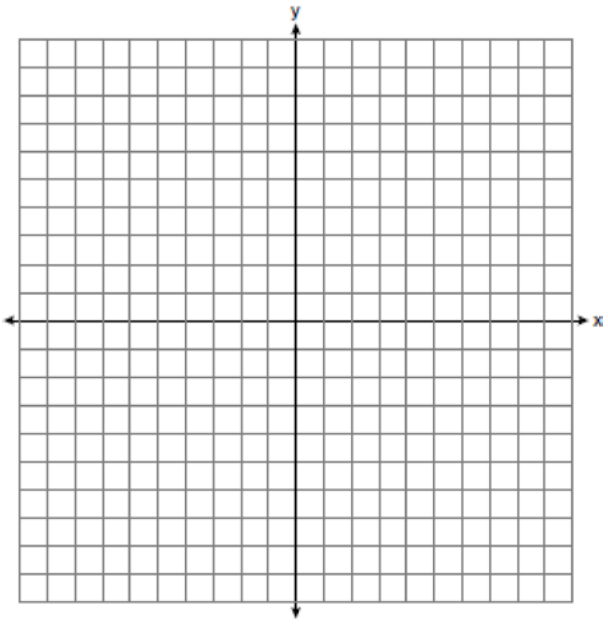


26 Triangles ABC and DEF are graphed on the set of axes below.



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

27 Line segment PQ has endpoints $P(-5,1)$ and $Q(5,6)$, and point R is on $\overline{PQ}$. Determine and state the coordinates of R, such that $PR:RQ = 2:3$. [The use of the set of axes below is optional.]



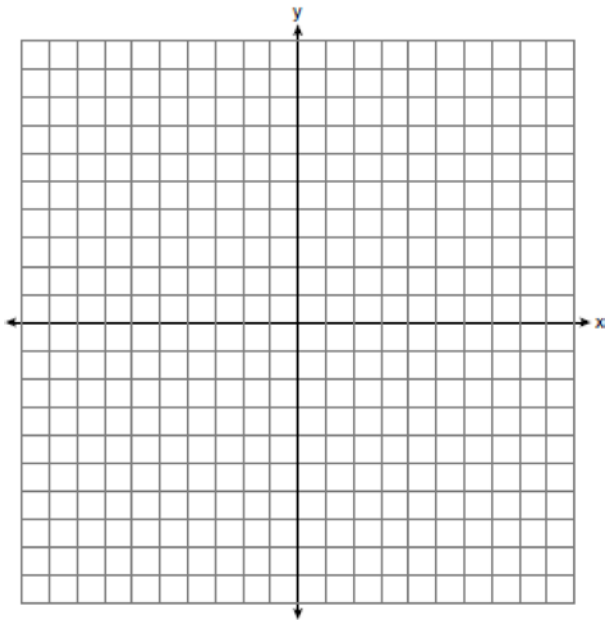
28 A circle has a radius of 6.4 inches. Determine and state, to the *nearest square inch*, the area of a sector whose arc measures 80°.

29 A large snowman is made of three spherical snowballs with radii of 1 foot, 2 feet, and 3 feet, respectively. Determine and state the amount of snow, in cubic feet, that is used to make the snowman. [Leave your answer in terms of π.]

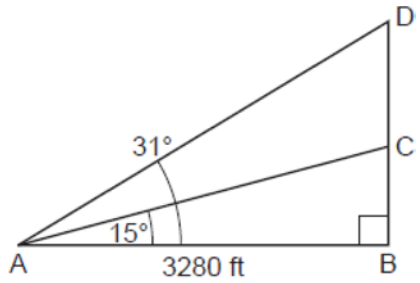
30 In the diagram below of right triangle ACB, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$, $AD = 2$ and $AC = 6$.

Determine and state the length of $\overline{AB}$.

31 Triangle RST has vertices with coordinates $R(-3,-2)$, $S(3,2)$ and $T(4,-4)$. Determine and state an equation of the line parallel to $\overline{RT}$ that passes through point S. [The use of the set of axes below is optional.]



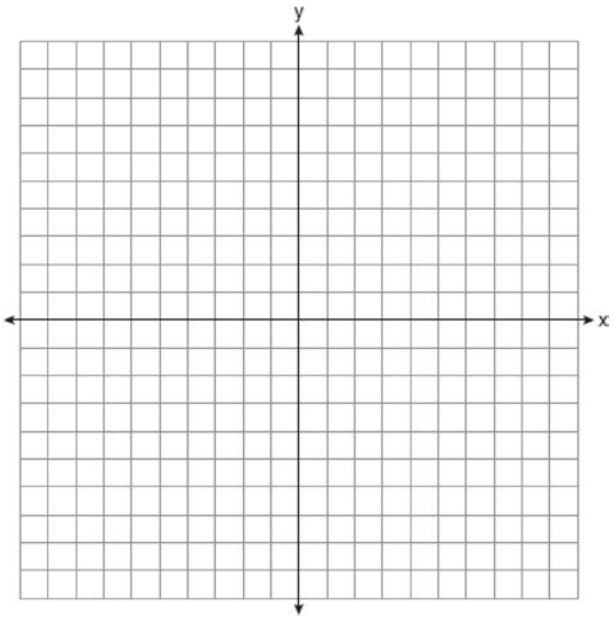
32 Cape Canaveral, Florida is where NASA launches rockets into space. As modeled in the diagram below, a person views the launch of a rocket from observation area A, 3280 feet away from launch pad B. After launch, the rocket was sighted at C with an angle of elevation of 15°. The rocket was later sighted at D with an angle of elevation of 31°.



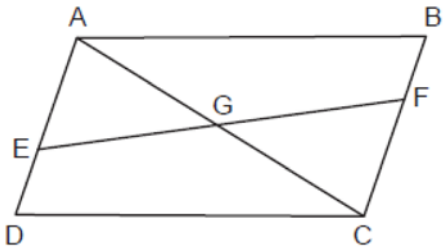
Determine and state, to the *nearest foot*, the distance the rocket traveled between the two sightings, C and D.

33 A small can of soup is a right circular cylinder with a base diameter of 7 cm and a height of 9 cm. A large container is also a right circular cylinder with a base diameter of 9 cm and a height of 13cm. Determine and state the volume of the small can and the volume of the large container to the *nearest cubic centimeter*. What is the minimum number of small cans that must be opened to fill the large container? Justify your answer.

34 Parallelogram *MATH* has vertices $M(-7,-2)$, $A(0,4)$, $T(9,2)$, and $H(2,-4)$. Prove that parallelogram *MATH* is a rhombus. [The use of the set of axes below is optional.] Determine and state the area of *MATH*.



35 Given: Quadrilateral *ABCD*, $\overline{AB} \cong \overline{CD}$, $\overline{AB} \parallel \overline{CD}$, diagonal $\overline{AC}$ intersects $\overline{EF}$ at *G*, and $\overline{DE} \cong \overline{BF}$



Prove: *G* is the midpoint of $\overline{EF}$

0623geo
Answer Section

1 ANS: 2 PTS: 2 REF: 062301geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

2 ANS: 3 PTS: 2 REF: 062302geo NAT: G.CO.B.6
TOP: Properties of Transformations KEY: graphics

3 ANS: 2

$$V = \frac{1}{3}\pi \cdot (2.5)^2 \cdot 7.2 \cong 47.1$$

PTS: 2 REF: 062303geo NAT: G.GMD.A.3 TOP: Volume
KEY: cones

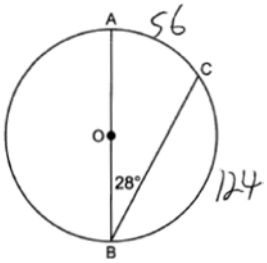
4 ANS: 1

$$\cos S = \frac{12.3}{13.6}$$

$$S \approx 25°$$

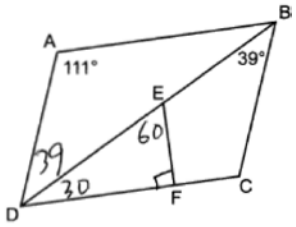
PTS: 2 REF: 062304geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

5 ANS: 2



PTS: 2 REF: 062305geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: inscribed

6 ANS: 3



PTS: 2 REF: 062306geo NAT: G.CO.C.11 TOP: Interior and Exterior Angles of Polygons

7 ANS: 3 PTS: 2 REF: 062307geo NAT: G.SRT.B.5
TOP: Side Splitter Theorem

8 ANS: 1 PTS: 2 REF: 062308geo NAT: G.CO.A.5
TOP: Compositions of Transformations

9 ANS: 4

$$x^2 + 6x + y^2 - 2y = -1$$

$$x^2 + 6x + 9 + y^2 - 2y + 1 = -1 + 9 + 1$$

$$(x+3)^2 + (y-1)^2 = 9$$

PTS: 2 REF: 062309geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

10 ANS: 3 PTS: 2 REF: 062310geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

11 ANS: 3

$3 \times 10 \times \frac{3}{12} = 7.5 \text{ ft}^3$ $\frac{7.5}{2} = 3.75$ $4 \times 3.66 = 14.64$

PTS: 2 REF: 062311geo NAT: G.GMD.A.3 TOP: Volume
KEY: prisms

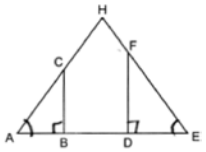
12 ANS: 1 PTS: 2 REF: 062312geo NAT: G.SRT.C.7
TOP: Cofunctions

13 ANS: 2

$$x_0 = \frac{kx_1 - x_2}{k-1} = \frac{\frac{1}{3}(-4) - 0}{\frac{1}{3} - 1} = \frac{\frac{-4}{3}}{\frac{-2}{3}} = 2 \quad y_0 = \frac{ky_1 - y_2}{k-1} = \frac{\frac{1}{3}(0) - -2}{\frac{1}{3} - 1} = \frac{2}{\frac{-2}{3}} = -3$$

PTS: 2 REF: 062313geo NAT: G.SRT.A.2 TOP: Dilations

14 ANS: 2



PTS: 2 REF: 062314geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

15 ANS: 1

$$m_{\overline{AB}} = \frac{-3-5}{-1-6} = \frac{-8}{-7} = \frac{8}{7}$$

PTS: 2 REF: 062315geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

16 ANS: 4

$$\sin 18 = \frac{8}{x}$$

$$x \approx 25.9$$

PTS: 2 REF: 062316geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

17 ANS: 2
$180 - (180 - 42 - 42)$

PTS: 2 REF: 062317geo NAT: G.CO.C.10 TOP: Exterior Angle Theorem

18 ANS: 4 PTS: 2 REF: 062318geo NAT: G.CO.C.9
TOP: Lines and Angles

19 ANS: 2
$3y = -6x + 3$

$y = -2x + 1$

PTS: 2 REF: 062319geo NAT: G.SRT.A.1 TOP: Line Dilations

20 ANS: 3
1) $\frac{360}{3} = 120$; 2) $\frac{360}{6} = 60$; 3) $\frac{360}{8} = 45$; 4) $\frac{360}{9} = 40$. 120 is not a multiple of 45.

PTS: 2 REF: 062320geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

21 ANS: 4 PTS: 2 REF: 062321geo NAT: G.SRT.B.5
TOP: Side Splitter Theorem

22 ANS: 4
$2(x + 13) = 5x - 1$ $MN = 9 + 13 = 22$

$2x + 26 = 5x - 1$

$27 = 3x$

$x = 9$

PTS: 2 REF: 062322geo NAT: G.CO.C.10 TOP: Midsegments

23 ANS: 3 PTS: 2 REF: 062323geo NAT: G.CO.C.11
TOP: Trapezoids

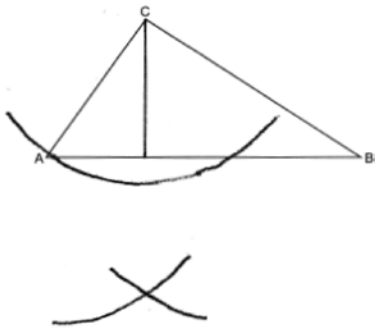
24 ANS: 4
$\left(\frac{-4+0}{2}, \frac{6+4}{2}\right) \rightarrow (-2,5)$; $\frac{6-4}{-4-0} = \frac{2}{-4} = -\frac{1}{2}$; $m_{\perp} = 2$; $y - 5 = 2(x + 2)$

$y = 2x + 4 + 5$

$y = 2x + 9$

PTS: 2 REF: 062324geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: perpendicular bisector

25 ANS:

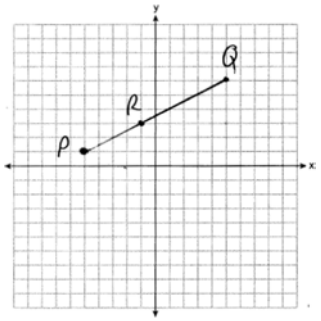


PTS: 2 REF: 062325geo NAT: G.CO.D.12 TOP: Constructions
KEY: parallel and perpendicular lines

26 ANS:
$T_{4,-4}$, followed by a 90º clockwise rotation about point D.

PTS: 2 REF: 062326geo NAT: G.CO.A.5 TOP: Compositions of Transformations

27 ANS:



$-5+\frac{2}{5}(5--5)\ \ 1+\frac{2}{5}(6-1)\ \ (-1,3)$

$-5+\frac{2}{5}(10) \qquad 1+\frac{2}{5}(5)$

$-5+4 \qquad 1+2$

$-1 \qquad 3$

PTS: 2 REF: 062327geo NAT: G.GPE.B.6 TOP: Directed Line Segments

28 ANS:
$\frac{80}{360}\cdot\pi(6.4)^2\approx 29$

PTS: 2 REF: 062328geo NAT: G.C.B.5 TOP: Sectors

29 ANS:
$\frac{4}{3}\pi\cdot(1)^3+\frac{4}{3}\pi\cdot(2)^3\ \frac{4}{3}\pi\cdot(3)^3=\frac{4}{3}\pi+\frac{32}{3}\pi+\frac{108}{3}\pi=48\pi$

PTS: 2 REF: 062329geo NAT: G.GMD.A.3 TOP: Volume
KEY: spheres

30 ANS:

$6^2 = 2(x+2);\ 16+2=18$

$36 = 2x+4$

$32 = 2x$

$16 = x$

PTS: 2 REF: 062330geo NAT: G.SRT.B.5 TOP: Similarity
KEY: leg

31 ANS:

$\frac{-2--4}{-3-4} = \frac{2}{-7};\ y-2 = -\frac{2}{7}(x-3)$

PTS: 2 REF: 062331geo NAT: G.GPE.B.4 TOP: Triangles in the Coordinate Plane

32 ANS:

$\tan 15 = \frac{x}{3280};\ \tan 31 = \frac{y}{3280}\ ;\ 1970.8 - 878.9 \approx 1092$

$x \approx 878.9 \qquad x \approx 1970.8$

PTS: 4 REF: 062332geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

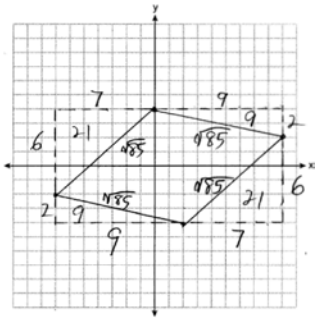
33 ANS:

$\pi(3.5)^2(9) \approx 346;\ \pi(4.5)^2(13) \approx 827;\ \frac{827}{346} \approx 2.4;$ 3 cans

PTS: 4 REF: 062333geo NAT: G.GMD.A.3 TOP: Volume
KEY: cylinders

34 ANS:

A rhombus has four congruent sides. Since each side measures $\sqrt{85}$, all four sides of *MATH* are congruent, and



MATH is a rhombus. $16 \times 8 - (21+9+21+9) = 68$

PTS: 4 REF: 062334geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane

35 ANS:

Quadrilateral $ABCD$, $\overline{AB} \cong \overline{CD}$, $\overline{AB} \parallel \overline{CD}$, diagonal $\overline{AC}$ intersects $\overline{EF}$ at G, and $\overline{DE} \cong \overline{BF}$ (given); $ABCD$ is a parallelogram (a quadrilateral with a pair of opposite sides $\parallel$ is a parallelogram); $\overline{AD} \cong \overline{CB}$ (opposite side of a parallelogram are congruent); $\overline{AE} \cong \overline{CF}$ (subtraction postulate); $\overline{AD} \parallel \overline{CB}$ (opposite side of a parallelogram are parallel); $\angle EAG \cong \angle FCG$ (if parallel sides are cut by a transversal, the alternate interior angles are congruent); $\angle AGE \cong \angle CGF$ (vertical angles); $\triangle AEG \cong \triangle CFG$ (AAS); $\overline{EG} \cong \overline{FG}$ (CPCTC): G is the midpoint of $\overline{EF}$ (since G divides $\overline{EF}$ into two equal parts, G is the midpoint of $\overline{EF}$).

PTS: 6 REF: 062335geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs