Geometry CCSS Regents Exam 0125
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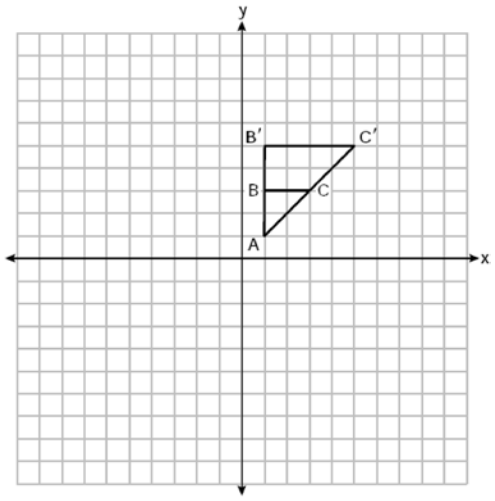
0125geo

1 On the set of axes below, $\triangle AB'C'$ is the image of $\triangle ABC$.



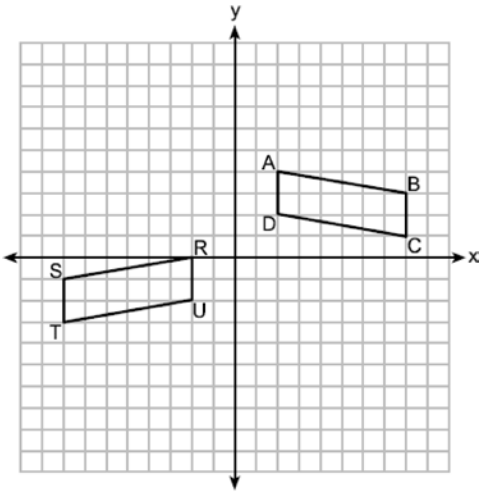
What is the scale factor and center of dilation that maps $\triangle ABC$ onto $\triangle AB'C'$?

1) $\frac{1}{2}$ and the origin
2) 2 and the origin
3) $\frac{1}{2}$ and vertex A
4) 2 and vertex A

2 Line segment PAQ has endpoints whose coordinates are $P(-2,6)$ and $Q(3,-4)$. What are the coordinates of point A, such that $PA:AQ = 2:3$?

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

3 On the set of axes below, congruent parallelograms $ABCD$ and $RSTU$ are graphed.



Which sequence of transformations maps $ABCD$ onto RSTU?

1) a reflection over the x-axis followed by a translation ten units to the left and one unit up
2) a translation four units down followed by a reflection over the y-axis
3) a reflection over the y-axis followed by a translation of two units down
4) a translation ten units to the left followed by a reflection over the x-axis

4 Triangle ABC has a right angle at C. If $AC = 7.7$ and $m\angle B = 24°$, what is AB, to the *nearest tenth*?

1) 18.9
2) 17.3
3) 8.4
4) 3.1

5 Given $\triangle PQR$ and $\triangle LMN$ with $\overline{PQ} \cong \overline{LM}$, which additional statement is sufficient to always prove $\triangle PQR \cong \triangle LMN$?

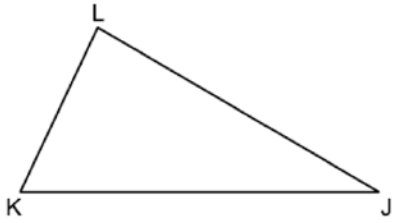
1) $\overline{QR} \cong \overline{MN}$ and $\angle R \cong \angle N$
2) $\overline{QR} \cong \overline{MN}$ and $\angle Q \cong \angle M$
3) $\overline{QR} \cong \overline{MN}$ and $\angle P \cong \angle L$
4) $\overline{QR} \cong \overline{MN}$ and $\angle P \cong \angle M$

6 The equation of a circle is $x^2 + 6y = 4x - y^2 + 12$. What are the coordinates of the center and the length of the radius?
1) center $(2,-3)$ and radius 5
2) center $(-2,3)$ and radius 5
3) center $(2,-3)$ and radius 25
4) center $(-2,3)$ and radius 25

7 A square with a side length of 3 is continuously rotated about one of its sides. The resulting three-dimensional object is a
1) cube with a volume of 9.
2) cube with a volume of 27.
3) cylinder with a volume of 27π.
4) cylinder with a volume of 54π.

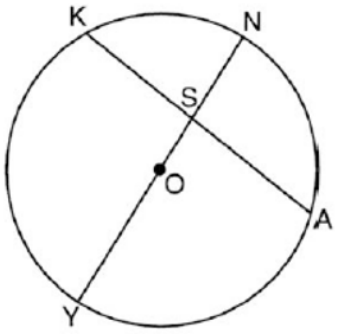
8 Line k is represented by the equation $4y + 3 = 7x$. Which equation represents a line that is perpendicular to line k and passes through the point $(-5,2)$?
1) $y + 2 = \frac{4}{7}(x - 5)$
2) $y - 2 = \frac{4}{7}(x + 5)$
3) $y + 2 = -\frac{4}{7}(x - 5)$
4) $y - 2 = -\frac{4}{7}(x + 5)$

9 Scalene triangle JKL is drawn below.



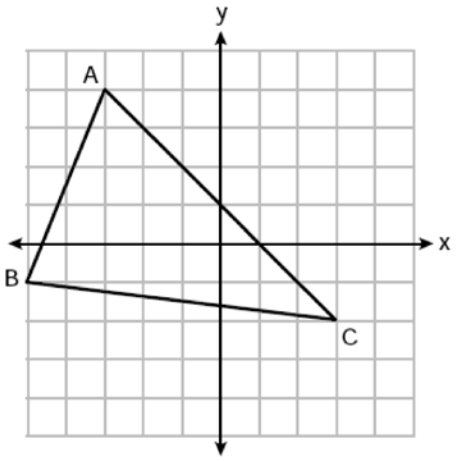
If median $\overline{LM}$ is drawn to side $\overline{KJ}$, which statement is always true?
1) $LM = KM$
2) $KM = \frac{1}{2}KJ$
3) $\overline{LM} \perp \overline{KJ}$
4) $\angle KLM \cong \angle JLM$

10 In circle O, chord $\overline{KA}$ intersects diameter $\overline{YN}$ at S.



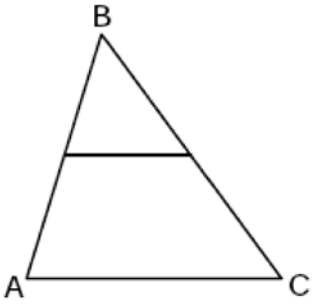
If $m\overset{\frown}{YK} = 120°$ and $m\overset{\frown}{YA} = 105°$, what is $m\angle ASN$?
1) 22.5°
2) 75°
3) 97.5°
4) 120°

11 Triangle ABC is graphed on the set of axes below. The vertices of $\triangle ABC$ have coordinates $A(-3,4)$, $B(-5,-1)$, and $C(3,-2)$.



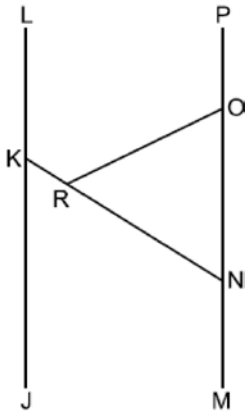
What is the area of $\triangle ABC$?
1) 16
2) 20
3) 21
4) 24

12 In $\triangle ABC$ below, $\overline{DE}$ is a midsegment, and $\overline{BD} \cong \overline{DE}$.



Which statement is always true?
1) $\triangle ABC$ is isosceles
2) $\triangle ABC$ is scalene
3) $\overline{BD} \cong \overline{BE}$
4) $\overline{DA} \cong \overline{EC}$

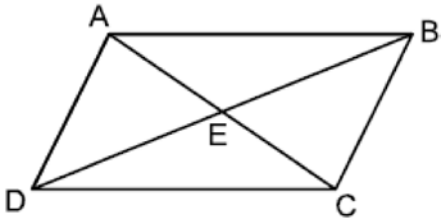
13 As shown in the diagram below, $\overline{JKL} \parallel \overline{MNOP}$, $\overline{KRN}$, and $\overline{OR} \cong \overline{ON}$.



If $m\angle POR = 116°$, what is $m\angle LKN$?
1) 58°
2) 116°
3) 122°
4) 128°

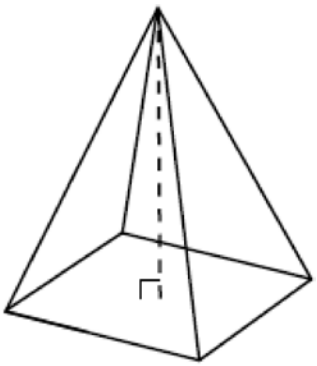
14 The ratio of similarity of square $ABCD$ to square $WXYZ$ is $2:5$. If $AB = x + 3$ and $WX = 3x + 5$, then the perimeter of $ABCD$ is
1) 8
2) 20
3) 32
4) 80

15 In parallelogram $ABCD$ below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E.



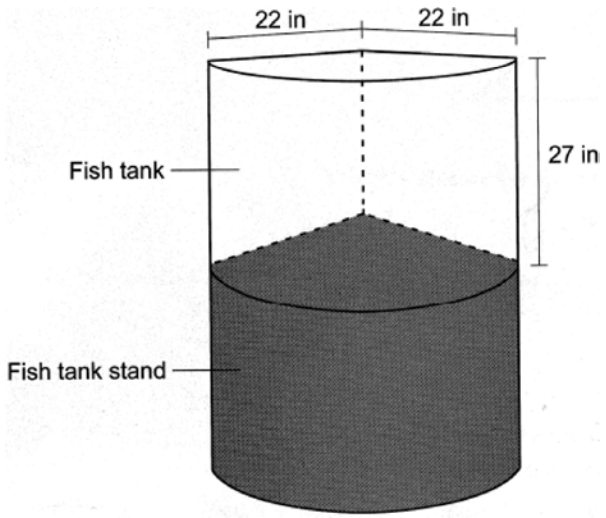
Which transformation would map $\triangle ABC$ onto $\triangle CDA$?
1) a reflection over $\overline{AC}$
2) a reflection over $\overline{DB}$
3) a clockwise rotation of 90° about point E
4) a clockwise rotation of 180° about point E

16 The square pyramid drawn below has a volume of 175.



If the height of the pyramid is 21, what is the perimeter of the base?
1) 5
2) 10
3) 20
4) 25

17 A glass fish tank is designed to be placed on a stand in the corner of a room with perpendicular walls. The tank can be modeled using part of a cylinder, as shown below. The inner length of the fish tank along the wall is 22 inches, and the height of the tank is 27 inches.



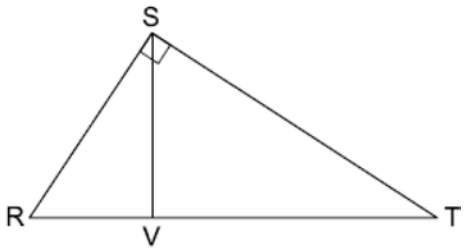
How much water, to the *nearest gallon*, does the fish tank hold? [1 gal = 231 in^3]

1) 44
2) 59
3) 89
4) 178

18 Line *m*, whose equation is $y = -2x + 8$, is dilated by a scale factor of $\frac{1}{2}$ centered at the origin. Which equation represents the image of line *m*?

1) $y = -x + 4$
2) $y = -2x + 4$
3) $y = -x + 8$
4) $y = -2x + 8$

19 In right triangle *RST* below, altitude $\overline{SV}$ is drawn to hypotenuse $\overline{RT}$.



Which statement is always true?

1) $\frac{RT}{ST} = \frac{ST}{VT}$
2) $\frac{VR}{VT} = \frac{VT}{VS}$
3) $\frac{RV}{SV} = \frac{SV}{RT}$
4) $\frac{TR}{VR} = \frac{VR}{SR}$

20 What is the measure, in radians, of a central angle that intercepts an arc length of 12π cm in a circle with a diameter of 36 cm?

1) $\frac{\pi}{6}$
2) $\frac{\pi}{3}$
3) $\frac{2\pi}{3}$
4) $\frac{3\pi}{2}$

21 A regular nonagon has a center point, *P*. What degree of rotation about point *P* will carry the nonagon onto itself?

1) 60°
2) 90°
3) 180°
4) 200°

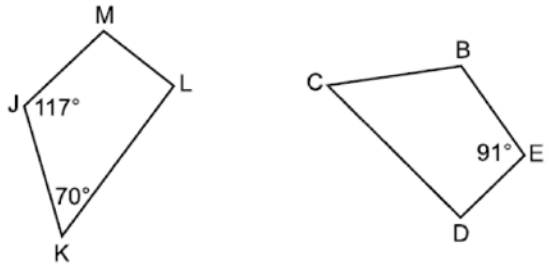
22 If two sides of a triangle have lengths of 2 and 7, the length of the third side could be
1) 9
2) 8
3) 5
4) 4

23 The car tire shown in the photograph below has a diameter of $2\frac{1}{4}$ feet.

Approximately how many rotations will the tire make in one mile?
1) 373
2) 747
3) 1328
4) 2347

24 In quadrilateral $TOWN$, $\overline{OW} \cong \overline{TN}$ and $\overline{OT} \cong \overline{WN}$. Which additional information is sufficient to prove quadrilateral $TOWN$ is a rhombus?
1) $\overline{ON} \perp \overline{TW}$
2) $\overline{TO} \perp \overline{OW}$
3) $\overline{OW} \parallel \overline{TN}$
4) $\overline{ON}$ and $\overline{TW}$ bisect each other.

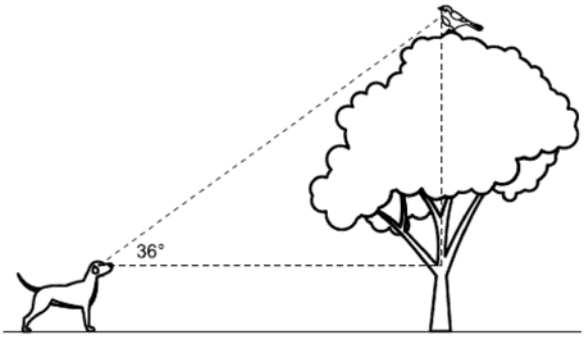
25 In the diagram below, quadrilateral $BCDE$ maps onto quadrilateral $JKLM$ using a sequence of rigid motions.



Determine and state the degree measure of angle D.

26 Given $\overline{AB}$ below, use a compass and a straightedge to construct a segment that is $\frac{1}{4}AB$. [Leave all construction marks.]

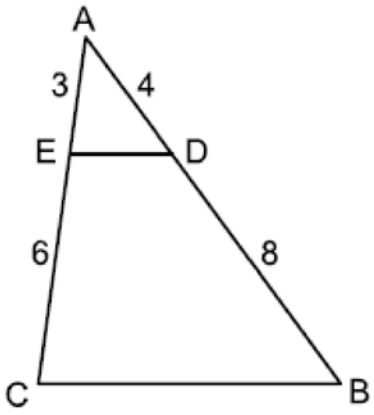
27 A dog sees a bird in a tree. The angle of elevation from the dog's eyes to the bird is 36°, as modeled below.



The dog is 18.5 feet away from the base of the tree, and his eyes are 2.5 feet above the ground. Determine and state how high the bird is above the ground, to the *nearest foot*.

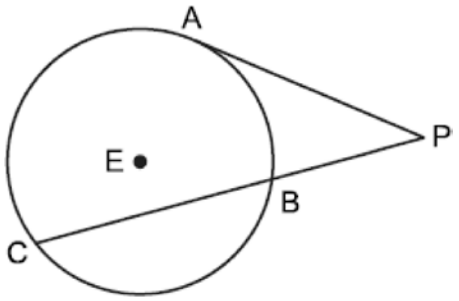
28 Pure silver has a density of 10.5 g/cm^3. Samantha has a pure silver charm on her necklace in the shape of a sphere. The radius of the charm is 0.5 cm. Determine and state the mass of the charm, to the *nearest tenth of a gram*.

29 In $\triangle ABC$ below, $\overline{DE}$ is drawn such that $AD = 4$, $DB = 8$, $AE = 3$, and $EC = 6$.



Explain why $\triangle ADE \sim \triangle ABC$.

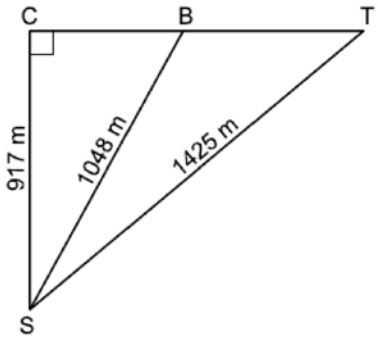
30 In circle E below, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn.



If $PB = 9$ and $BC = 16$, determine and state the length of $\overline{PA}$.

31 In a right triangle, $\sin(4x + 3)° = \cos(2x - 9)°$. Determine and state the value of x.

32 Modeled by right triangles below, a surveyor (S) is taking land measurements using a cabin (C), a boulder (B), and a tree (T) as fixed points of reference. The cabin, boulder, and tree are collinear. The surveyor is 917 meters from the cabin, 1048 meters from the boulder, and 1425 meters from the tree.

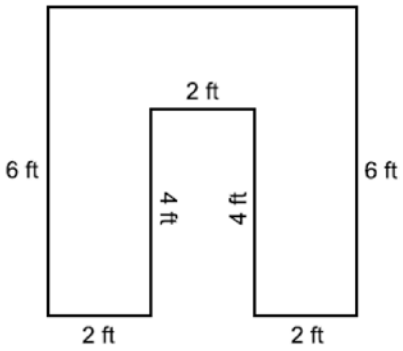


Determine and state, to the *nearest degree*, the measure of $\angle BST$.

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet. The diagram below shows the top view of the garden bed with its inside measurements.

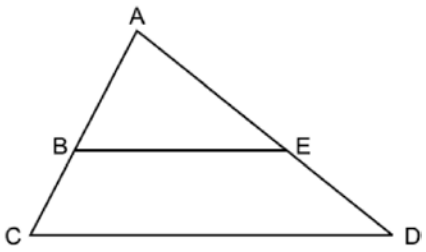
Garden Bed

Top View of Garden Bed



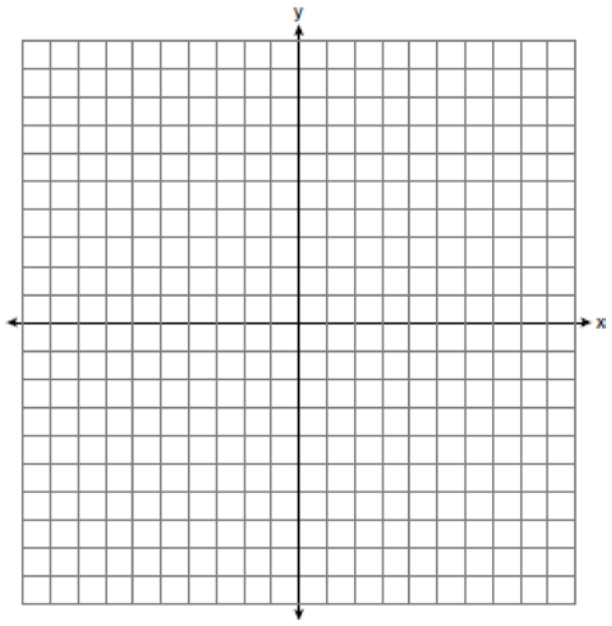
The garden bed is filled with topsoil to a uniform height of 1.25 feet. Determine and state the volume of the topsoil, in cubic feet. Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil. Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

34 Given: $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$



Prove: $AB \bullet AD = AE \bullet AC$

35 Triangle PET has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$. Prove $\triangle PET$ is a right triangle. State the coordinates of N, the image of P, after a 180° rotation centered at (1,3). Prove $PENT$ is a rectangle. [The use of the set of axes below is optional.]



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Answer Section

1 ANS: 4 PTS: 2 REF: 012501geo NAT: G.SRT.A.2
TOP: Dilations

2 ANS: 4

$-2+\frac{2}{5}(3--2)=-2+2=0 \quad 6+\frac{2}{5}(-4-6)=6-4=2$

PTS: 2 REF: 012502geo NAT: G.GPE.B.6 TOP: Directed Line Segments

3 ANS: 2 PTS: 2 REF: 012503geo NAT: G.CO.A.5
TOP: Compositions of Transformations

4 ANS: 1

$\sin 24=\frac{7.7}{x}$

$x \approx 18.9$

PTS: 2 REF: 012504geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

5 ANS: 2
SAS

PTS: 2 REF: 012505geo NAT: G.SRT.B.5 TOP: Triangle Proofs
KEY: statements

6 ANS: 1

$x^2-4x+4+y^2+6y+9=12+4+9$

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

PTS: 2 REF: 012506geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

7 ANS: 3

$V=\pi(3)^2(3)=27\pi$

PTS: 2 REF: 012507geo NAT: G.GMD.B.4 TOP: Rotations of Two-Dimensional Objects

8 ANS: 4

$4y=7x-3 \quad m=\frac{7}{4}$.

$y=\frac{7}{4}x-\frac{3}{4} \quad m_{\perp}=-\frac{4}{7}$

PTS: 2 REF: 012508geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

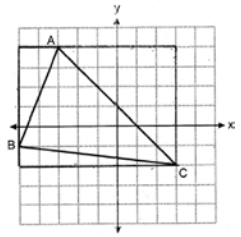
9 ANS: 2 PTS: 2 REF: 012509geo NAT: G.SRT.B.4
TOP: Medians, Altitudes and Bisectors

10 ANS: 3

$$\frac{120+(180-105)}{2}=\frac{195}{2}=97.5$$

PTS: 2 REF: 012510geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: intersecting chords, angle

11 ANS: 3

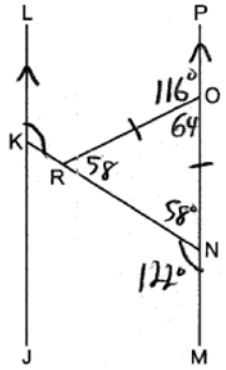


$$8\times 6-\frac{1}{2}(8\times 1+5\times 2+6\times 6)=48-\frac{1}{2}(54)=21$$

PTS: 2 REF: 012511geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

12 ANS: 1 PTS: 2 REF: 012512geo NAT: G.CO.C.10
TOP: Midsegments

13 ANS: 3



PTS: 2 REF: 012513geo NAT: G.CO.C.9 TOP: Lines and Angles

14 ANS: 3

$$\frac{5}{2}(x+3)=3x+5 \quad AB=5+3=8 \;\; 8\times 4=32$$

$$5x+15=6x+10$$

$$5=x$$

PTS: 2 REF: 012514geo NAT: G.SRT.B.5 TOP: Similarity
KEY: perimeter and area

15 ANS: 4 PTS: 2 REF: 012515geo NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself

16 ANS: 3

$175 = \frac{1}{3} \cdot s^2 \cdot 21 \quad 5 \times 4 = 20$

$25 = s^2$

$5 = s$

PTS: 2 REF: 012516geo NAT: G.GMD.A.3 TOP: Volume
KEY: pyramids

17 ANS: 1

$\frac{\frac{1}{4}\left(\pi \cdot 22^2 \cdot 27\right)}{231} \approx 44$

PTS: 2 REF: 012517geo NAT: G.GMD.A.3 TOP: Volume
KEY: cylinders

18 ANS: 2 PTS: 2 REF: 012518geo NAT: G.SRT.A.1
TOP: Line Dilations

19 ANS: 1 PTS: 2 REF: 012519geo NAT: G.SRT.B.4
TOP: Similarity

20 ANS: 3

$\frac{x}{2\pi} \times 36\pi = 12\pi$

$18x = 12\pi$

$x = \frac{12\pi}{18} = \frac{2\pi}{3}$

PTS: 2 REF: 012520geo NAT: F.TF.A.1 TOP: Arc Length
KEY: angle

21 ANS: 4

$\frac{360°}{9} = 40° \quad 200º$ is a multiple of $40º$

PTS: 2 REF: 012521geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

22 ANS: 2

$7 - 2 < T < 7 + 2$

$5 < T < 9$

PTS: 2 REF: 012522geo NAT: G.CO.C.10 TOP: Triangle Inequality Theorem

23 ANS: 2

$\frac{5280}{2.25\pi} \approx 747$

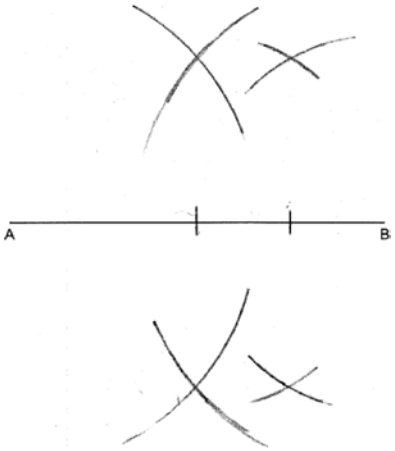
PTS: 2 REF: 012523geo NAT: G.GMD.A.1 TOP: Circumference

24 ANS: 1 PTS: 2 REF: 012524geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

25 ANS:
$D = 360 - (117 + 70 + 91) = 82$

PTS: 2 REF: 012525geo NAT: G.CO.B.6 TOP: Properties of Transformations

26 ANS:



PTS: 2 REF: 012526geo NAT: G.CO.D.12 TOP: Constructions
KEY: line bisector

27 ANS:
$\tan 36 = \frac{x}{18.5}$ $13.44 + 2.5 \approx 16$

$x \approx 13.44$

PTS: 2 REF: 012527geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

28 ANS:
$\frac{4}{3}\pi \times .5^3 \times 10.5 \approx 5.5$

PTS: 2 REF: 012528geo NAT: G.MG.A.2 TOP: Density

29 ANS:
Because $\overline{DE}$ divides $\overline{AC}$ and $\overline{AB}$ proportionally $\left(\frac{3}{6} = \frac{4}{8}\right)$, $\overline{DE}$ is a side splitter and $\overline{ED} \parallel \overline{CB}$. Therefore $\angle AED \cong \angle ACB$ and $\angle ADE \cong \angle ABC$ as corresponding angles. $\triangle ADE \sim \triangle ABC$ by AA.

PTS: 2 REF: 012529geo NAT: G.SRT.B.4 TOP: Side Splitter Theorem

30 ANS:
$x^2 = 9 \times 25$

$x = 15$

PTS: 2 REF: 012530geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: secant and tangent drawn from common point, length

31 ANS:

$4x + 3 + 2x - 9 = 90$

$6x - 6 = 90$

$6x = 96$

$x = 16$

PTS: 2 REF: 012531geo NAT: G.SRT.C.7 TOP: Cofunctions

32 ANS:

$\sin x = \frac{917}{1048}$ $\sin T = \frac{917}{1425}$ $180 - ((180 - 61) + 40) = 21$

$x \approx 61$ $T \approx 40$

$\angle SBC$

PTS: 4 REF: 012532geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

33 ANS:

$((6 \times 6) - (4 \times 2)) \times 1.25 = 35$ $18 \times \$3.68 = \$66.24$

PTS: 4 REF: 012533geo NAT: G.GMD.A.3 TOP: Volume

KEY: compositions

34 ANS:

1) $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$ (Given); 2) $\angle ABE \cong \angle ACD$ and $\angle AEB \cong \angle ADC$ (A transversal crossing parallel lines creates congruent corresponding angles; 3) $\triangle ABE \cong \triangle ACD$ (AA); 4) $\frac{AB}{AC} = \frac{AE}{AD}$ (Corresponding sides of similar triangles are proportional); 5) $AB \bullet AD = AE \bullet AC$ (Product of the means equals the product of the extremes)

PTS: 4 REF: 012534geo NAT: G.SRT.A.3 TOP: Similarity Proofs

35 ANS:

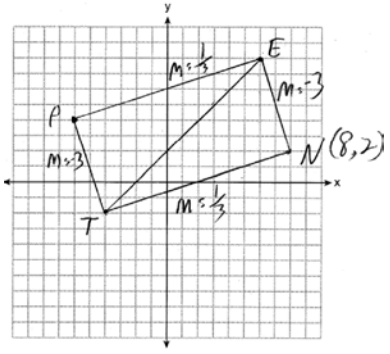
$m_{\overline{PE}} = \frac{8-4}{6--6} = \frac{4}{12} = \frac{1}{3}$ Since the slopes of $\overline{PE}$ and $\overline{PT}$ are opposite reciprocals, they are perpendicular and

$m_{\overline{PT}} = \frac{4--2}{-6--4} = \frac{6}{-2} = -3$

form a right angle. $\triangle PET$ is a right triangle because it has a right angle. (8,2) $m_{\overline{TN}} = \frac{2--2}{8--4} = \frac{4}{12} = \frac{1}{3}$ Because

$$m_{\overline{EN}} = \frac{8-2}{6-8} = \frac{6}{-2} = -3$$

the slopes of $\overline{PE}$ and $\overline{TN}$ are equal, $\overline{PE} \parallel \overline{TN}$. Because the slopes of $\overline{PT}$ and $\overline{EN}$ are equal, $\overline{PT} \parallel \overline{EN}$. Because opposite sides are parallel, *PENT* is a parallelogram. Because $\angle P$ is a right angle, *PENT* is a rectangle.



PTS: 6 REF: 012535geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane