Geometry Regents Exam 0825
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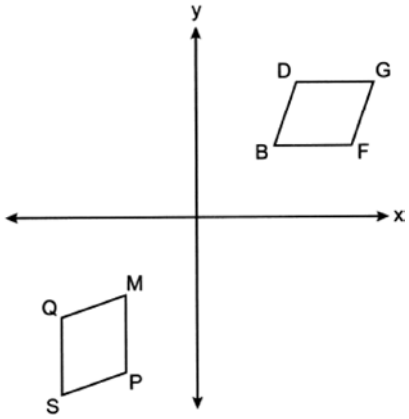
0825geo

1 An equilateral triangle is continuously rotated around one of its altitudes. The three-dimensional object formed is a
1) cone
2) sphere
3) cylinder
4) pyramid

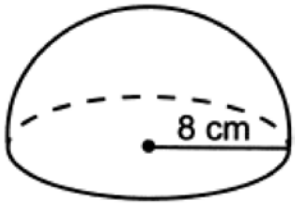
2 On the set of axes below, quadrilateral *BDGF* is rotated 90 degrees clockwise about the origin and then reflected over the *y*-axis. The image of quadrilateral *BDGF* is quadrilateral *MQSP*.



Side $\overline{BD}$ will always map onto
1) $\overline{MP}$
2) $\overline{PS}$
3) $\overline{MQ}$
4) $\overline{SQ}$

3 In right triangle *JOE*, hypotenuse $JO = 31.8$ and $m\angle J = 38°$. To the *nearest tenth*, the length of $\overline{EJ}$ is
1) 19.6
2) 25.1
3) 40.4
4) 51.7

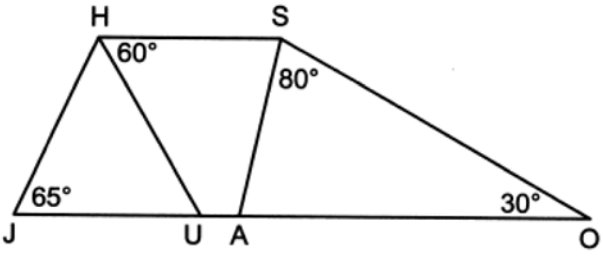
4 The hemisphere below has a radius of 8 cm.



To the *nearest cubic centimeter*, the volume of the hemisphere is
1) 201
2) 268
3) 1072
4) 2145

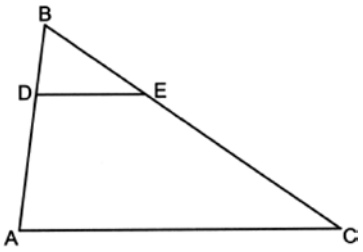
5 In parallelogram *ABCD*, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at *E*. Which information is sufficient to prove *ABCD* is a rhombus?
1) $\overline{AE} \cong \overline{EC}$
2) $\overline{AC} \cong \overline{BD}$
3) $\overline{AB} \perp \overline{BC}$
4) $\overline{AC} \perp \overline{BD}$

6 Trapezoid *JOSH*, shown below, has non-parallel sides $\overline{JH}$ and $\overline{OS}$, $m\angle J = 65°$, $m\angle O = 30°$, $m\angle OSA = 80°$, and $m\angle SHU = 60°$.



What is $m\angle HSA$?
1) 55°
2) 60°
3) 65°
4) 70°

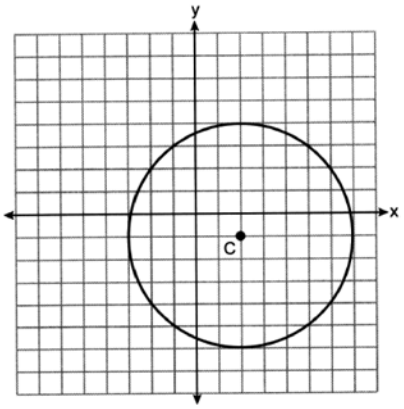
7 In $\triangle ABC$ below, points D and E are on $\overline{AB}$ and $\overline{CB}$, respectively, such that $\overline{DE} \parallel \overline{AC}$.



If $AD = 8$, $DB = 4$, and $DE = 6$, what is the length of $\overline{AC}$?

1) 24
2) 18
3) 12
4) 10

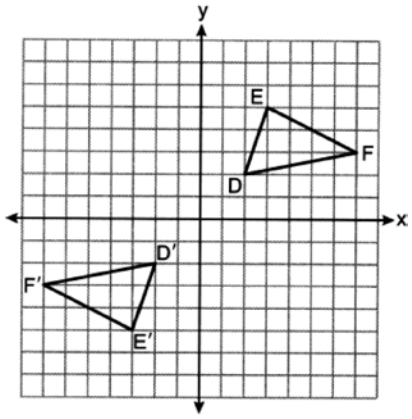
8 On the set of axes below, circle C has a center with coordinates $(2,-1)$.



Which equation represents circle C?

1) $(x-2)^2+(y+1)^2=25$
2) $(x-2)^2+(y+1)^2=16$
3) $(x+2)^2+(y-1)^2=25$
4) $(x+2)^2+(y-1)^2=16$

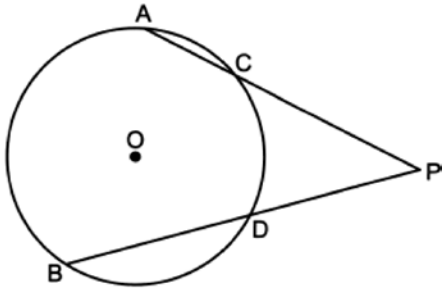
9 On the set of axes below, $\triangle D'E'F'$ is the image of $\triangle DEF$.



A transformation that maps $\triangle DEF$ onto $\triangle D'E'F'$ is a

1) reflection over the line $y = x$
2) reflection over the line $y = -x$
3) point reflection through the origin
4) translation 4 units left and 4 units down

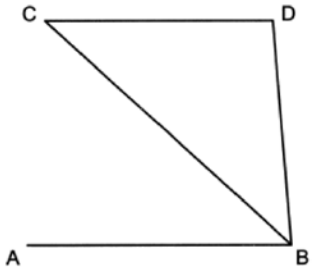
10 In circle O below, secants $\overline{PCA}$ and $\overline{PDB}$ are drawn from external point P.



If $PA = 17$, $PD = 10$, and $BD = 12$, what is the length of $\overline{PC}$, to the *nearest tenth*?

1) 7.1
2) 7.7
3) 12.9
4) 14.2

11 In the diagram below, $\overline{CD} \parallel \overline{AB}$, and $\overline{CB}$ bisects $\angle ABD$.



Which statement must be true?

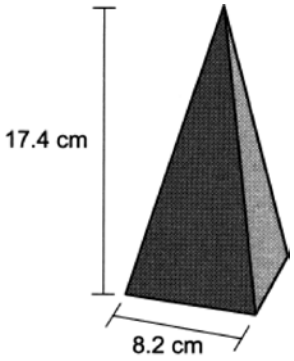
1) $\overline{CD} \cong \overline{AB}$
2) $\overline{AB} \cong \overline{BD}$
3) $\triangle CDB$ is a right triangle
4) $\triangle CDB$ is an isosceles triangle

12 Line h is represented by the equation $y = \frac{2}{3}x - 4$.

Which equation represents the line that is perpendicular to line h and passes through the point $(6,1)$?

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

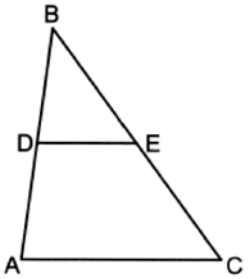
13 A wooden toy block can be modeled by a pyramid with a square base, as shown below. The height of the block is 17.4 cm and the square base has a side length of 8.2 cm.



The block is made of solid oak, which has a density of 0.77 g/cm^3. What is the mass of the block, to the *nearest gram*?

1) 300
2) 506
3) 637
4) 901

14 In $\triangle ABC$ below, midsegment $\overline{DE}$ is drawn.



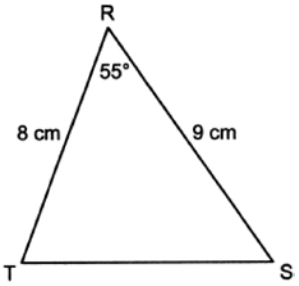
If $DE = x + 3$ and $AC = 3x - 5$, what is the length of $\overline{DE}$?

1) 28
2) 14
3) 7
4) 4

15 Triangle DUG is an isosceles right triangle with the right angle at G. If $DU = 10\sqrt{2}$, what is the length of $\overline{GU}$?

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

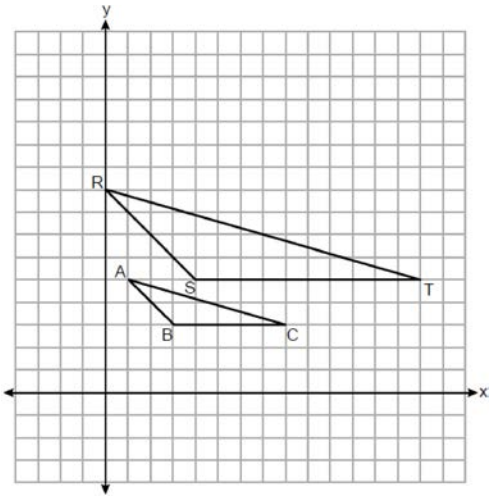
16 In $\triangle RST$ below, $RS = 9$ cm, $RT = 8$ cm, and $m\angle TRS = 55°$.



What is the area of $\triangle RST$, to the *nearest square centimeter*?

1) 59
2) 36
3) 29
4) 21

17 Triangle ABC is dilated by a scale factor of 2 to map onto its image, $\triangle RST$, on the set of axes below.



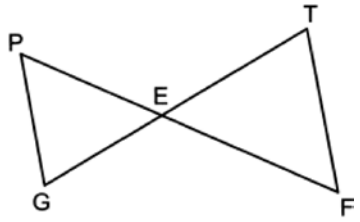
What are the coordinates of the center of this dilation?

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

18 What is the perimeter of $\triangle ABC$, where the vertices have coordinates $A(-2,3)$, $B(-2,-1)$, and $C(6,-1)$?

1) 16
2) 92
3) $16\sqrt{5}$
4) $12+4\sqrt{5}$

19 In the diagram below, $\overline{GT}$ and $\overline{PF}$ intersect at E, and $\angle P \cong \angle F$.



Which equation is always true?

1) $\frac{PE}{FE} = \frac{FT}{PG}$
2) $\frac{GE}{TE} = \frac{FT}{PG}$
3) $\frac{PE}{GE} = \frac{TE}{FE}$
4) $\frac{PE}{FE} = \frac{PG}{FT}$

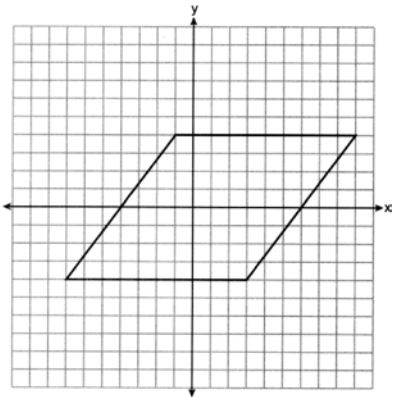
20 A section of sidewalk in the shape of a rectangular prism is being replaced. The sidewalk is 10 feet long, 4 feet wide, and 4 inches deep. A brand of concrete mix yields 0.6 cubic foot of concrete per bag. What is the minimum number of bags of concrete mix that must be purchased to completely replace this sidewalk?

1) 22
2) 23
3) 26
4) 27

21 The line $4x - 6y = 24$ is transformed by a dilation of scale factor 3 centered at the origin. Which equation represents the image of the line after this dilation?

1) $y = \frac{2}{3}x - 12$
2) $y = \frac{2}{3}x - 4$
3) $y = 2x - 12$
4) $y = 2x - 4$

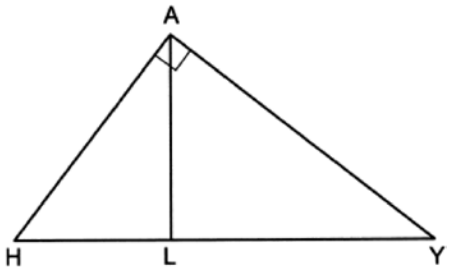
22 A rhombus is graphed on the set of axes below.



Which transformation does *not* carry the rhombus onto itself?

1) a rotation of 180° about the origin
2) a rotation of 180° about point $(1,0)$
3) a reflection over the line $y = \frac{1}{2}x - \frac{1}{2}$
4) a reflection over the line $y = -2x + 2$

23 In right triangle HAY below, altitude $\overline{AL}$ is drawn to hypotenuse $\overline{HY}$.



If $HY = 25$ and $YA = 20$, the length of $\overline{AL}$ is

1) 9
2) 12
3) 15
4) 16

24 Square $ABCD$ has an area of 36. If the square is dilated by a scale factor of $\frac{1}{2}$ centered at A, what is the area of its image?

1) 9
2) 18
3) 72
4) 144

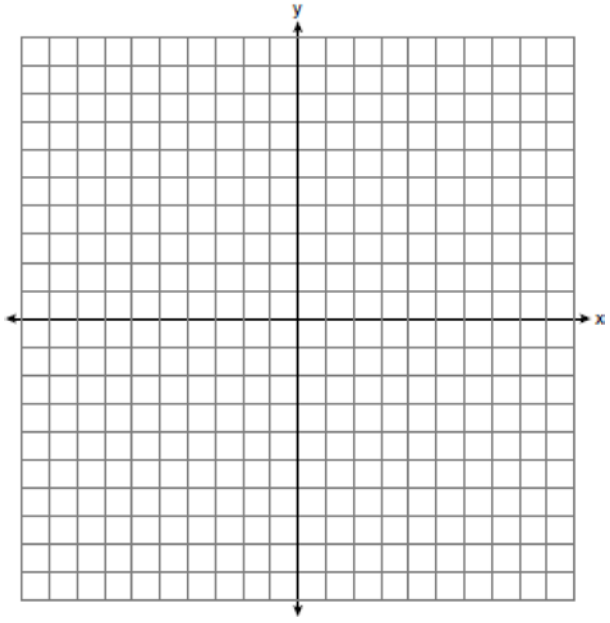
25 Triangle $D'A'N'$ is the image of $\triangle DAN$ after a translation. Explain why $\triangle D'A'N'$ must be congruent to $\triangle DAN$.

26 The table below lists five metals and their densities.

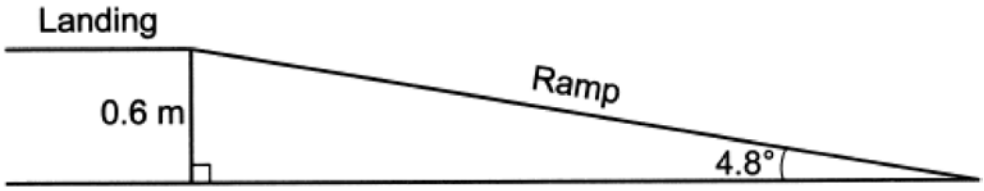
Metal	**Density** (g/cm^3)
Zinc	7.14
Tin	7.31
Iron	7.86
Copper	8.96
Silver	10.5

A solid metal cube has an edge length of 5 cm and a mass of 982.5 grams. Using the table above, determine and state the type of metal from which this cube is made.

27 The endpoints of $\overline{CAS}$ are $C(-3,1)$ and $S(7,6)$. Determine and state the coordinates of point A such that the ratio of $CA:AS$ is $3:2$. [The use of the set of axes below is optional.]

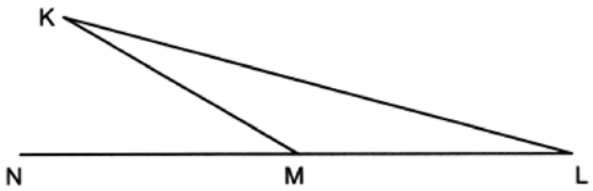


28 The ramp shown in the diagram below has an angle of elevation of 4.8º. The ramp is built to a landing 0.6 m above the ground.



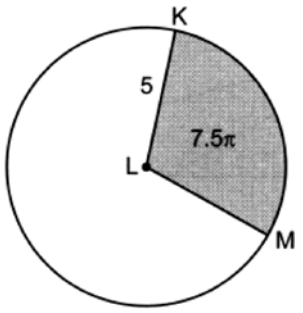
Determine and state the length of the ramp, to the *nearest tenth of a meter*.

29 Angle *KML* is the vertex angle of isosceles triangle *KLM* below. Side $\overline{LM}$ is extended through vertex *M* to point *N*.



If m∠*K* = 15°, determine and state m∠*KMN*.

30 In the diagram below of circle *L*, the area of the shaded sector *KLM* is 7.5π and *LK* = 5.

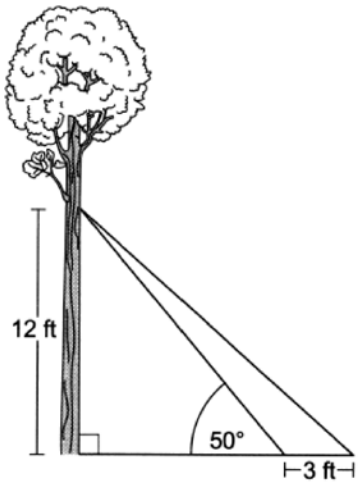


Determine and state the degree measure of angle *KLM*, the central angle of the shaded sector.

31 Using a compass and straightedge, construct the image of point *A* after a reflection over $\overline{BC}$. [Leave all construction marks.]

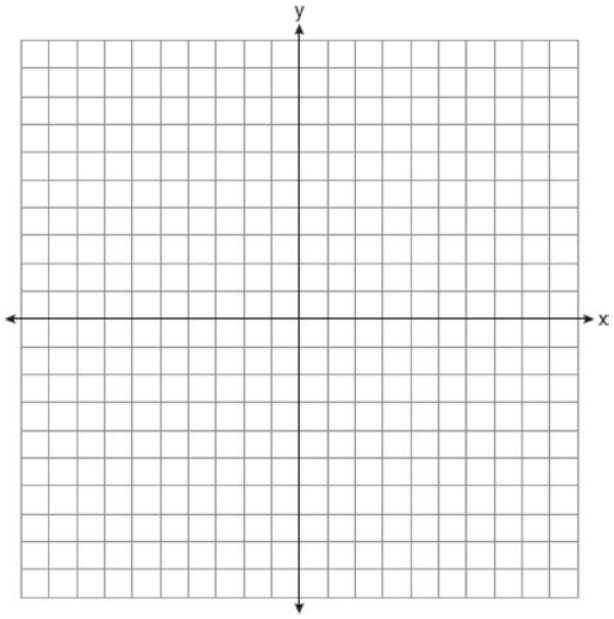
32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm. Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows. [1000 cm^3=1 liter]

33 As modeled in the diagram below, two cables are attached from a point on a tree 12 feet above the ground. The longer cable is anchored on the ground 3 feet farther from the tree than the shorter cable is anchored. The angle of elevation between the shorter cable and the ground is 50º.

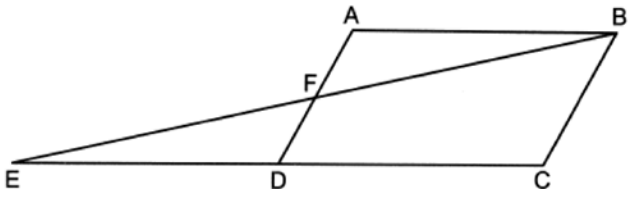


Determine and state, to the *nearest foot*, the distance from the base of the tree to the point where the longer cable is attached to the ground. Determine and state, to the *nearest degree*, the angle of elevation between the longer cable and the ground.

34 Quadrilateral *READ* has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$. Prove *READ* is a rectangle. [The use of the set of axes below is optional.]



35 In quadrilateral *ABCD* below, side $\overline{CD}$ is extended through *D* to point *E* such that $\overline{AFD}$ and $\overline{BFE}$ bisect each other, and $\overline{DE} \cong \overline{DC}$.



Prove *ABCD* is a parallelogram.

0825geo
Answer Section

1 ANS: 1 PTS: 2 REF: 082501geo NAT: G.GMD.B.4
TOP: Rotations of Two-Dimensional Objects

2 ANS: 3 PTS: 2 REF: 082502geo NAT: G.CO.B.6
TOP: Properties of Transformations

3 ANS: 2

$$\cos 38 = \frac{x}{31.8}$$

$$x \approx 25.1$$

PTS: 2 REF: 082503geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

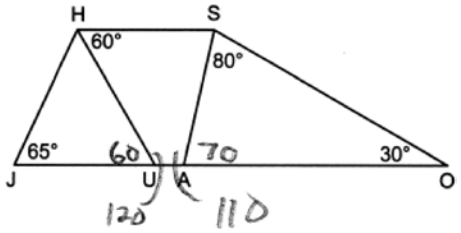
4 ANS: 3

$$V = \frac{1}{2} \times \frac{4}{3} \pi \cdot (8)^3 \approx 1072$$

PTS: 2 REF: 082504geo NAT: G.GMD.A.3 TOP: Volume
KEY: spheres

5 ANS: 4 PTS: 2 REF: 082505geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

6 ANS: 4



PTS: 2 REF: 082506geo NAT: G.CO.C.11 TOP: Interior and Exterior Angles of Polygons

7 ANS: 2

$$\frac{4}{6} = \frac{12}{x}$$

$$4x = 72$$

$$x = 18$$

PTS: 2 REF: 082507geo NAT: G.SRT.B.4 TOP: Side Splitter Theorem

8 ANS: 1 PTS: 2 REF: 082508geo NAT: G.GPE.A.1
TOP: Equations of Circles KEY: write equation, given graph

9 ANS: 3 PTS: 2 REF: 082509geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: graphics

10 ANS: 3

$17x = 22 \cdot 10$

$x \approx 12.9$

PTS: 2 REF: 082510geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: secants drawn from common point, length

11 ANS: 4 PTS: 2 REF: 082511geo NAT: G.CO.C.10
TOP: Interior and Exterior Angles of Triangles

12 ANS: 3

The slope of line h is $\frac{2}{3}$. The perpendicular slope is $-\frac{3}{2}$.

PTS: 2 REF: 082512geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

13 ANS: 1

$\frac{1}{3}(8.2)^2(17.4)(0.77) \approx 300$

PTS: 2 REF: 082513geo NAT: G.MG.A.2 TOP: Density

14 ANS: 2

$3x - 5 = 2(x + 3)$

$3x - 5 = 2x + 6$

$x = 11$

PTS: 2 REF: 082514geo NAT: G.CO.C.10 TOP: Midsegments

15 ANS: 3

$x^2 + x^2 = (10\sqrt{2})^2$

$2x^2 = 200$

$x^2 = 100$

$x = 10$

PTS: 2 REF: 082515geo NAT: G.SRT.C.8 TOP: Special Right Triangles

16 ANS: 3

$K = \frac{1}{2}(8)(9)\sin 55 \approx 29$

PTS: 2 REF: 082516geo NAT: G.SRT.D.9 TOP: Using Trigonometry to Find Area
KEY: basic

17 ANS: 2

$x_0 = \frac{kx_1 - x_2}{k - 1} = \frac{2(3) - 4}{2 - 1} = 2 \quad y_0 = \frac{ky_1 - y_2}{k - 1} = \frac{2(3) - 5}{2 - 1} = 1$

PTS: 2 REF: 082517geo NAT: G.SRT.A.2 TOP: Dilations

18 ANS: 4

$4+8+\sqrt{4^2+8^2} = 12+\sqrt{80} = 12+4\sqrt{5}$

PTS: 2 REF: 082518geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

19 ANS: 4 PTS: 2 REF: 082519geo NAT: G.SRT.B.5
TOP: Similarity KEY: basic

20 ANS: 2

$\frac{10 \cdot 4 \cdot \frac{1}{3}}{0.6} \approx 22.2$

PTS: 2 REF: 082520geo NAT: G.GMD.A.3 TOP: Volume
KEY: prisms

21 ANS: 1

$4x - 6y = 24$

$-6y = -4x + 24$

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

PTS: 2 REF: 082521geo NAT: G.SRT.A.1 TOP: Line Dilations

22 ANS: 1 PTS: 2 REF: 082522geo NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself

23 ANS: 2

$\frac{x}{20} = \frac{15}{25}$

$25x = 300$

$x = 12$

PTS: 2 REF: 082523geo NAT: G.SRT.B.4 TOP: Similarity

24 ANS: 1

$\left(\frac{\sqrt{36}}{2}\right)^2 = 9$

PTS: 2 REF: 082524geo NAT: G.SRT.B.5 TOP: Similarity
KEY: perimeter and area

25 ANS:
Translations preserve distance.

PTS: 2 REF: 082525geo NAT: G.CO.B.6 TOP: Properties of Transformations

26 ANS:

$\frac{982.5}{5^3} = 7.86$ Iron

PTS: 2 REF: 082526geo NAT: G.MG.A.2 TOP: Density

27 ANS:

$-3+\frac{3}{5}(7--3)=-3+\frac{3}{5}(10)=-3+6=3 \quad 1+\frac{3}{5}(6-1)=1+\frac{3}{5}(5)=1+3=4 \quad (3,4)$

PTS: 2 REF: 082527geo NAT: G.GPE.B.6 TOP: Directed Line Segments

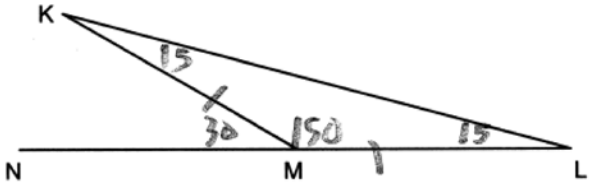
28 ANS:

$\sin 4.8=\frac{.6}{x}$

$x \approx 7.2$

PTS: 2 REF: 082528geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

29 ANS:



PTS: 2 REF: 082529geo NAT: G.CO.C.10 TOP: Exterior Angle Theorem

30 ANS:

$\frac{7.5\pi}{25\pi} \cdot 360 = 108$

PTS: 2 REF: 082530geo NAT: G.C.B.5 TOP: Sectors

31 ANS:

PTS: 2 REF: 082531geo NAT: G.CO.D.12 TOP: Constructions
KEY: line bisector

32 ANS:

$\frac{75000}{\pi(10)^2(26)} \approx 9$

PTS: 4 REF: 082532geo NAT: G.GMD.A.3 TOP: Volume
KEY: cylinders

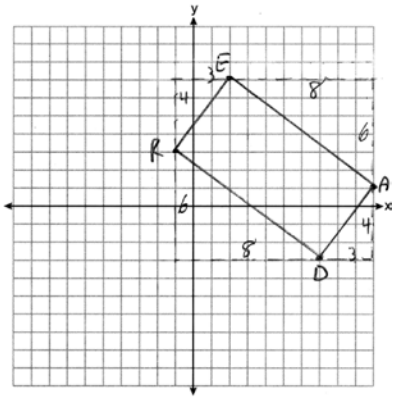
33 ANS:

$\tan 50 = \frac{12}{x}$ $10 + 3 = 13$ $\tan\theta = \frac{12}{13}$

$x \approx 10$ $\theta \approx 43$

PTS: 4 REF: 082533geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

34 ANS:



$m_{\overline{RE}} = \frac{4}{3}$ $m_{\overline{EA}} = -\frac{6}{8} = -\frac{3}{4}$ $m_{\overline{AD}} = \frac{4}{3}$ $m_{\overline{DR}} = -\frac{6}{8} = -\frac{3}{4}$ Adjacent sides have slopes that are opposite reciprocals, so are perpendicular. Perpendicular lines form right angles. A quadrilateral with four right angles is a rectangle.

PTS: 4 REF: 082534geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane

35 ANS:

1) Quadrilateral $ABCD$, side $\overline{CD}$ is extended through D to point E such that $\overline{AFD}$ and $\overline{BFE}$ bisect each other, and $\overline{DE} \cong \overline{DC}$ (given); 2) $\overline{FE} \cong \overline{FB}$ and $\overline{FD} \cong \overline{FA}$ (bisected lines form two congruent segments); 3) $\angle EFD \cong \angle BFA$ (vertical angles are congruent); 4) $\triangle EFD \cong \triangle BFA$ (SAS); 5) $\overline{AB} \cong \overline{DE}, \angle E \cong \angle ABF$ (CPCTC); 6) $\overline{AB} \cong \overline{DC}$ (Substitution); 7) $\overline{AB} \parallel \overline{DC}$ (if the alternate interior angles formed by a transversal crossing two lines are congruent, the lines are parallel); 8) $ABCD$ is a parallelogram (if a pair of opposite sides of a quadrilateral are parallel and congruent, it is a parallelogram).

PTS: 6 REF: 082535geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs