Geometry Regents Exam 0626
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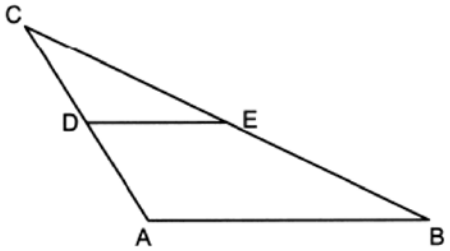
## 0626geo

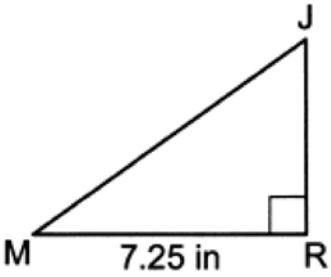
1 Which transformation would result in the area of a rectangle's image being different from the area of its pre-image?
   1) a reflection over the $y$-axis
   2) a translation 4 units to the right
   3) a rotation of 90º counterclockwise about the origin
   4) a vertical stretch of scale factor 3 with respect to $y = 0$

2 In the diagram below of $\triangle ABC$, points $D$ and $E$ are the midpoints of $\overline{CA}$ and $\overline{CB}$, respectively.



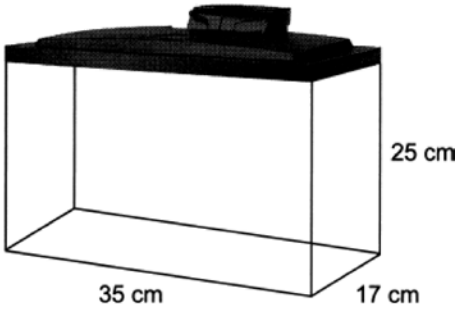

Which statement must always be true?
   1) $DE = \frac{1}{2}AB$
   2) $DE = \frac{1}{2}AC$
   3) $AD = \frac{1}{2}AB$
   4) $AB = \frac{1}{2}DE$

3 In triangle $RJM$ below, m$\angle R = 90°$ and $MR = 7.25$ inches.



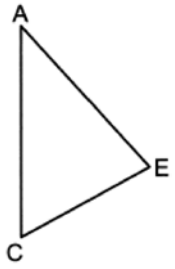

If the measure of angle $M$ is 35°, what is the length of $\overline{MJ}$, to the *nearest hundredth of an inch*?
   1) 4.16
   2) 5.94
   3) 8.85
   4) 12.64

4 A fish tank in the shape of a rectangular prism with a length of 35 cm, width of 17 cm, and a height of 25 cm is shown below.




If the fish tank is filled with water to a height 3 centimeters from the top, how many liters of water are in this tank, to the *nearest liter*? [1 liter = 1000 cubic centimeters]
   1) 10
   2) 13
   3) 15
   4) 17

5 Triangle $ACE$ is drawn below. Triangle $ACE$ is mapped onto triangle $AXE$ after a reflection over side $\overline{AE}$. Triangle $AXE$ is then mapped onto triangle $LXE$ after a reflection over side $\overline{XE}$.



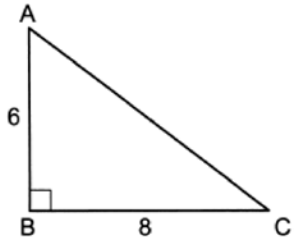

Which side of $\triangle LXE$ is the image of $\overline{AC}$?

1) $\overline{LE}$
2) $\overline{AX}$
3) $\overline{XE}$
4) $\overline{LX}$

6 The lines whose equations are represented by $y = -\frac{1}{2}x + 2$ and $x + 2y = 8$ are

1) parallel
2) perpendicular
3) the same line
4) neither parallel nor perpendicular

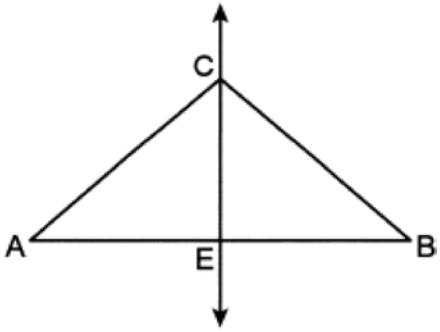
7 Right triangle $ABC$ below has legs whose lengths are 6 and 8.




What is the volume of the three-dimensional object formed by continuously rotating $\triangle ABC$ about $\overline{AB}$?

1) $96\pi$
2) $128\pi$
3) $288\pi$
4) $384\pi$

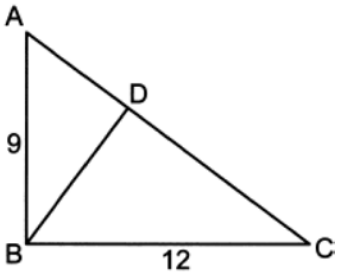
8 In $\triangle ABC$ below, $\overleftrightarrow{CE}$ is the perpendicular bisector of $\overline{AEB}$.




Which statement is always true?

1) $\overline{AC} \cong \overline{BC}$
2) $\overline{AE} \cong \overline{CE}$
3) $\angle EAC \cong \angle BCE$
4) $m\angle A + m\angle B = 90°$

9 In right triangle $ABC$ below, $AB = 9$, $BC = 12$, and altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$.




Which equation is always true for $\overline{BD}$?

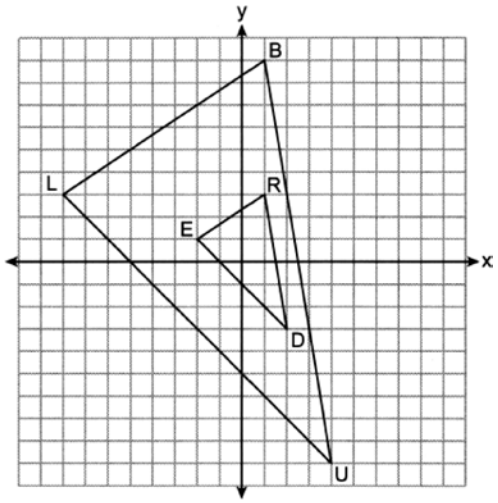
1) $\cos A = \frac{BD}{9}$
2) $\sin C = \frac{BD}{12}$
3) $\tan A = \frac{BD}{9}$
4) $\sin C = \frac{BD}{15}$

10 Which regular polygon, when rotated about its center, carries onto itself after both a 120° rotation and a 180° rotation?

1) triangle
2) square
3) hexagon
4) octagon

11 The coordinates of the endpoints of $\overline{PA}$ are $P(3,-6)$ and $A(-2,9)$. If point $C$ is on $\overline{PA}$, what are the coordinates of $C$ such that $PC{:}CA = 1{:}4$?
1) $(-1,6)$
2) $(0,3)$
3) $(1,0)$
4) $\left(2,-3\right)$

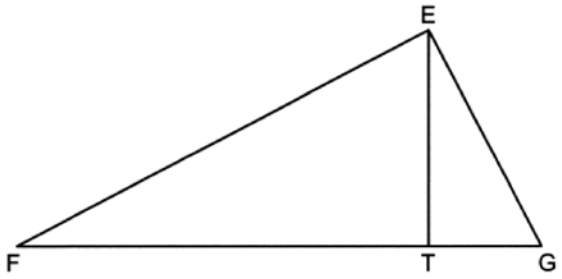
12 On the set of axes below, $\triangle BLU$ is the image of $\triangle RED$ after a dilation.




What are the scale factor and the coordinates of the center of dilation of this transformation?
1) 2 and $(0,0)$
2) 2 and $(1,0)$
3) 3 and $(0,0)$
4) 3 and $(1,0)$

13 What are the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 = 45 + 4x$?
1) center $(2,0)$ and radius 7
2) center $(-2,0)$ and radius 7
3) center $(2,0)$ and radius 49
4) center $(-2,0)$ and radius 49

14 In right triangle $EFG$ below, altitude $\overline{ET}$ is drawn to hypotenuse $\overline{FG}$.

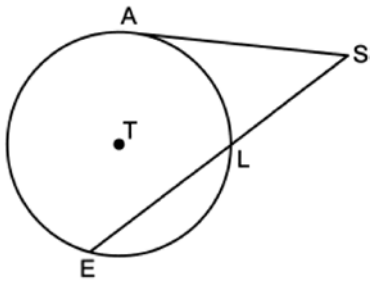



If $EF = 17$ and $FT = 15$, what is the length of $\overline{TG}$, to the *nearest tenth*?
1) 3.8
2) 4.3
3) 8.0
4) 9.1

15 In trapezoid $ERJT$, sides $\overline{ER}$ and $\overline{TJ}$ are parallel. If $m\angle R = (2x + 15)°$ and $m\angle J = (3x - 40)°$, what is $m\angle J$?
1) 125°
2) 97°
3) 83°
4) 55°

16 In isosceles right triangle $ABC$, the length of hypotenuse $\overline{AC}$ is 14. What is the length of $\overline{BC}$, to the *nearest tenth*?
1) 7.0
2) 8.1
3) 9.9
4) 19.8

17 In circle $T$ below, tangent $\overline{AS}$ and secant $\overline{ELS}$ are drawn.




If $SL = 8$ and $LE = 10$, the length of $\overline{AS}$ is

1) $\sqrt{18}$
2) $\sqrt{80}$
3) 9
4) 12

18 Parallelogram $MERT$ has diagonals that intersect at $I$. Which additional statement is sufficient to prove $MERT$ is a rhombus?

1) $\angle ERT \cong \angle RTM$
2) $\angle MEI \cong \angle RTI$
3) $m\angle TIM \cong 90°$
4) $\overline{ME} \cong \overline{RT}$

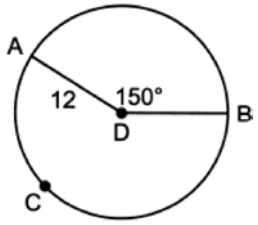
19 For the acute angles in right triangle $ABC$, $\sin(3x)° = \cos(x + 10)°$. What is the measure of the *smallest* angle in $\triangle ABC$?

1) 5°
2) 15°
3) 30°
4) 60°

20 Which two-dimensional shape below can *not* be a plane section of a rectangular prism?

1) triangle
2) octagon
3) pentagon
4) trapezoid

21 Points $A$, $B$, and $C$ are on circle $D$ below such that $DA = 12$ and $m\angle ADB = 150°$.



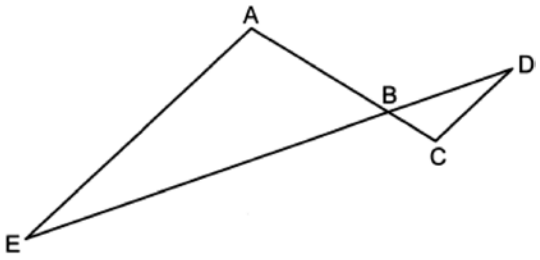

The length of $\overset{\frown}{AB}$ is

1) $5\pi$
2) $10\pi$
3) $24\pi$
4) $60\pi$

22 The lengths of two sides of a triangle are 12 and 30. The length of the third side could be

1) 12
2) 18
3) 28
4) 42

23 In the diagram below, $\overline{AC}$ and $\overline{ED}$ intersect at $B$, and $\overline{AE} \parallel \overline{CD}$.

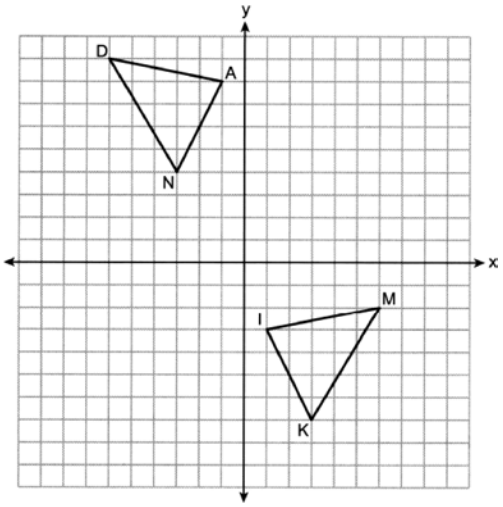



If $AB = 6$, $BC = 2$, $CD = 3$, and $BD = 4$, what is the perimeter of $\triangle ABE$?

1) 9
2) 18
3) 21
4) 27

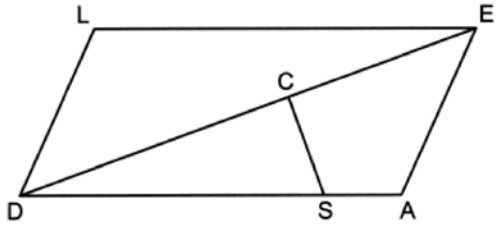
24 On the coordinate plane, a line is dilated by a scale factor, centered at a point on the line. The image of the line has
1) the same slope and the same $y$-intercept as the original line
2) the same $y$-intercept but a different slope as the original line
3) the same slope but a different $y$-intercept as the original line
4) a different slope and a different $y$-intercept than the original line

25 On the set of axes below, $\triangle DAN \cong \triangle MIK$.




Describe a sequence of rigid motions that maps $\triangle DAN$ onto $\triangle MIK$.

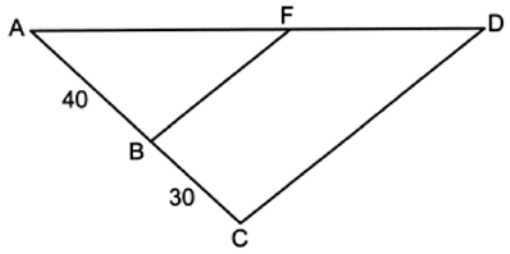
26 In parallelogram $LEAD$ below, $C$ is on $\overline{DE}$ and $S$ is on $\overline{DA}$ such that $\overline{SC} \perp \overline{DE}$.




If $m\angle LED = 21°$, determine and state the measure of $\angle CSA$.

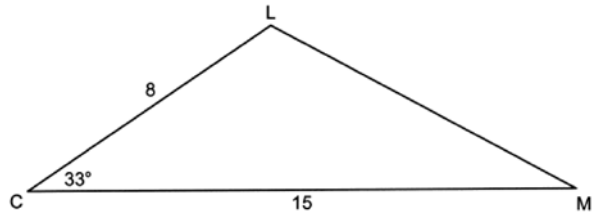
27 A section of tree trunk from a white pine tree can be modeled by a cylinder. The diameter of the trunk is 1.5 feet, and the height of this section is 8 feet. If white pine weighs 25 pounds per cubic foot, determine and state the weight of this section of the white pine tree, to the *nearest pound*.

28 In $\triangle ADC$ below, points $B$ and $F$ are on $\overline{AC}$ and $\overline{AD}$, respectively, such that $AB = 40$, $BC = 30$, and $\overline{BF}$ is drawn.



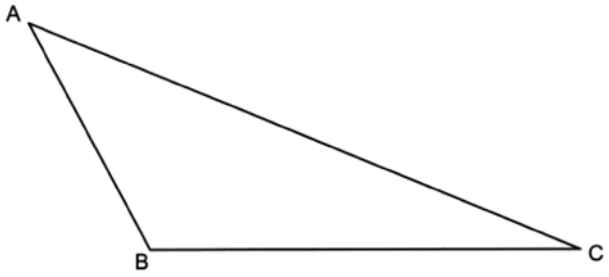

If $AF = 64$, determine and state the length of $\overline{FD}$ that would prove $\overline{BF} \parallel \overline{CD}$.

29 In $\triangle CLM$ below, $m\angle C = 33°$, $CL = 8$, and $CM = 15$.



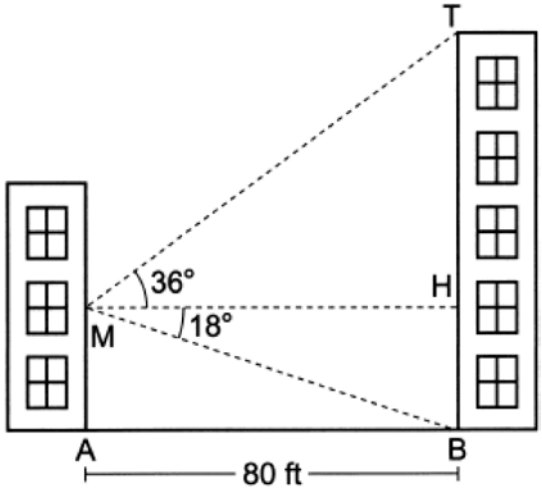

Determine and state, to the *nearest tenth*, the area of $\triangle CLM$.

30 In the diagram of $\triangle ABC$ below, use a compass and straightedge to construct the angle bisector of $\angle ABC$. [Leave all construction marks.]



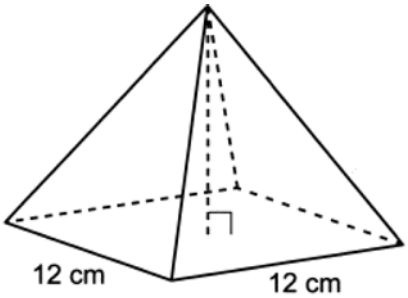
31 The diagonals of parallelogram *GRAM* intersect at *P*. If $RP = 12$ and $GA = 24$, explain why *GRAM* is a rectangle.

32 As modeled below, Maria wants to determine the height of the building across the street from her position, *M*. The angle of elevation from *M* to the top of the building, *T*, is 36°. From *M*, the angle of depression to the base of the building, *B*, is 18°. The buildings are 80 feet apart.



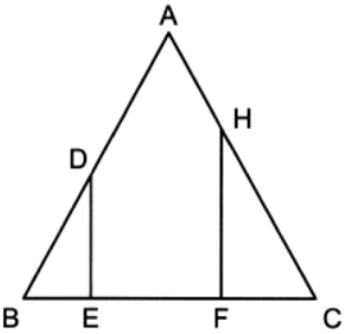

Determine and state, to the *nearest foot*, the height of the building, *TB*, across the street from Maria.

33 An artist uses clay to make solid pyramids with a square base whose sides measure 12 cm, as modeled below.



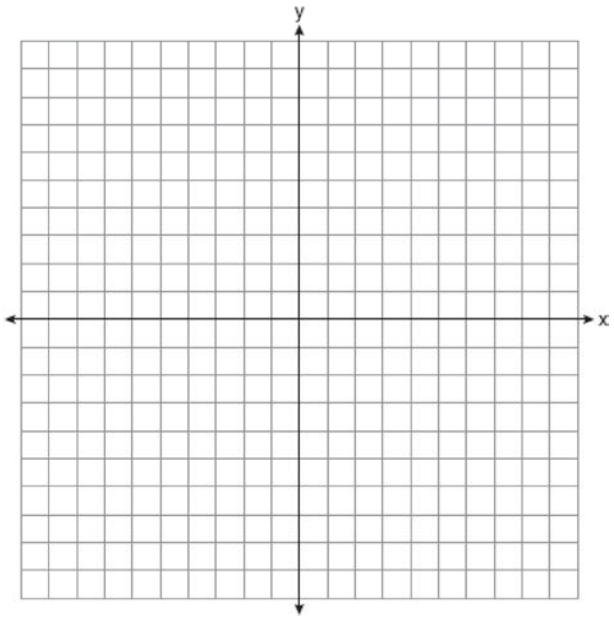

The height of each pyramid is 8 cm, and the density of the clay is 1.25 g/cm$^3$. If the artist has 15 kilograms of clay, determine and state the maximum number of pyramids that can be made.

34 Given: Triangle *ABC*, $\overline{AB} \cong \overline{AC}$, $\overline{DE} \perp \overline{BC}$, and $\overline{HF} \perp \overline{BC}$




Prove: $\frac{DE}{BE} = \frac{HF}{CF}$

35 Triangle *ABC* has vertices whose coordinates are $A(-3,-1)$, $B(-5,2)$, and $C(-1,8)$. State the coordinates of point *D* such that quadrilateral *ABCD* is a parallelogram. Prove *ABCD* is a parallelogram. State the coordinates of point *E*, the midpoint of $\overline{BC}$. Prove $\triangle ABE$ is an isosceles triangle. [The use of the set of axes below is optional.]



# 0626geo
## Answer Section

1 ANS: 4 PTS: 2 REF: 062601geo NAT: G.CO.A.2
TOP: Identifying Transformations

2 ANS: 1 PTS: 2 REF: 062602geo NAT: G.CO.C.10
TOP: Midsegments

3 ANS: 3

$\cos 35 = \frac{7.25}{x}$

$x \approx 8.85$

PTS: 2 REF: 062603geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

4 ANS: 2

$\frac{35 \times 17 \times 22}{1000} \approx 13$

PTS: 2 REF: 062604geo NAT: G.GMD.A.3 TOP: Volume
KEY: prisms

5 ANS: 4 PTS: 2 REF: 062605geo NAT: G.CO.A.5
TOP: Compositions of Transformations

6 ANS: 1

$x + 2y = 8$ The lines have the same slope of $-\frac{1}{2}$, but different $y$-intercepts.

$2y = -x + 8$

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

PTS: 2 REF: 062606geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: classify

7 ANS: 2

$V = \frac{1}{3}(\pi)(8)^2(6) = 128\pi$

PTS: 2 REF: 062607geo NAT: G.GMD.B.4 TOP: Rotations of Two-Dimensional Objects

8 ANS: 1 PTS: 2 REF: 062608geo NAT: G.SRT.B.4
TOP: Medians, Altitudes and Bisectors

9 ANS: 2 PTS: 2 REF: 062609geo NAT: G.SRT.C.6
TOP: Trigonometric Ratios

10 ANS: 3

$\frac{360}{6} = 60$ 120° and 180° are both multiples of 60°.

PTS: 2 REF: 062610geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

11 ANS: 4

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

PTS: 2 REF: 062611geo NAT: G.GPE.B.6 TOP: Directed Line Segments

12 ANS: 4

Point $R$ is 3 units from $(1,0)$ and point $B$ is 9 units from $(1,0)$.

PTS: 2 REF: 062612geo NAT: G.SRT.A.2 TOP: Dilations

13 ANS: 1

$x^2 - 4x + y^2 = 45$

$x^2 - 4x + 4 + y^2 = 45 + 4$

$(x-2) + y^2 = 49$

PTS: 2 REF: 062613geo NAT: G.GPE.A.1 TOP: Equations of Circles

KEY: completing the square

14 ANS: 2

$15(15+x) = 17^2$

$225 + 15x = 289$

$15x = 64$

$x \approx 4.3$

PTS: 2 REF: 062614geo NAT: G.SRT.B.4 TOP: Similarity

15 ANS: 3

$2x + 15 + 3x - 40 = 180 \quad \text{m}\angle J = (3(41) - 40)° = 83°$

$5x - 25 = 180$

$5x = 205$

$x = 41$

PTS: 2 REF: 062615geo NAT: G.CO.C.11 TOP: Trapezoids

16 ANS: 3

$x^2 + x^2 = 14^2$

$2x^2 = 196$

$x^2 = 98$

$x \approx 9.9$

PTS: 2 REF: 062616geo NAT: G.SRT.C.8 TOP: Special Right Triangles

17 ANS: 4

$x^2 = 18 \times 8$

$x^2 = 144$

$x = 12$

PTS: 2 REF: 062617geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: secant and tangent drawn from common point, length

18 ANS: 3 PTS: 2 REF: 062618geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

19 ANS: 3

$3x + x + 10 = 90 \;\; 20 + 10 = 30$

$4x = 80$

$x = 20$

PTS: 2 REF: 062619geo NAT: G.SRT.C.7 TOP: Cofunctions

20 ANS: 2 PTS: 2 REF: 062620geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

21 ANS: 2

$\frac{150}{360} \cdot 24\pi = 10\pi$

PTS: 2 REF: 062621geo NAT: G.C.B.5 TOP: Arc Length

22 ANS: 3

$12 + 28 > 30$

PTS: 2 REF: 062622geo NAT: G.CO.C.10 TOP: Triangle Inequality Theorem

23 ANS: 4

$\frac{6}{2}(2 + 3 + 4) = 27$

PTS: 2 REF: 062623geo NAT: G.SRT.B.5 TOP: Similarity
KEY: perimeter and area

24 ANS: 1 PTS: 2 REF: 062624geo NAT: G.SRT.A.1
TOP: Line Dilations

25 ANS:

$T_{0,-11} \circ r_{y\text{-axis}}$

PTS: 2 REF: 062625geo NAT: G.CO.A.5 TOP: Compositions of Transformations

26 ANS:

$180 - (90 + 21) = 69 \;\; 180 - 69 = 111$

PTS: 2 REF: 062626geo NAT: G.CO.C.11 TOP: Interior and Exterior Angles of Polygons

27 ANS:

$$\pi\left(\frac{1.5}{2}\right)^2(8)\cdot 25 \approx 353$$

PTS: 2 REF: 062627geo NAT: G.MG.A.2 TOP: Density

28 ANS:

$$\frac{40}{70} = \frac{64}{64+x}$$

$$2560 + 40x = 4480$$

$$40x = 1920$$

$$x = 48$$

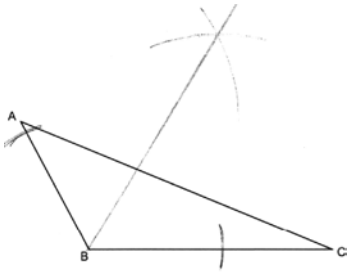
PTS: 2 REF: 062628geo NAT: G.SRT.B.4 TOP: Side Splitter Theorem

29 ANS:

$$\frac{1}{2}\cdot 8 \cdot 15\sin 33 \approx 32.7$$

PTS: 2 REF: 062629geo NAT: G.SRT.D.9 TOP: Using Trigonometry to Find Area
KEY: basic

30 ANS:




PTS: 2 REF: 062630geo NAT: G.CO.D.12 TOP: Constructions
KEY: angle bisector

31 ANS:

Because *GRAM* is a parallelogram, the diagonals bisect each other, and so $RM = 24$. Since the diagonals are congruent, *GRAM* is a rectangle.

PTS: 2 REF: 062631geo NAT: G.CO.C.11 TOP: Quadrilateral Proofs

32 ANS:

$$\tan 36 = \frac{x}{80} \qquad \tan 18 = \frac{y}{80} \qquad TB \approx 58 + 26 \approx 84$$

$$x \approx 58.12 \qquad y \approx 25.99$$

PTS: 4 REF: 062632geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

33 ANS:

$$\frac{15000}{\frac{1}{3}(12)^2(8)(1.25)} \approx 31$$

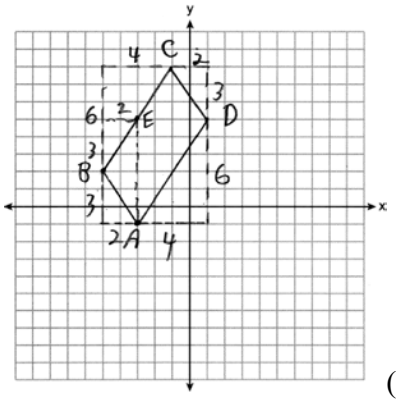
PTS: 4 REF: 062633geo NAT: G.MG.A.2 TOP: Density

34 ANS:

Triangle $ABC$, $\overline{AB} \cong \overline{AC}$, $\overline{DE} \perp \overline{BC}$, and $\overline{HF} \perp \overline{BC}$ (Given); $\angle B \cong \angle C$ (Isosceles Triangle Theorem); $\angle DEB$ and $\angle HFC$ are right angles (Perpendicular lines form right angles); $\angle DEB \cong \angle HFC$ (All right angles are congruent); $\triangle DEB \cong \triangle HFC$ (AA); $\frac{DE}{BE} = \frac{HF}{CF}$ (similar triangles have proportional corresponding sides)

PTS: 4 REF: 062634geo NAT: G.SRT.A.3 TOP: Similarity Proofs

35 ANS:




(1,5). $m_{\overline{AB}} = -\frac{3}{2} = m_{\overline{CD}}$ and $m_{\overline{BC}} = \frac{6}{4} = m_{\overline{AD}}$ (Sides that have the same slope are parallel). $ABCD$ is a parallelogram because both pairs of opposite sides are parallel. $(-3,5)$.

$BE = \sqrt{3^2 + 2^2} = \sqrt{13}$ and $AB = \sqrt{3^2 + 2^2} = \sqrt{13}$ ($\triangle ABE$ is isosceles because two sides are congruent).

PTS: 6 REF: 062635geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane