Geometry CCSS Regents Exam 0822
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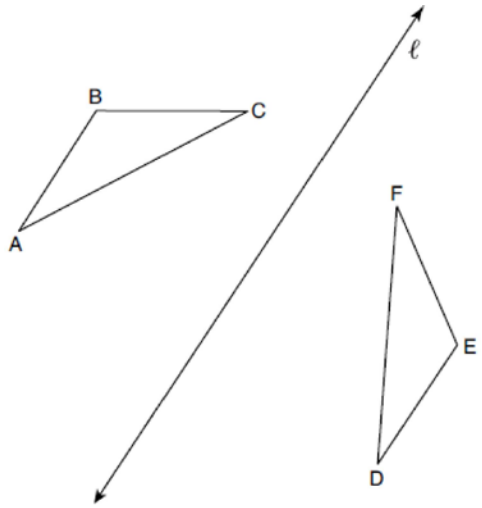
0822geo

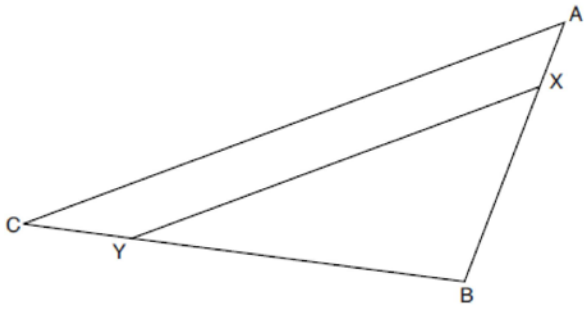
1 In the diagram below, $\triangle ABC$ is reflected over line ℓ to create $\triangle DEF$.



If $m\angle A = 40°$ and $m\angle B = 95°$, what is $m\angle F$?

1) 40°
2) 45°
3) 85°
4) 95°

2 The diagram below shows triangle ABC with point X on side $\overline{AB}$ and point Y on side $\overline{CB}$.



Which information is sufficient to prove that $\triangle BXY \sim \triangle BAC$?

1) $\angle B$ is a right angle.
2) $\overline{XY}$ is parallel to $\overline{AC}$.
3) $\triangle ABC$ is isosceles.
4) $\overline{AX} \cong \overline{CY}$

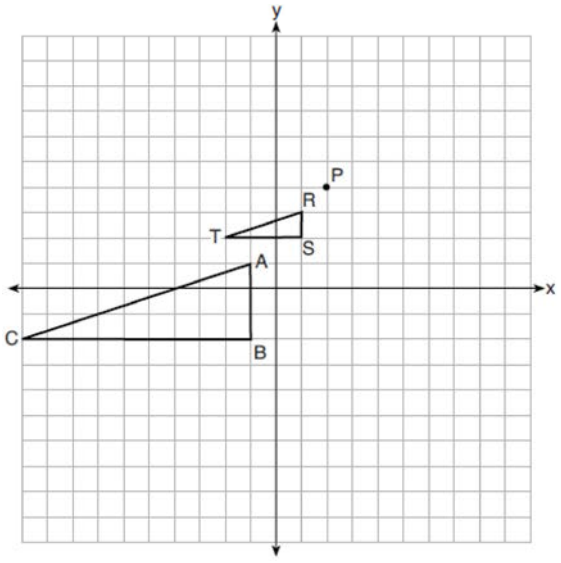
3 Quadrilateral $MATH$ is congruent to quadrilateral $WXYZ$. Which statement is always true?

1) $MA = XY$
2) $m\angle H = m\angle W$
3) Quadrilateral $WXYZ$ can be mapped onto quadrilateral $MATH$ using a sequence of rigid motions.
4) Quadrilateral $MATH$ and quadrilateral $WXYZ$ are the same shape, but not necessarily the same size.

4 A quadrilateral has diagonals that are perpendicular but *not* congruent. This quadrilateral could be
1) a square
2) a rhombus
3) a rectangle
4) an isosceles trapezoid

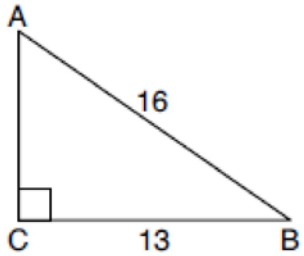
5 Which regular polygon has a minimum rotation of 36° about its center that carries the polygon onto itself?
1) pentagon
2) octagon
3) nonagon
4) decagon

6 On the set of axes below, $\triangle RST$ is the image of $\triangle ABC$ after a dilation centered at point P.



The scale factor of the dilation that maps $\triangle ABC$ onto $\triangle RST$ is
1) $\frac{1}{3}$
2) 2
3) 3
4) $\frac{2}{3}$

7 In the diagram of $\triangle ABC$ below, m$\angle C = 90°$, $CB = 13$, and $AB = 16$.



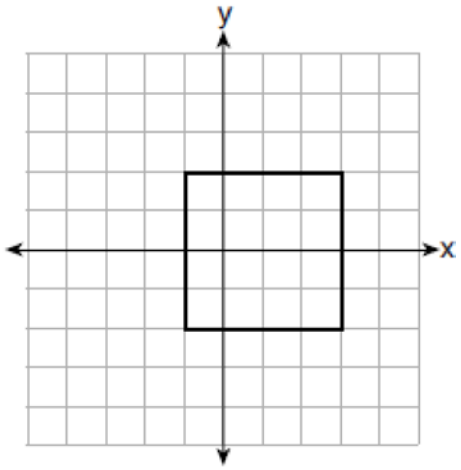
What is the measure of $\angle A$, to the *nearest degree*?
1) 36°
2) 39°
3) 51°
4) 54°

8 The Pyramid of Memphis, in Tennessee, stands 107 yards tall and has a square base whose side is 197 yards long.

What is the volume of the Pyramid of Memphis, to the *nearest cubic yard*?

1) 751,818
2) 1,384,188
3) 2,076,212
4) 4,152,563

9 A square is graphed on the set of axes below, with vertices at (−1,2), (−1,−2), (3,−2), and (3,2).



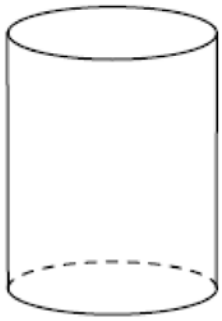
Which transformation would *not* carry the square onto itself?

1) reflection over the y-axis
2) reflection over the x-axis
3) rotation of 180 degrees around point (1,0)
4) reflection over the line $y = x - 1$

10 If scalene triangle XYZ is similar to triangle QRS and $m\angle X = 90°$, which equation is always true?

1) $\sin Y = \sin S$
2) $\cos R = \cos Z$
3) $\cos Y = \sin Q$
4) $\sin R = \cos Z$

11 A plane intersects a cylinder perpendicular to its bases.



This cross section can be described as a

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

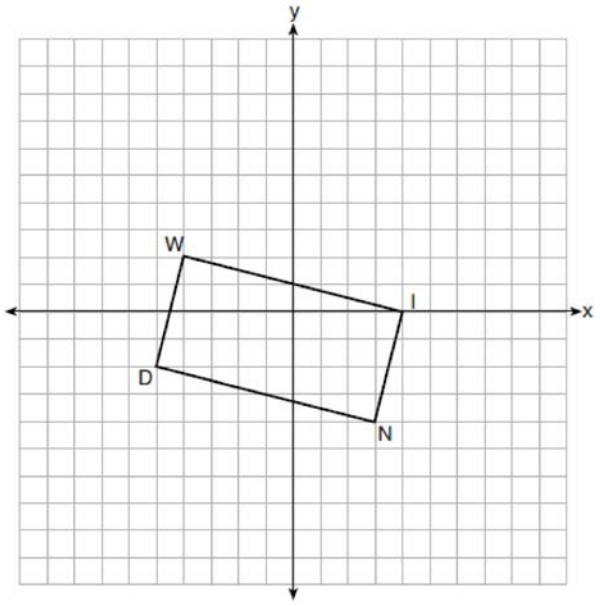
12 An equation of line p is $y = \frac{1}{3}x + 4$. An equation of line q is $y = \frac{2}{3}x + 8$. Which statement about lines p and q is true?

1) A dilation of $\frac{1}{2}$ centered at the origin will map line q onto line p.
2) A dilation of 2 centered at the origin will map line p onto line q.
3) Line q is not the image of line p after a dilation because the lines are not parallel.
4) Line q is not the image of line p after a dilation because the lines do not pass through the origin.

13 The coordinates of the endpoints of $\overline{SC}$ are $S(-7,3)$ and $C(2,-6)$. If point M is on $\overline{SC}$, what are the coordinates of M such that $SM:MC$ is 1:2?

1) $(-4,0)$
2) $(0,-4)$
3) $(-1,-3)$
4) $\left(-\frac{5}{2},-\frac{3}{2}\right)$

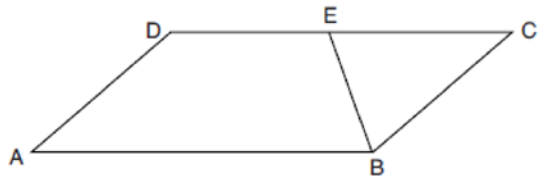
14 On the set of axes below, rectangle *WIND* has vertices with coordinates $W(-4,2)$, $I(4,0)$, $N(3,-4)$, and $D(-5,-2)$.



What is the area of rectangle *WIND*?

1) 17
2) 31
3) 32
4) 34

15 In parallelogram *ABCD* shown below, $\overline{EB}$ bisects $\angle ABC$.



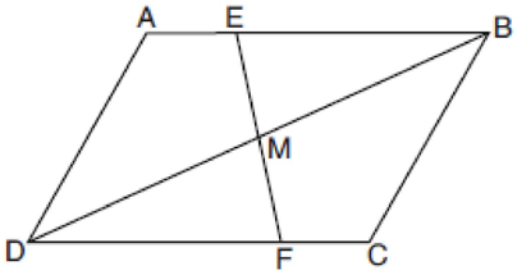
If $m\angle A = 40°$, then $m\angle BED$ is

1) 40°
2) 70°
3) 110°
4) 140°

16 In right triangles *ABC* and *RST*, hypotenuse $AB = 4$ and hypotenuse $RS = 16$. If $\triangle ABC \sim \triangle RST$, then 1:16 is the ratio of the corresponding

1) legs
2) areas
3) volumes
4) perimeters

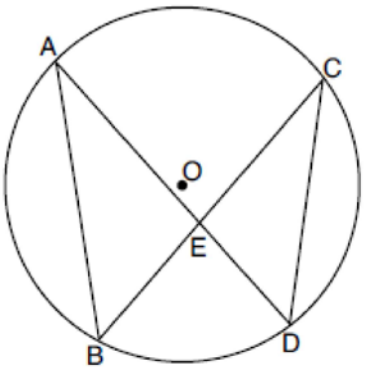
17 Parallelogram $ABCD$ with diagonal $\overline{DB}$ is drawn below. Line segment EF is drawn such that it bisects $\overline{DB}$ at M.



Which triangle congruence method would prove that $\triangle EMB \sim \triangle FMD$?

1) ASA, only
2) AAS, only
3) both ASA and AAS
4) neither ASA nor AAS

18 In the diagram below of circle O, chords $\overline{AD}$ and $\overline{BC}$ intersect at E, and chords $\overline{AB}$ and $\overline{CD}$ are drawn.



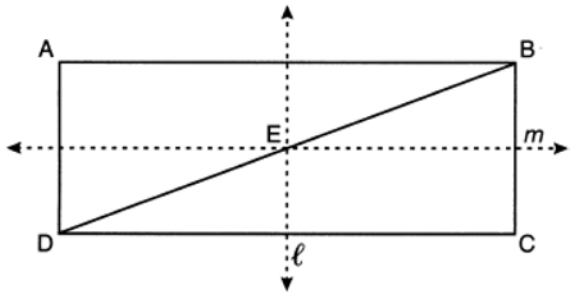
Which statement must always be true?

1) $\overline{AB} \cong \overline{CD}$
2) $\overline{AD} \cong \overline{BC}$
3) $\angle B \cong \angle C$
4) $\angle A \cong \angle C$

19 What are the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 - 12y - 20.25 = 0$?

1) center $(0,6)$ and radius 7.5
2) center $(0,-6)$ and radius 7.5
3) center $(0,12)$ and radius 4.5
4) center $(0,-12)$ and radius 4.5

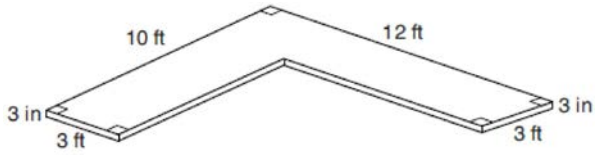
20 In the diagram below, $ABCD$ is a rectangle, and diagonal $\overline{BD}$ is drawn. Line ℓ, a vertical line of symmetry, and line m, a horizontal line of symmetry, intersect at point E.



Which sequence of transformations will map $\triangle ABD$ onto $\triangle CDB$?

1) a reflection over line ℓ followed by a 180° rotation about point E
2) a reflection over line ℓ followed by a reflection over line m
3) a 180° rotation about point B
4) a reflection over $\overline{DB}$

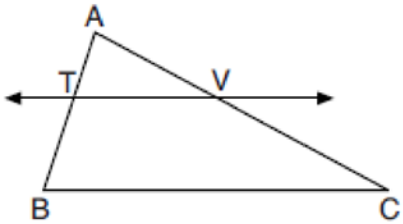
21 The diagram below models a countertop designed for a kitchen. The countertop is made of solid oak and is 3 inches thick.



If oak weighs approximately 44 pounds per cubic foot, the approximate weight, in pounds, of the countertop is

1) 630
2) 730
3) 750
4) 870

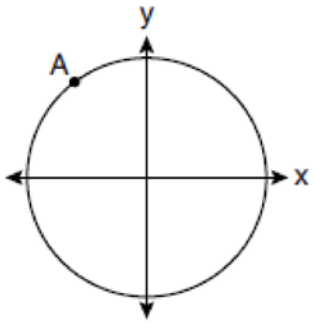
22 In the diagram below of $\triangle ABC$, $\overline{TV}$ intersects $\overline{AB}$ and $\overline{AC}$ at points T and V respectively, and $m\angle ATV = m\angle ABC$.



If $AT = 4$, $BC = 18$, $TB = 5$, and $AV = 6$, what is the perimeter of quadrilateral $TBCV$?

1) 38.5
2) 39.5
3) 40.5
4) 44.9

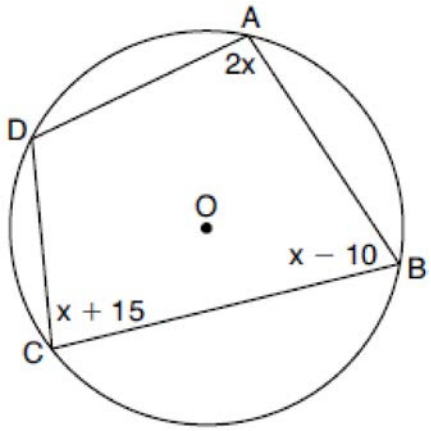
23 A circle centered at the origin passes through $A(-3,4)$.



What is the equation of the line tangent to the circle at A?

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

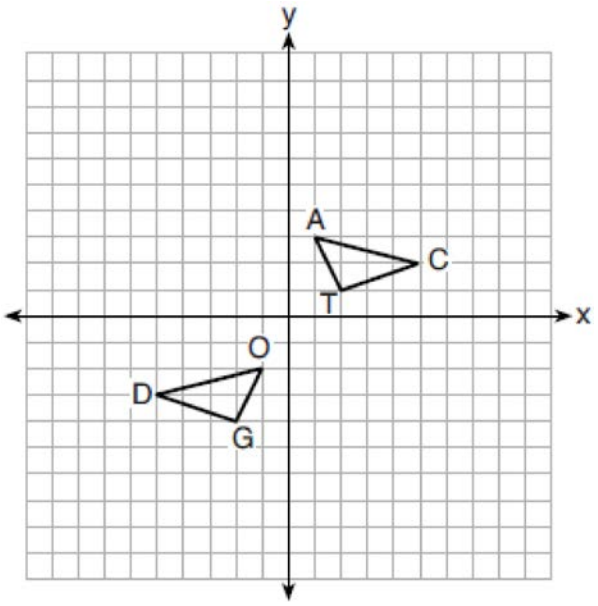
24 In the diagram below, quadrilateral $ABCD$ is inscribed in circle O, $m\angle A=(2x)°$, $m\angle B=(x-10)°$, and $m\angle C=(x+15)°$.



What is $m\angle D$?

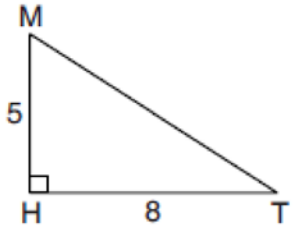
1) 55°
2) 70°
3) 110°
4) 135°

25 On the set of axes below, $\triangle DOG \cong \triangle CAT$.



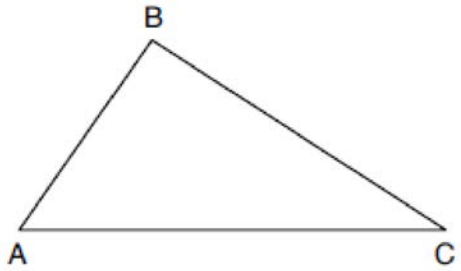
Describe a sequence of transformations that maps $\triangle DOG$ onto $\triangle CAT$.

26 In right triangle MTH shown below, $m\angle H = 90°$, $HT = 8$, and $HM = 5$.

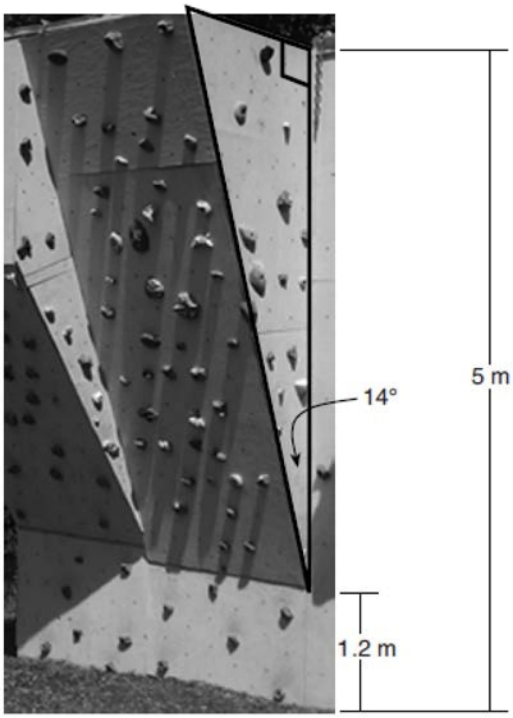


Determine and state, to the *nearest tenth*, the volume of the three-dimensional solid formed by rotating $\triangle MTH$ continuously around $\overline{MH}$.

27 Using a compass and straightedge, dilate triangle *ABC* by a scale factor of 2 centered at *C*. [Leave all construction marks.]

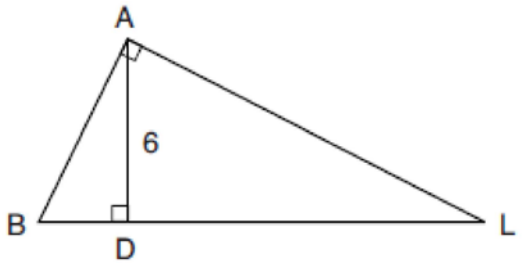


28 A rock-climbing wall at a local park has a right triangular section that slants toward the climber, as shown in the picture below. The height of the wall is 5 meters and the slanted section begins 1.2 meters up the wall at an angle of 14 degrees.



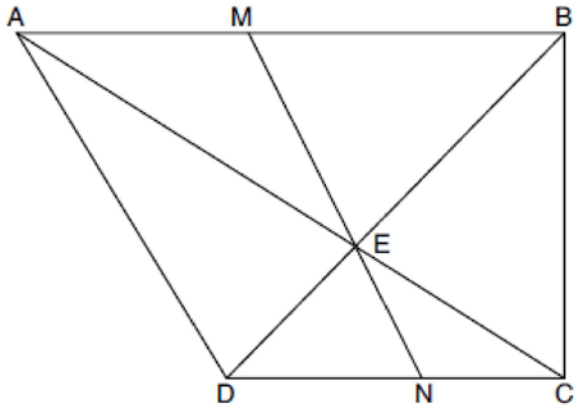
Determine and state, to the *nearest hundredth*, the number of meters in the length of the section of the wall that is slanted (hypotenuse).

29 In the diagram below of right triangle BAL, altitude $\overline{AD}$ is drawn to hypotenuse $\overline{BDL}$. The length of $\overline{AD}$ is 6.



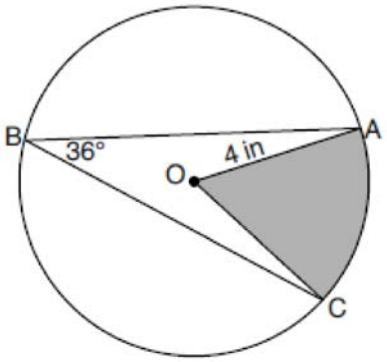
If the length of $\overline{DL}$ is four times the length of $\overline{BD}$, determine and state the length of $\overline{BD}$.

30 Trapezoid $ABCD$, where $\overline{AB} \parallel \overline{CD}$, is shown below. Diagonals $\overline{AC}$ and $\overline{DB}$ intersect $\overline{MN}$ at E, and $\overline{AD} \cong \overline{AE}$.



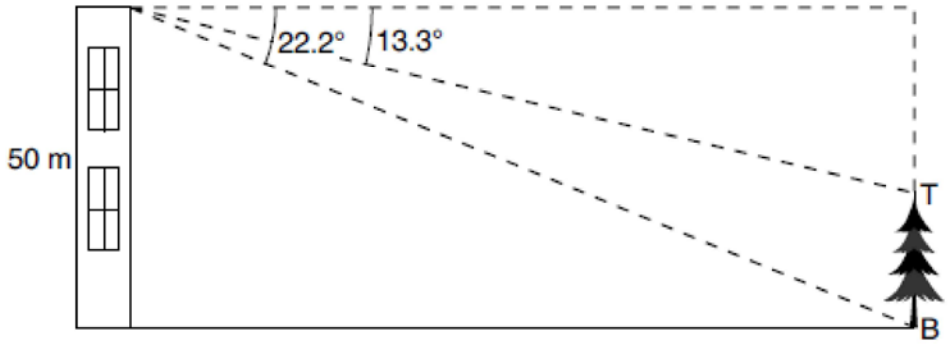
If $m\angle DAE = 35°$, $m\angle DCE = 25°$, and $m\angle NEC = 30°$, determine and state $m\angle ABD$.

31 In the diagram below of circle O, the measure of inscribed angle ABC is 36° and the length of $\overline{OA}$ is 4 inches.



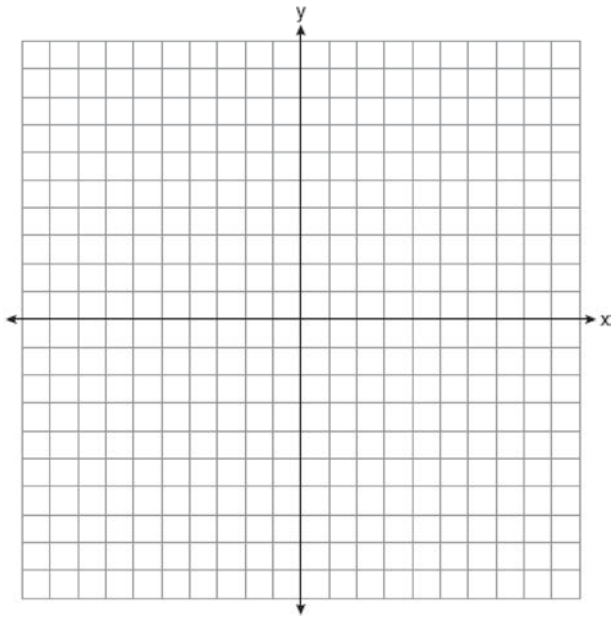
Determine and state, to the *nearest tenth of a square inch*, the area of the shaded sector.

32 As modeled in the diagram below, a building has a height of 50 meters. The angle of depression from the top of the building to the top of the tree, *T*, is 13.3°. The angle of depression from the top of the building to the bottom of the tree, *B*, is 22.2°.

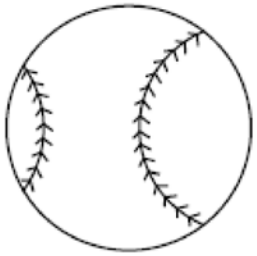


Determine and state, to the *nearest meter*, the height of the tree.

33 The coordinates of the vertices of quadrilateral *HYPE* are $H(-3,6)$, $Y(2,9)$, $P(8,-1)$, and $E(3,-4)$. Prove *HYPE* is a rectangle. [The use of the set of axes below is optional.]

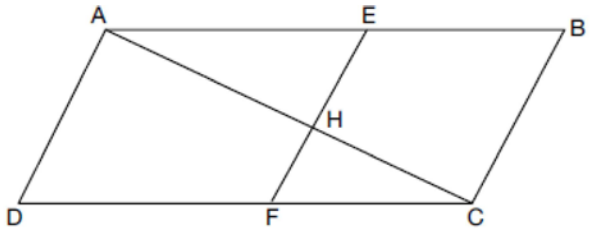


34 A packing box for baseballs is the shape of a rectangular prism with dimensions of 2 ft × 1 ft × 18 in. Each baseball has a diameter of 2.94 inches.



Determine and state the maximum number of baseballs that can be packed in the box if they are stacked in layers and each layer contains an equal number of baseballs. The weight of a baseball is approximately 0.025 pound per cubic inch. Determine and state, to the *nearest pound*, the total weight of all the baseballs in the fully packed box.

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$.



Prove: $(EH)(CH) = (FH)(AH)$

0822geo
Answer Section

1 ANS: 2
$180 - 40 - 95 = 45$

PTS: 2 REF: 082201geo NAT: G.CO.B.6 TOP: Properties of Transformations
KEY: graphics

2 ANS: 2
If (2) is true, $\angle ACB \cong \angle XYB$ and $\angle CAB \cong \angle YXB$.

PTS: 2 REF: 082202geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

3 ANS: 3 PTS: 2 REF: 082203geo NAT: G.CO.B.6
TOP: Properties of Transformations KEY: basic

4 ANS: 2 PTS: 2 REF: 082204geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

5 ANS: 4
$\frac{360°}{n} = 36$

$n = 10$

PTS: 2 REF: 082205geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

6 ANS: 1
$\frac{1}{3}, \frac{3}{9}, \frac{\sqrt{10}}{\sqrt{90}}$

PTS: 2 REF: 082206geo NAT: G.SRT.A.2 TOP: Dilations

7 ANS: 4
$\sin A = \frac{13}{16}$

$A \approx 54°$

PTS: 2 REF: 082207geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

8 ANS: 2
$V = \frac{1}{3} \cdot 197^2 \cdot 107 = 1{,}384{,}188$

PTS: 2 REF: 082208geo NAT: G.GMD.A.3 TOP: Volume
KEY: pyramids

9 ANS: 1 PTS: 2 REF: 082209geo NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself

10 ANS: 4 PTS: 2 REF: 082210geo NAT: G.SRT.C.7
TOP: Cofunctions

11 ANS: 1 PTS: 2 REF: 082211geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

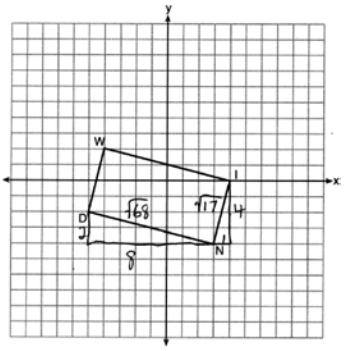
12 ANS: 3 PTS: 2 REF: 082212geo NAT: G.SRT.A.1
TOP: Line Dilations

13 ANS: 1

$-7+\frac{1}{3}(2--7)=-7+\frac{1}{3}(9)=-7+3=-4 \quad 3+\frac{1}{3}(-6-3)=3+\frac{1}{3}(-9)=3-3=0$

PTS: 2 REF: 082213geo NAT: G.GPE.B.6 TOP: Directed Line Segments

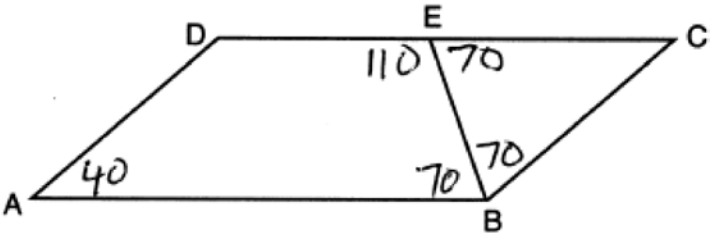
14 ANS: 4



$\sqrt{8^2+2^2}\times\sqrt{4^2+1^2}=\sqrt{68}\times\sqrt{17}=\sqrt{4}\sqrt{17}\times\sqrt{17}=2\cdot 17=34$

PTS: 2 REF: 082214geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

15 ANS: 3



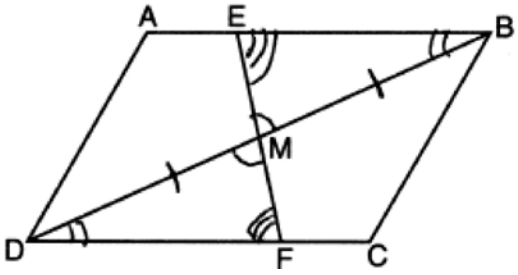
PTS: 2 REF: 082215geo NAT: G.CO.C.11 TOP: Interior and Exterior Angles of Polygons

16 ANS: 2

$\left(\frac{1}{4}\right)^2=\frac{1}{16}$

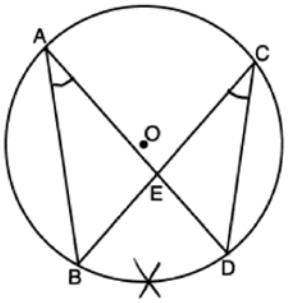
PTS: 2 REF: 082216geo NAT: G.SRT.B.5 TOP: Similarity
KEY: perimeter and area

17 ANS: 3



PTS: 2 REF: 082217geo NAT: G.SRT.B.5 TOP: Triangle Proofs
KEY: statements

18 ANS: 4



PTS: 2 REF: 082218geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: inscribed

19 ANS: 1

$x^2 + y^2 - 12y + 36 = 20.25 + 36 \quad \sqrt{56.25} = 7.5$

$x^2 + (y-6)^2 = 56.25$

PTS: 2 REF: 082219geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

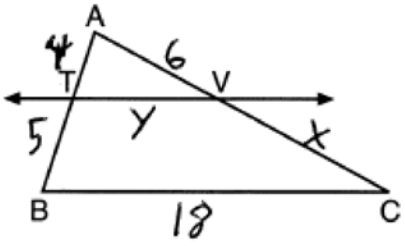
20 ANS: 2 PTS: 2 REF: 082220geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify

21 ANS: 1

$44\left(\left(10 \times 3 \times \frac{1}{4}\right) + \left(9 \times 3 \times \frac{1}{4}\right)\right) = 627$

PTS: 2 REF: 082221geo NAT: G.GMD.A.3 TOP: Volume
KEY: compositions

22 ANS: 4



$\frac{4}{5} = \frac{6}{x} \quad \frac{4}{9} = \frac{y}{18} \quad 5 + 18 + 7.5 + 8 = 38.5$

$x = 7.5 \quad y = 8$

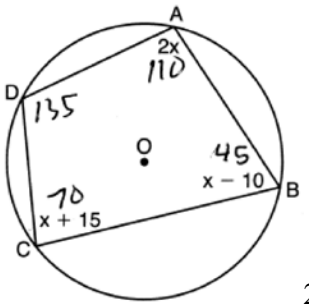
PTS: 2 REF: 082222geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

23 ANS: 2

slope of $\overline{OA} = \frac{4-0}{-3-0} = -\frac{4}{3} \quad m_{\perp} = \frac{3}{4}$

PTS: 2 REF: 082223geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: radius drawn to tangent

24 ANS: 4



$2x + x + 15 = 180 \quad 180 - 45 = 135$

$3x = 165$

$x = 55$

PTS: 2 REF: 082224geo NAT: G.C.A.3 TOP: Inscribed Quadrilaterals

25 ANS:

$T_{0,5} \circ r_{\text{y-axis}}$

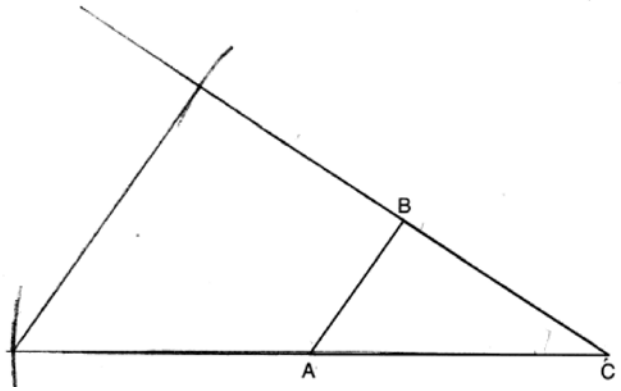
PTS: 2 REF: 082225geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify

26 ANS:

$\frac{1}{3} \pi \times 8^2 \times 5 \approx 335.1$

PTS: 2 REF: 082226geo NAT: G.GMD.B.4 TOP: Rotations of Two-Dimensional Objects

27 ANS:



PTS: 2 REF: 082227geo NAT: G.CO.D.12 TOP: Constructions
KEY: congruent and similar figures

28 ANS:

$\cos 14 = \frac{5 - 1.2}{x}$

$x \approx 3.92$

PTS: 2 REF: 082228geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

29 ANS:

$4x \cdot x = 6^2$

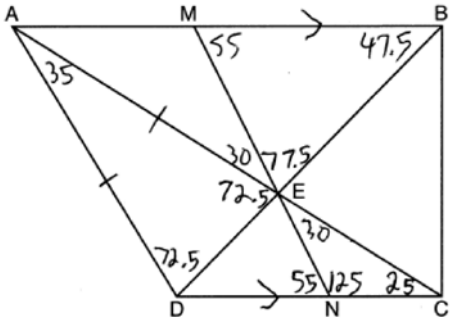
$4x^2 = 36$

$x^2 = 9$

$x = 3$

PTS: 2 REF: 082229geo NAT: G.SRT.B.5 TOP: Similarity
KEY: leg

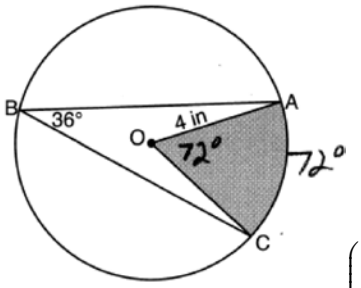
30 ANS:



47.5°

PTS: 2 REF: 082230geo NAT: G.CO.C.11 TOP: Interior and Exterior Angles of Polygons

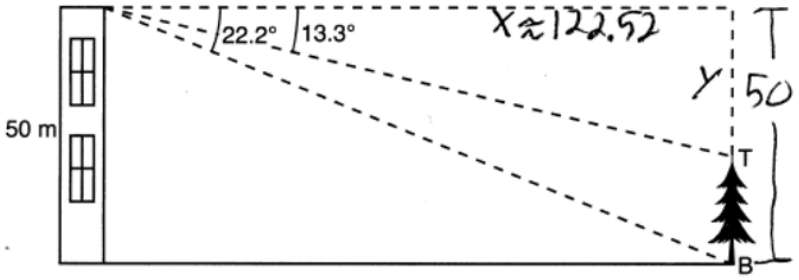
31 ANS:



$\left(\frac{72}{360}\right)\pi(4)^2 \approx 10.1$

PTS: 2 REF: 082231geo NAT: G.C.B.5 TOP: Sectors

32 ANS:



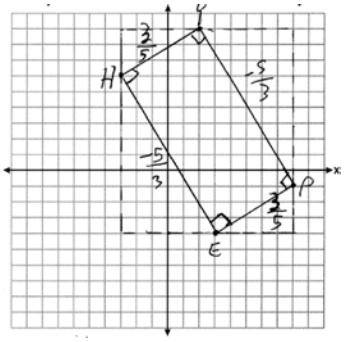
$\tan 22.2 = \frac{50}{x}$ $\tan 13.3 = \frac{y}{122.52}$

$x \approx 122.52$ $y \approx 29$

$50 - 29 = 21$

PTS: 4 REF: 082232geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: advanced

33 ANS:



1) Quadrilateral $HYPE$ with $H(-3,6)$, $Y(2,9)$, $P(8,-1)$, and $E(3,-4)$ (Given); 2) Slope of $\overline{HY}$ and $\overline{PE}$ is $\frac{3}{5}$, slope of $\overline{YP}$ and $\overline{EH}$ is $-\frac{5}{3}$ (Slope determined graphically); 3) $\overline{HY} \perp \overline{YP}$, $\overline{PE} \perp \overline{EH}$, $\overline{YP} \perp \overline{PE}$, $\overline{EY} \perp \overline{HY}$ (The slopes of perpendicular lines are opposite reciprocals); 4) $\angle H$, $\angle Y$, $\angle P$, $\angle E$ are right angles (Perpendicular lines form right angles); 5) $HYPE$ is a rectangle (A rectangle has four right angles).

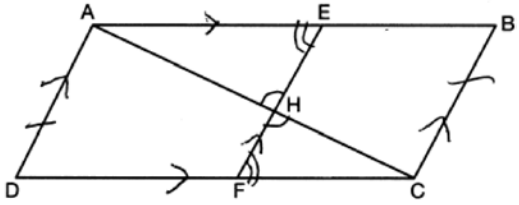
PTS: 4 REF: 082233geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

34 ANS:

$24 \text{ in} \times 12 \text{ in} \times 18 \text{ in}$ $2.94 \approx 3$ $\frac{24}{3} \times \frac{12}{3} \times \frac{18}{3} = 192$ $192\left(\frac{4}{3}\pi\right)\left(\frac{2.94}{2}\right)^3(0.025) \approx 64$

PTS: 4 REF: 082234geo NAT: G.MG.A.2 TOP: Density

35 ANS:



1) Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$ (Given); 2) $\angle EHA \cong \angle FHC$ (Vertical angles are congruent); 3) $\overline{AD} \parallel \overline{BC}$ (Transitive property of parallel lines); 4) $ABCD$ is a parallelogram (Quadrilateral with a pair of sides both parallel and congruent); 5) $\overline{AB} \parallel \overline{CD}$ (Opposite sides of a parallelogram); 6) $\angle AEH \cong \angle CFH$ (Alternate interior angles formed by parallel lines and a transversal); 7) $\triangle AEH \sim \triangle CFH$ (AA); 8) $\frac{EH}{FH} = \frac{AH}{CH}$ (Corresponding sides of similar triangles are proportional); 8) $(EH)(CH) = (FH)(AH)$ (Product of means equals product of extremes).

PTS: 6 REF: 082235geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs