1. In the diagram below, $DE$, $DF$, and $EF$ are midsegments of $\triangle ABC$.

   ![Diagram of triangle ABC with midsegments DE, DF, and EF]

   The perimeter of quadrilateral $ADEF$ is equivalent to

2. The diameter of a basketball is approximately 9.5 inches and the diameter of a tennis ball is approximately 2.5 inches. The volume of the basketball is about how many times greater than the volume of the tennis ball?

3. In right triangle $RST$, altitude $TV$ is drawn to hypotenuse $RS$. If $RV = 12$ and $RT = 18$, what is the length of $SV$?

4. Molly wishes to make a lawn ornament in the form of a solid sphere. The clay being used to make the sphere weighs .075 pound per cubic inch. If the sphere's radius is 4 inches, what is the weight of the sphere, to the nearest pound?

5. In $\triangle ABC$ shown below, side $AC$ is extended to point $D$ with $m\angle DAB = (180 - 3x)\degree$, $m\angle B = (6x - 40)\degree$, and $m\angle C = (x + 20)\degree$.

   ![Diagram of triangle ABC with extended side AC]

   What is $m\angle BAC$?

6. In $\triangle SCU$ shown below, points $T$ and $O$ are on $SU$ and $CU$, respectively. Segment $OT$ is drawn so that $\angle C \cong \angle OTU$.

   ![Diagram of triangle SCU with segments OT drawn]

   If $TU = 4$, $OU = 5$, and $OC = 7$, what is the length of $ST$?

7. An isosceles right triangle whose legs measure 6 is continuously rotated about one of its legs to form a three-dimensional object. The three-dimensional object is a
8 Which equation represents a line parallel to the line whose equation is \(-2x + 3y = -4\) and passes through the point \((1,3)\)?

9 In the diagram below of \(\triangle ABC\), \(\angle ABC\) is a right angle, \(AC = 12\), \(AD = 8\), and altitude \(BD\) is drawn.

What is the length of \(BC\)?

10 In right triangle \(ABC\), \(m\angle A = 32^\circ\), \(m\angle B = 90^\circ\), and \(AC = 6.2\) cm. What is the length of \(BC\), to the nearest tenth of a centimeter?

11 A water cup in the shape of a cone has a height of 4 inches and a maximum diameter of 3 inches. What is the volume of the water in the cup, to the nearest tenth of a cubic inch, when the cup is filled to half its height?

12 What is the area of a sector of a circle with a radius of 8 inches and formed by a central angle that measures \(60^\circ\)?

13 A student has a rectangular postcard that he folds in half lengthwise. Next, he rotates it continuously about the folded edge. Which three-dimensional object below is generated by this rotation?

14 As shown in the diagram below, a regular pyramid has a square base whose side measures 6 inches. If the altitude of the pyramid measures 12 inches, its volume, in cubic inches, is

15 Which object is formed when right triangle \(RST\) shown below is rotated around leg \(RS\)?

16 A 12-foot ladder leans against a building and reaches a window 10 feet above ground. What is the measure of the angle, to the nearest degree, that the ladder forms with the ground?
17. A shipping container is in the shape of a right rectangular prism with a length of 12 feet, a width of 8.5 feet, and a height of 4 feet. The container is completely filled with contents that weigh, on average, 0.25 pound per cubic foot. What is the weight, in pounds, of the contents in the container?

18. Given $\triangle MRO$ shown below, with trapezoid $PTRO$, $MR = 9$, $MP = 2$, and $PO = 4$. What is the length of $TR$?

19. In circle $O$ two secants, $ABP$ and $CDP$, are drawn to external point $P$. If $m\overset{\frown}{AC} = 72^\circ$, and $m\overset{\frown}{BD} = 34^\circ$, what is the measure of $\angle P$?

20. In the diagram below of circle $O$, chord $DF$ bisects chord $BC$ at $E$. If $BC = 12$ and $FE$ is 5 more than $DE$, then $FE$ is

21. In the diagram of $\triangle ABC$ below, points $D$ and $E$ are on sides $AB$ and $CB$ respectively, such that $DE \parallel AC$. If $EB$ is 3 more than $DB$, $AB = 14$, and $CB = 21$, what is the length of $AD$?

22. In the diagram shown below, $PA$ is tangent to circle $T$ at $A$, and secant $PBC$ is drawn where point $B$ is on circle $T$. If $PB = 3$ and $BC = 15$, what is the length of $PA$?

23. The coordinates of the endpoints of $\overline{QS}$ are $Q(-9,8)$ and $S(9,-4)$. Point $R$ is on $\overline{QS}$ such that $QR:RS$ is in the ratio of 1:2. What are the coordinates of point $R$?
24 Line segment $NY$ has endpoints $N(-11,5)$ and $Y(5,-7)$. What is the equation of the perpendicular bisector of $NY$?

25 The endpoints of one side of a regular pentagon are $(-1,4)$ and $(2,3)$. What is the perimeter of the pentagon?

26 In the diagram below, $AD$ intersects $BE$ at $C$, and $AB \parallel DE$.

If $CD = 6.6$ cm, $DE = 3.4$ cm, $CE = 4.2$ cm, and $BC = 5.25$ cm, what is the length of $AC$, to the nearest hundredth of a centimeter?

27 A tent is in the shape of a right pyramid with a square floor. The square floor has side lengths of 8 feet. If the height of the tent at its center is 6 feet, what is the volume of the tent, in cubic feet?

28 A gallon of paint will cover approximately 450 square feet. An artist wants to paint all the outside surfaces of a cube measuring 12 feet on each edge. What is the least number of gallons of paint he must buy to paint the cube?

29 The greenhouse pictured below can be modeled as a rectangular prism with a half-cylinder on top. The rectangular prism is 20 feet wide, 12 feet high, and 45 feet long. The half-cylinder has a diameter of 20 feet.

To the nearest cubic foot, what is the volume of the greenhouse?

30 The diagram below shows two similar triangles.

If $\tan \theta = \frac{3}{7}$, what is the value of $x$, to the nearest tenth?

31 A three-inch line segment is dilated by a scale factor of 6 and centered at its midpoint. What is the length of its image?
32 In triangle $ABC$, points $D$ and $E$ are on sides $AB$ and $BC$, respectively, such that $DE \parallel AC$, and $AD:DB = 3:5$.

If $DB = 6.3$ and $AC = 9.4$, what is the length of $DE$, to the nearest tenth?

33 In the diagram below of parallelogram $ROCK$, $m\angle C$ is $70^\circ$ and $m\angle ROS$ is $65^\circ$.

What is $m\angle KSO$?

34 Point $Q$ is on $MN$ such that $MQ:QN = 2:3$. If $M$ has coordinates $(3,5)$ and $N$ has coordinates $(8,-5)$, the coordinates of $Q$ are

35 What is an equation of a circle whose center is $(1,4)$ and diameter is $10$?

36 A ladder 20 feet long leans against a building, forming an angle of $71^\circ$ with the level ground. To the nearest foot, how high up the wall of the building does the ladder touch the building?

37 In the diagram of right triangle $ABC$ shown below, $AB = 14$ and $AC = 9$.

What is the measure of $\angle A$, to the nearest degree?

38 Which transformation would not always produce an image that would be congruent to the original figure?

39 A circle with a radius of $5$ was divided into $24$ congruent sectors. The sectors were then rearranged, as shown in the diagram below.

To the nearest integer, the value of $x$ is
40 On the set of axes below, the vertices of \( \triangle PQR \) have coordinates \( P(-6,7), Q(2,1), \) and \( R(-1,-3). \)

What is the area of \( \triangle PQR? \)

41 From a point on the ground one-half mile from the base of a historic monument, the angle of elevation to its top is 11.87°. To the nearest foot, what is the height of the monument?

42 As shown in the diagram below, the radius of a cone is 2.5 cm and its slant height is 6.5 cm.

How many cubic centimeters are in the volume of the cone?

43 In parallelogram \( PQRS, \overline{QP} \) is extended to point \( T \) and \( \overline{ST} \) is drawn.

If \( \overline{ST} \cong \overline{SP} \) and \( m\angle R = 130^\circ \), what is \( m\angle PST? \)

44 In \( \triangle ABC, \overline{BD} \) is the perpendicular bisector of \( \overline{ADC} \). Based upon this information, which statements below can be proven?

I. \( \overline{BD} \) is a median.
II. \( \overline{BD} \) bisects \( \angle ABC \).
III. \( \triangle ABC \) is isosceles.

45 Yolanda is making a springboard to use for gymnastics. She has 8-inch-tall springs and wants to form a 16.5° angle with the base, as modeled in the diagram below.

To the nearest tenth of an inch, what will be the length of the springboard, \( x? \)

46 What are the coordinates of the center and the length of the radius of the circle represented by the equation \( x^2 + y^2 - 4x + 8y + 11 = 0? \)
47 In the diagram below, \( \triangle ABC \) with sides 13, 15, and 16, is mapped onto \( \triangle DEF \) after a clockwise rotation of 90° about point \( P \).

If \( DE = 2x - 1 \), what is the value of \( x \)?

48 A fabricator is hired to make a 27-foot-long solid metal railing for the stairs at the local library. The railing is modeled by the diagram below. The railing is 2.5 inches high and 2.5 inches wide and is comprised of a rectangular prism and a half-cylinder.

How much metal, to the nearest cubic inch, will the railing contain?

49 Line segment \( CD \) is the altitude drawn to hypotenuse \( EF \) in right triangle \( ECF \). If \( EC = 10 \) and \( EF = 24 \), then, to the nearest tenth, \( ED \) is

50 The line \( y = 2x - 4 \) is dilated by a scale factor of \( \frac{3}{2} \) and centered at the origin. Which equation represents the image of the line after the dilation?

51 What is the volume of a hemisphere that has a diameter of 12.6 cm, to the nearest tenth of a cubic centimeter?

52 In the diagram below, \( ABCD \) is a parallelogram, \( AB \) is extended through \( B \) to \( E \), and \( CE \) is drawn.

If \( CE \cong BE \) and \( m\angle D = 112° \), what is \( m\angle E \)?

53 In the diagram below of right triangle \( KMI \), altitude \( IG \) is drawn to hypotenuse \( KM \).

If \( KG = 9 \) and \( IG = 12 \), the length of \( IM \) is
54 If the altitudes of a triangle meet at one of the triangle’s vertices, then the triangle is

55 In right triangle $ABC$ shown below, point $D$ is on $\overline{AB}$ and point $E$ is on $\overline{CB}$ such that $\overrightarrow{AC} \parallel \overrightarrow{DE}$.

If $AB = 15$, $BC = 12$, and $EC = 7$, what is the length of $BD$?

56 Seawater contains approximately 1.2 ounces of salt per liter on average. How many gallons of seawater, to the nearest tenth of a gallon, would contain 1 pound of salt?

57 The equation of line $h$ is $2x + y = 1$. Line $m$ is the image of line $h$ after a dilation of scale factor 4 with respect to the origin. What is the equation of the line $m$?

58 The coordinates of the vertices of $\triangle RST$ are $R(-2,-3)$, $S(8,2)$, and $T(4,5)$. Which type of triangle is $\triangle RST$?

59 In a right triangle, $\sin(40 - x)^\circ = \cos(3x)^\circ$. What is the value of $x$?

60 In the diagram below, quadrilateral $ABCD$ is inscribed in circle $P$.

What is $m\angle ADC$?

61 Point $P$ is on the directed line segment from point $X(-6,-2)$ to point $Y(6,7)$ and divides the segment in the ratio 1:5. What are the coordinates of point $P$?

62 Given: $\triangle ABE$ and $\triangle CBD$ shown in the diagram below with $DB \cong BE$

Which statement is needed to prove $\triangle ABE \cong \triangle CBD$ using only $\text{SAS} \cong \text{SAS}$?
63 In the diagram below, \( \overline{DB} \) and \( \overline{AF} \) intersect at point \( C \), and \( \overline{AD} \) and \( \overline{FBE} \) are drawn.

If \( AC = 6 \), \( DC = 4 \), \( FC = 15 \), \( m \angle D = 65^\circ \), and \( m \angle CBE = 115^\circ \), what is the length of \( CB \)?

64 In the diagram below, \( \overline{AC} \) has endpoints with coordinates \( A(-5,2) \) and \( C(4,-10) \).

If \( B \) is a point on \( \overline{AC} \) and \( AB:BC = 1:2 \), what are the coordinates of \( B \)?

65 The diagonals of rhombus \( TEAM \) intersect at \( P(2,1) \). If the equation of the line that contains diagonal \( TA \) is \( y = -x + 3 \), what is the equation of a line that contains diagonal \( EM \)?

66 The equation of a circle is \( x^2 + y^2 - 6y + 1 = 0 \). What are the coordinates of the center and the length of the radius of this circle?

67 An equilateral triangle has sides of length 20. To the nearest tenth, what is the height of the equilateral triangle?

68 On the set of axes below, rectangle \( ABCD \) can be proven congruent to rectangle \( KLMN \) using which transformation?
69. After a dilation centered at the origin, the image of \( \overline{CD} \) is \( \overline{C'D'} \). If the coordinates of the endpoints of these segments are \( C(6,-4) \), \( D(2,-8) \), \( C'(9,-6) \), and \( D'(3,-12) \), the scale factor of the dilation is

70. In the diagram of \( \triangle ABC \), points \( D \) and \( E \) are on \( \overline{AB} \) and \( \overline{CB} \), respectively, such that \( \overline{AC} \parallel \overline{DE} \).

If \( AD = 24 \), \( DB = 12 \), and \( DE = 4 \), what is the length of \( AC \)?

71. In the diagram shown below, \( \overline{AC} \) is tangent to circle \( O \) at \( A \) and to circle \( P \) at \( C \), \( \overline{OP} \) intersects \( \overline{AC} \) at \( B \), \( OA = 4 \), \( AB = 5 \), and \( PC = 10 \).

What is the length of \( BC \)?

72. The equation of a circle is \( x^2 + y^2 - 12y + 20 = 0 \). What are the coordinates of the center and the length of the radius of the circle?

73. In the diagram below, \( \triangle ABC \sim \triangle DEC \).

If \( AC = 12 \), \( DC = 7 \), \( DE = 5 \), and the perimeter of \( \triangle ABC \) is 30, what is the perimeter of \( \triangle DEC \)?

74. In the diagram below of circle \( O \), the area of the shaded sector \( LOM \) is \( 2\pi \text{ cm}^2 \).

If the length of \( NL \) is 6 cm, what is \( m\angle N \)?

75. In the diagram below, triangle \( ACD \) has points \( B \) and \( E \) on sides \( \overline{AC} \) and \( \overline{AD} \), respectively, such that \( BE \parallel CD \), \( AB = 1 \), \( BC = 3.5 \), and \( AD = 18 \).

What is the length of \( \overline{AE} \), to the nearest tenth?
76 As shown in the diagram below, the angle of elevation from a point on the ground to the top of the tree is 34°.

If the point is 20 feet from the base of the tree, what is the height of the tree, to the nearest tenth of a foot?

77 In rhombus \(VENU\), diagonals \(\overline{VN}\) and \(\overline{EU}\) intersect at \(S\). If \(VN = 12\) and \(EU = 16\), what is the perimeter of the rhombus?

78 In the diagram below, \(\triangle ABC\) has vertices \(A(4,5)\), \(B(2,1)\), and \(C(7,3)\).

What is the slope of the altitude drawn from \(A\) to \(BC\)?

79 Triangle \(RST\) is graphed on the set of axes below.

How many square units are in the area of \(\triangle RST\)?

80 A solid metal prism has a rectangular base with sides of 4 inches and 6 inches, and a height of 4 inches. A hole in the shape of a cylinder, with a radius of 1 inch, is drilled through the entire length of the rectangular prism.

What is the approximate volume of the remaining solid, in cubic inches?

81 Line segment \(A'B'\), whose endpoints are \((4, -2)\) and \((16, 14)\), is the image of \(\overline{AB}\) after a dilation of \(\frac{1}{2}\) centered at the origin. What is the length of \(AB\)?
82 The 2010 U.S. Census populations and population densities are shown in the table below.

<table>
<thead>
<tr>
<th>State</th>
<th>Population Density (people/mi²)</th>
<th>Population in 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida</td>
<td>350.6</td>
<td>18,801,310</td>
</tr>
<tr>
<td>Illinois</td>
<td>231.1</td>
<td>12,830,632</td>
</tr>
<tr>
<td>New York</td>
<td>411.2</td>
<td>19,378,102</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>283.9</td>
<td>12,702,379</td>
</tr>
</tbody>
</table>

Based on the table above, which list has the states' areas, in square miles, in order from largest to smallest?

83 In the diagram below, \(\triangle ABE\) is the image of \(\triangle ACD\) after a dilation centered at the origin. The coordinates of the vertices are \(A(0,0), B(3,0), C(4.5,0), D(0,6),\) and \(E(0,4)\).

84 The area of a sector of a circle with a radius measuring 15 cm is \(75\pi\) cm\(^2\). What is the measure of the central angle that forms the sector?

85 In the diagram below of \(\triangle ABC, D, E,\) and \(F\) are the midpoints of \(AB, BC,\) and \(CA,\) respectively.

What is the ratio of the area of \(\triangle CFE\) to the area of \(\triangle CAB\)?

86 Line \(y = 3x - 1\) is transformed by a dilation with a scale factor of 2 and centered at \((3,8)\). The line's image is

87 The equation of a circle is \(x^2 + y^2 - 6x + 2y = 6\). What are the coordinates of the center and the length of the radius of the circle?
88 In the diagram below, which single transformation was used to map triangle $A$ onto triangle $B$?

89 In the diagram of right triangle $ABC$, $\overline{CD}$ intersects hypotenuse $AB$ at $D$.

If $AD = 4$ and $DB = 6$, which length of $AC$ makes $\overline{CD} \perp AB$?

91 The equation of a circle is $x^2 + 8x + y^2 - 12y = 144$. What are the coordinates of the center and the length of the radius of the circle?

92 Kevin’s work for deriving the equation of a circle is shown below.

93 In the diagram below, line $m$ is parallel to line $n$. Figure 2 is the image of Figure 1 after a reflection over line $m$. Figure 3 is the image of Figure 2 after a reflection over line $n$.

Which single transformation would carry Figure 1 onto Figure 3?
94 The table below shows the population and land area, in square miles, of four counties in New York State at the turn of the century.

<table>
<thead>
<tr>
<th>County</th>
<th>2000 Census Population</th>
<th>2000 Land Area (mi²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broome</td>
<td>200,536</td>
<td>706.82</td>
</tr>
<tr>
<td>Dutchess</td>
<td>280,150</td>
<td>801.59</td>
</tr>
<tr>
<td>Niagara</td>
<td>219,846</td>
<td>522.95</td>
</tr>
<tr>
<td>Saratoga</td>
<td>200,635</td>
<td>811.84</td>
</tr>
</tbody>
</table>

Which county had the greatest population density?

95 What is an equation of a line that is perpendicular to the line whose equation is \(2y = 3x - 10\) and passes through \((-6, 1)\)?

96 In the diagram below, \(m\angle ABC = 268°\).

What is the number of degrees in the measure of \(\angle ABC\)?

97 A 15-foot ladder leans against a wall and makes an angle of 65° with the ground. What is the horizontal distance from the wall to the base of the ladder, to the nearest tenth of a foot?

98 In the diagram below, \(\overline{DC}, \overline{AC}, \overline{DOB}, \overline{CB}\), and \(\overline{AB}\) are chords of circle \(O\), \(FDE\) is tangent at point \(D\), and radius \(\overline{AO}\) is drawn. Sam decides to apply this theorem to the diagram: “An angle inscribed in a semi-circle is a right angle.”

Which angle is Sam referring to?

99 What are the coordinates of the center and length of the radius of the circle whose equation is \(x^2 + 6x + y^2 - 4y = 23\)?
100 In the diagram below, a sequence of rigid motions maps $ABCD$ onto $JKLM$.

If $m \angle A = 82^\circ$, $m \angle B = 104^\circ$, and $m \angle L = 121^\circ$, the measure of $\angle M$ is

101 In the diagram below, $AEFB \parallel CGD$, and $GE$ and $GF$ are drawn.

If $m \angle EFG = 32^\circ$ and $m \angle AEG = 137^\circ$, what is $m \angle EGF$?

102 The Great Pyramid of Giza was constructed as a regular pyramid with a square base. It was built with an approximate volume of 2,592,276 cubic meters and a height of 146.5 meters. What was the length of one side of its base, to the nearest meter?

103 The coordinates of the endpoints of $AB$ are $A(-8, -2)$ and $B(16, 6)$. Point $P$ is on $AB$. What are the coordinates of point $P$, such that $AP:PB$ is 3:5?

104 What is an equation of the perpendicular bisector of the line segment shown in the diagram below?

105 What is an equation of circle $O$ shown in the graph below?
106 Francisco needs the three pieces of glass shown below to complete a stained glass window. The shapes, two triangles and a trapezoid, are measured in inches.

![Diagram of glass pieces]

Glass can be purchased in rectangular sheets that are 12 inches wide. What is the minimum length of a sheet of glass, in inches, that Francisco must purchase in order to have enough to complete the window?

107 A countertop for a kitchen is modeled with the dimensions shown below. An 18-inch by 21-inch rectangle will be removed for the installation of the sink.

![Countertop diagram]

What is the area of the top of the installed countertop, to the nearest square foot?

108 In the figure shown below, quadrilateral $TAEO$ is circumscribed around circle $D$. The midpoint of $TA$ is $R$, and $HO \cong PE$.

![Quadrilateral diagram]

If $AP = 10$ and $EO = 12$, what is the perimeter of quadrilateral $TAEO$?
109 In $\triangle ABC$ shown below, $\angle ACB$ is a right angle, $E$ is a point on $AC$, and $ED$ is drawn perpendicular to hypotenuse $AB$.

If $AB = 9$, $BC = 6$, and $DE = 4$, what is the length of $AE$?

110 The coordinates of the vertices of parallelogram $CDEH$ are $C(-5,5)$, $D(2,5)$, $E(-1,-1)$, and $H(-8,-1)$. What are the coordinates of $P$, the point of intersection of diagonals $CE$ and $DH$?

111 A hemispherical water tank has an inside diameter of 10 feet. If water has a density of 62.4 pounds per cubic foot, what is the weight of the water in a full tank, to the nearest pound?

112 Directed line segment $DE$ has endpoints $D(-4,-2)$ and $E(1,8)$. Point $F$ divides $DE$ such that $DF:FE$ is 2:3. What are the coordinates of $F$?

113 What is the volume, in cubic centimeters, of a right square pyramid with base edges that are 64 cm long and a slant height of 40 cm?

114 If an equilateral triangle is continuously rotated around one of its medians, which 3-dimensional object is generated?

115 If $\sin(2x + 7)^\circ = \cos(4x - 7)^\circ$, what is the value of $x$?

116 What are the coordinates of point $C$ on the directed segment from $A(-8,4)$ to $B(10,-2)$ that partitions the segment such that $AC:CB$ is 2:1?

117 Given the right triangle in the diagram below, what is the value of $x$, to the nearest foot?

118 To build a handicapped-access ramp, the building code states that for every 1 inch of vertical rise in height, the ramp must extend out 12 inches horizontally, as shown in the diagram below.

What is the angle of inclination, $x$, of this ramp, to the nearest hundredth of a degree?
119 In the diagram below of parallelogram $ABCD$, $AFGB$, $CF$ bisects $\angle DCB$, $DG$ bisects $\angle ADC$, and $CF$ and $DG$ intersect at $E$.

If $m\angle B = 75^\circ$, then the measure of $\angle EFA$ is

120 Circle $O$ with a radius of 9 is drawn below. The measure of central angle $AOC$ is $120^\circ$.

What is the area of the shaded sector of circle $O$?

121 What is an equation of a line which passes through $(6,9)$ and is perpendicular to the line whose equation is $4x - 6y = 15$?

122 Line segment $RW$ has endpoints $R(-4,5)$ and $W(6,20)$. Point $P$ is on $RW$ such that $RP:PW$ is $2:3$. What are the coordinates of point $P$?

123 Which equation represents the line that passes through the point $(-2,2)$ and is parallel to $y = \frac{1}{2}x + 8$?

124 What are the coordinates of the point on the directed line segment from $K(-5,-4)$ to $L(5,1)$ that partitions the segment into a ratio of 3 to 2?

125 A fish tank in the shape of a rectangular prism has dimensions of 14 inches, 16 inches, and 10 inches. The tank contains 1680 cubic inches of water. What percent of the fish tank is empty?

126 A regular pentagon is shown in the diagram below.

If the pentagon is rotated clockwise around its center, the minimum number of degrees it must be rotated to carry the pentagon onto itself is

127 The base of a pyramid is a rectangle with a width of 4.6 cm and a length of 9 cm. What is the height, in centimeters, of the pyramid if its volume is 82.8 cm$^3$?
128 The pyramid shown below has a square base, a height of 7, and a volume of 84. What is the length of the side of the base?

129 Triangle $ABC$, with vertices at $A(0,0)$, $B(3,5)$, and $C(0,5)$, is graphed on the set of axes shown below. Which figure is formed when $\triangle ABC$ is rotated continuously about $BC$?

130 If a rectangle is continuously rotated around one of its sides, what is the three-dimensional figure formed?

131 In circle $O$, diameter $AB$, chord $BC$, and radius $OC$ are drawn, and the measure of arc $BC$ is $108^\circ$.

Some students wrote these formulas to find the area of sector $COB$:

- Amy $\frac{3}{10} \cdot \pi \cdot (BC)^2$
- Beth $\frac{108}{360} \cdot \pi \cdot (OC)^2$
- Carl $\frac{3}{10} \cdot \pi \cdot \left(\frac{1}{2}AB\right)^2$
- Dex $\frac{108}{360} \cdot \pi \cdot \left(\frac{1}{2}AB\right)^2$

Which students wrote correct formulas?

132 In a right triangle, the acute angles have the relationship $\sin(2x + 4) = \cos(46)$. What is the value of $x$?

133 Given square $RSTV$, where $RS = 9$ cm. If square $RSTV$ is dilated by a scale factor of 3 about a given center, what is the perimeter, in centimeters, of the image of $RSTV$ after the dilation?
134 An ice cream waffle cone can be modeled by a right circular cone with a base diameter of 6.6 centimeters and a volume of $54.45\pi$ cubic centimeters. What is the number of centimeters in the height of the waffle cone?

135 Which set of statements would describe a parallelogram that can always be classified as a rhombus?
   I. Diagonals are perpendicular bisectors of each other.
   II. Diagonals bisect the angles from which they are drawn.
   III. Diagonals form four congruent isosceles right triangles.

136 The diagram shows rectangle $ABCD$, with diagonal $BD$.

   What is the perimeter of rectangle $ABCD$, to the nearest tenth?

137 A quadrilateral has vertices with coordinates $(-3,1), (0,3), (5,2), \text{ and } (-1,-2)$. Which type of quadrilateral is this?

138 Line $MN$ is dilated by a scale factor of 2 centered at the point $(0,6)$. If $MN$ is represented by $y = -3x + 6$, which equation can represent the image of $MN$?

139 In the diagram of $\triangle ABC$ below, $\overline{DE}$ is parallel to $AB$, $CD = 15$, $AD = 9$, and $AB = 40$.

   The length of $\overline{DE}$ is

140 In triangle $CHR$, $O$ is on $HR$, and $D$ is on $CR$ so that $\angle H \cong \angle RDO$.

   If $RD = 4$, $RO = 6$, and $OH = 4$, what is the length of $CD$?
141 In a circle with a diameter of 32, the area of a sector is \( \frac{512\pi}{3} \). The measure of the angle of the sector, in radians, is \( \text{?} \).

142 In the diagram below, \( \overline{CD} \) is the image of \( \overline{AB} \) after a dilation of scale factor \( k \) with center \( E \).

Which ratio is equal to the scale factor \( k \) of the dilation?

143 The density of the American white oak tree is 752 kilograms per cubic meter. If the trunk of an American white oak tree has a circumference of 4.5 meters and the height of the trunk is 8 meters, what is the approximate number of kilograms of the trunk?

144 An equation of a line perpendicular to the line represented by the equation \( y = \frac{1}{2}x - 5 \) and passing through \((6, -4)\) is \( \text{?} \).

145 Triangle \( DAN \) is graphed on the set of axes below. The vertices of \( \triangle DAN \) have coordinates \( D(-6, -1), \ A(6, 3), \) and \( N(-3, 10) \).

What is the area of \( \triangle DAN \)?

146 A designer needs to create perfectly circular necklaces. The necklaces each need to have a radius of 10 cm. What is the largest number of necklaces that can be made from 1000 cm of wire?

147 In the diagram below of circle \( O \), chord \( \overline{CD} \) is parallel to diameter \( \overline{AOB} \) and \( m\angle CD = 130 \).

What is \( m\angle AC \)?
148 The graph below shows two congruent triangles, \(ABC\) and \(A'B'C'\).

Which rigid motion would map \(\Delta ABC\) onto \(\Delta A'B'C'\)?

149 On the graph below, point \(A(3,4)\) and \(\overline{BC}\) with coordinates \(B(4,3)\) and \(C(2,1)\) are graphed.

What are the coordinates of \(B'\) and \(C'\) after \(\overline{BC}\) undergoes a dilation centered at point \(A\) with a scale factor of 2?

150 What is an equation of the image of the line \(y = \frac{3}{2} x - 4\) after a dilation of a scale factor of \(\frac{3}{4}\) centered at the origin?

151 In the diagram below, \(\angle GRS \cong \angle ART\), \(GR = 36\), \(SR = 45\), \(AR = 15\), and \(RT = 18\).

Which triangle similarity statement is correct?

152 A 20-foot support post leans against a wall, making a 70° angle with the ground. To the nearest tenth of a foot, how far up the wall will the support post reach?

153 A man who is 5 feet 9 inches tall casts a shadow of 8 feet 6 inches. Assuming that the man is standing perpendicular to the ground, what is the angle of elevation from the end of the shadow to the top of the man’s head, to the nearest tenth of a degree?

154 The cross section of a regular pyramid contains the altitude of the pyramid. The shape of this cross section is a
155 In the diagram below, $\overline{AKS}$, $\overline{NKC}$, $\overline{AN}$, and $\overline{SC}$ are drawn such that $AN \cong SC$. Which additional statement is sufficient to prove $\triangle KAN \cong \triangle KSC$ by AAS?

156 In the diagram of $\triangle ADC$ below, $EB \parallel DC$, $AE = 9$, $ED = 5$, and $AB = 9.2$. What is the length of $AC$, to the nearest tenth?

157 The ratio of similarity of $\triangle BOY$ to $\triangle GRL$ is 1:2. If $BO = x + 3$ and $GR = 3x - 1$, then the length of $GR$ is

158 In circle $O$, secants $\overline{ADB}$ and $\overline{AEC}$ are drawn from external point $A$ such that points $D$, $B$, $E$, and $C$ are on circle $O$. If $AD = 8$, $AE = 6$, and $EC$ is 12 more than $BD$, the length of $BD$ is

159 Chelsea is sitting 8 feet from the foot of a tree. From where she is sitting, the angle of elevation of her line of sight to the top of the tree is $36^\circ$. If her line of sight starts 1.5 feet above ground, how tall is the tree, to the nearest foot?

160 Triangle $A'B'C'$ is the image of $\triangle ABC$ after a dilation followed by a translation. Which statement(s) would always be true with respect to this sequence of transformations?
   I. $\triangle ABC \cong \triangle A'B'C'$
   II. $\triangle ABC \sim \triangle A'B'C'$
   III. $AB \parallel A'B'$
   IV. $AA' = BB'$

161 Square $MATH$ has a side length of 7 inches. Which three-dimensional object will be formed by continuously rotating square $MATH$ around side $AT$?
162 In the diagram below of \( \triangle PQR \), \( ST \) is drawn parallel to \( PR \), \( PS = 2 \), \( SQ = 5 \), and \( TR = 5 \).

What is the length of \( QR \)?

163 As shown in the diagram below, \( \overrightarrow{ABC} \parallel \overrightarrow{EFG} \) and \( \overrightarrow{BF} \cong \overrightarrow{EF} \).

If \( \angle CBF = 42.5^\circ \), then \( \angle EBF \) is

164 In the diagram below of \( \triangle ACD \), \( DB \) is a median to \( AC \), and \( AB \cong DB \).

If \( \angle DAB = 32^\circ \), what is \( \angle BDC \)?

165 Given \( \triangle ABC \) with \( \angle B = 62^\circ \) and side \( AC \) extended to \( D \), as shown below.

Which value of \( x \) makes \( AB \cong CB \)?

166 In the diagram below of triangle \( MNO \), \( \angle M \) and \( \angle O \) are bisected by \( MS \) and \( OR \), respectively. Segments \( MS \) and \( OR \) intersect at \( T \), and \( \angle N = 40^\circ \).

If \( \angle TMR = 28^\circ \), the measure of angle \( OTS \) is

167 A standard-size golf ball has a diameter of 1.680 inches. The material used to make the golf ball weighs 0.6523 ounce per cubic inch. What is the weight, to the nearest hundredth of an ounce, of one golf ball?
168 A company is creating an object from a wooden cube with an edge length of 8.5 cm. A right circular cone with a diameter of 8 cm and an altitude of 8 cm will be cut out of the cube. Which expression represents the volume of the remaining wood?

169 In the diagram below of right triangle $ABC$, altitude $BD$ is drawn to hypotenuse $AC$.

If $BD = 4$, $AD = x - 6$, and $CD = x$, what is the length of $CD$?

170 In the diagram below, right triangle $ABC$ has legs whose lengths are 4 and 6.

What is the volume of the three-dimensional object formed by continuously rotating the right triangle around $AB$?

171 Linda is designing a circular piece of stained glass with a diameter of 7 inches. She is going to sketch a square inside the circular region. To the nearest tenth of an inch, the largest possible length of a side of the square is

172 In the diagram of quadrilateral $NAVY$ below, $m\angle YNA = 30^\circ$, $m\angle YAN = 38^\circ$, $m\angle AVY = 94^\circ$, and $m\angle VAY = 46^\circ$.

Which segment has the shortest length?

173 Tennis balls are sold in cylindrical cans with the balls stacked one on top of the other. A tennis ball has a diameter of 6.7 cm. To the nearest cubic centimeter, what is the minimum volume of the can that holds a stack of 4 tennis balls?

174 The coordinates of the endpoints of directed line segment $ABC$ are $A(-8,7)$ and $C(7,-13)$. If $AB:BC = 3:2$, the coordinates of $B$ are

175 After a dilation with center $(0,0)$, the image of $DB$ is $D'B'$. If $DB = 4.5$ and $D'B' = 18$, the scale factor of this dilation is
176 A child’s tent can be modeled as a pyramid with a square base whose sides measure 60 inches and whose height measures 84 inches. What is the volume of the tent, to the nearest cubic foot?

177 In the diagram below, the circle shown has radius 10. Angle $B$ intercepts an arc with a length of $2\pi$.

What is the measure of angle $B$, in radians?

178 In the diagram below of $\triangle HAR$ and $\triangle NTY$, angles $H$ and $N$ are right angles, and $\triangle HAR \sim \triangle NTY$.

If $AR = 13$ and $HR = 12$, what is the measure of angle $Y$, to the nearest degree?

179 A plane intersects a hexagonal prism. The plane is perpendicular to the base of the prism. Which two-dimensional figure is the cross section of the plane intersecting the prism?

180 In the diagram below of circle $O$, $GO = 8$ and $m \angle GOJ = 60^\circ$.

What is the area, in terms of $\pi$, of the shaded region?

181 Which point shown in the graph below is the image of point $P$ after a counterclockwise rotation of $90^\circ$ about the origin?
182 In the diagram below, \( \overline{AF} \) and \( \overline{DB} \) intersect at \( C \), and \( \overline{AD} \) and \( \overline{FBE} \) are drawn such that \( m\angle D = 65^\circ \), \( m\angle CBE = 115^\circ \), \( DC = 7.2 \), \( AC = 9.6 \), and \( FC = 21.6 \).

What is the length of \( \overline{CB} \)?

183 In the diagram of equilateral triangle \( \triangle ABC \) shown below, \( E \) and \( F \) are the midpoints of \( \overline{AC} \) and \( \overline{BC} \), respectively.

If \( EF = 2x + 8 \) and \( AB = 7x - 2 \), what is the perimeter of trapezoid \( ABFE \)?

184 What are the coordinates of the center and the length of the radius of the circle whose equation is \( x^2 + y^2 = 8x - 6y + 39 \)?

185 In the diagram below, \( \overline{BC} \) connects points \( B \) and \( C \) on the congruent sides of isosceles triangle \( \triangle ADE \), such that \( \triangle ABC \) is isosceles with vertex angle \( A \).

If \( AB = 10 \), \( BD = 5 \), and \( DE = 12 \), what is the length of \( \overline{BC} \)?

186 Which regular polygon has a minimum rotation of \( 45^\circ \) to carry the polygon onto itself?

187 The vertices of square \( RSTV \) have coordinates \( R(-1,5) \), \( S(-3,1) \), \( T(-7,3) \), and \( V(-5,7) \). What is the perimeter of \( RSTV \)?
188 In parallelogram $QRST$ shown below, diagonal $TR$ is drawn, $U$ and $V$ are points on $TS$ and $QR$, respectively, and $UV$ intersects $TR$ at $W$.

If $m\angle S = 60^\circ$, $m\angle SRT = 83^\circ$, and $m\angle TWU = 35^\circ$, what is $m\angle WVQ$?

189 A right cylinder is cut perpendicular to its base. The shape of the cross section is a

190 In the diagram below of circle $O$, chords $AB$ and $CD$ intersect at $E$.

If $m\overarc{AC} = 72^\circ$ and $m\angle AEC = 58^\circ$, how many degrees are in $m\overarc{DB}$?

191 A hemispherical tank is filled with water and has a diameter of 10 feet. If water weighs 62.4 pounds per cubic foot, what is the total weight of the water in a full tank, to the nearest pound?

192 Given $MN$ shown below, with $M(-6,1)$ and $N(3,-5)$, what is an equation of the line that passes through point $P(6,1)$ and is parallel to $MN$?

193 In the diagram below of $\triangle ABC$, $D$ is a point on $BA$, $E$ is a point on $BC$, and $DE$ is drawn.

If $BD = 5$, $DA = 12$, and $BE = 7$, what is the length of $BC$ so that $AC \parallel DE$?
194 What is an equation of the line that passes through the point (6, 8) and is perpendicular to a line with equation $y = \frac{3}{2}x + 5$?

195 The center of circle $Q$ has coordinates $(3, -2)$. If circle $Q$ passes through $R(7, 1)$, what is the length of its diameter?

196 In $\triangle ABC$, where $\angle C$ is a right angle, $\cos A = \frac{\sqrt{21}}{5}$. What is $\sin B$?

197 A vendor is using an 8-ft by 8-ft tent for a craft fair. The legs of the tent are 9 ft tall and the top forms a square pyramid with a height of 3 ft. What is the volume, in cubic feet, of space the tent occupies?

198 Rhombus $STAR$ has vertices $S(-1, 2)$, $T(2, 3)$, $A(3, 0)$, and $R(0, -1)$. What is the perimeter of rhombus $STAR$?

199 In $\triangle RST$ shown below, altitude $SU$ is drawn to $RT$ at $U$.

If $SU = h$, $UT = 12$, and $RT = 42$, which value of $h$ will make $\triangle RST$ a right triangle with $\angle RST$ as a right angle?

200 Triangle $FGH$ is inscribed in circle $O$, the length of radius $OH$ is 6, and $FH \cong OG$. What is the area of the sector formed by angle $FOH$?
201 A right hexagonal prism is shown below. A two-dimensional cross section that is perpendicular to the base is taken from the prism.

Which figure describes the two-dimensional cross section?

202 Circle $O$ is centered at the origin. In the diagram below, a quarter of circle $O$ is graphed.

Which three-dimensional figure is generated when the quarter circle is continuously rotated about the $y$-axis?

203 A regular pyramid has a square base. The perimeter of the base is 36 inches and the height of the pyramid is 15 inches. What is the volume of the pyramid in cubic inches?

204 In right triangle $ABC$, hypotenuse $AB$ has a length of 26 cm, and side $BC$ has a length of 17.6 cm. What is the measure of angle $B$, to the nearest degree?

205 In the diagram below, $DE$ divides $AB$ and $AC$ proportionally, $m\angle C = 26^\circ$, $m\angle A = 82^\circ$, and $DF$ bisects $\angle BDE$.

The measure of angle $DFB$ is

206 A man was parasailing above a lake at an angle of elevation of $32^\circ$ from a boat, as modeled in the diagram below.

If 129.5 meters of cable connected the boat to the parasail, approximately how many meters above the lake was the man?
207 Triangle $RJM$ has an area of 6 and a perimeter of 12. If the triangle is dilated by a scale factor of 3 centered at the origin, what are the area and perimeter of its image, triangle $R'J'M'$?

208 If $x^2 + 4x + y^2 - 6y - 12 = 0$ is the equation of a circle, the length of the radius is

209 The diagram below shows circle $O$ with radii $OA$ and $OB$. The measure of angle $AOB$ is $120^\circ$, and the length of a radius is 6 inches.

Which expression represents the length of arc $AB$, in inches?

210 Which three-dimensional figure will result when a rectangle 6 inches long and 5 inches wide is continuously rotated about the longer side?

211 In the diagram of parallelogram $FRED$ shown below, $ED$ is extended to $A$, and $AF$ is drawn such that $AF \cong DF$.

If $m\angle R = 124^\circ$, what is $m\angle AFD$?

212 Point $M$ divides $AB$ so that $AM:MB = 1:2$. If $A$ has coordinates $(-1,-3)$ and $B$ has coordinates $(8,9)$, the coordinates of $M$ are

213 In rhombus $TIGE$, diagonals $TG$ and $IE$ intersect at $R$. The perimeter of $TIGE$ is 68, and $TG = 16$.

What is the length of diagonal $IE$?
214  A rectangle whose length and width are 10 and 6, respectively, is shown below. The rectangle is continuously rotated around a straight line to form an object whose volume is $150\pi$. Which line could the rectangle be rotated around?

215  A circle with a diameter of 10 cm and a central angle of $30^\circ$ is drawn below.

What is the area, to the nearest tenth of a square centimeter, of the sector formed by the $30^\circ$ angle?

216  In the diagram of $\triangle RST$ below, $m\angle T = 90^\circ$, $RS = 65$, and $ST = 60$.

What is the measure of $\angle S$, to the nearest degree?
Geometry Regents Bimodal Worksheets

Answer Section

1. ANS: 
   \[ AB + AC \]
   PTS: 2  REF: 011704geo  TOP: Midsegments

2. ANS: 
   \[ 55 \]
   \[ \frac{4}{3} \pi \left( \frac{9.5}{2} \right)^3 \approx 55 \]
   \[ \frac{4}{3} \pi \left( \frac{2.5}{2} \right)^3 \approx 55 \]
   PTS: 2  REF: 011614geo  TOP: Volume  KEY: spheres

3. ANS: 
   \[ 15 \]
   \[ 18^2 = 12(x + 12) \]
   \[ 324 = 12(x + 12) \]
   \[ 27 = x + 12 \]
   \[ x = 15 \]
   PTS: 2  REF: 081920geo  TOP: Similarity  KEY: leg

4. ANS: 
   \[ 20 \]
   \[ \frac{4}{3} \pi \cdot 4^3 + 0.075 = 20 \]
   PTS: 2  REF: 011619geo  TOP: Density

5. ANS: 
   \[ 60^\circ \]
   \[ 6x - 40 + x + 20 = 180 - 3x \] \[ \text{m} \angle BAC = 180 - (80 + 40) = 60 \]
   \[ 10x = 200 \]
   \[ x = 20 \]
   PTS: 2  REF: 011809geo  TOP: Exterior Angle Theorem
6 ANS:
\[
\frac{12}{4} = \frac{x}{5} \quad 15 - 4 = 11
\]
\[
x = 15
\]
PTS: 2 REF: 011624geo TOP: Similarity KEY: basic

7 ANS:
cone with a diameter of 12

8 ANS:
\[
y - 3 = \frac{2}{3}(x - 1)
\]
\[
m = \frac{-(-2)}{3} = \frac{2}{3}
\]
PTS: 2 REF: 061916geo TOP: Parallel and Perpendicular Lines KEY: write equation of parallel line

9 ANS:
\[
4\sqrt{3}
\]
\[
x^2 = 12(12 - 8)
\]
\[
x^2 = 48
\]
\[
x = 4\sqrt{3}
\]
PTS: 2 REF: 011823geo TOP: Similarity KEY: leg

10 ANS:
\[
3.3
\]
\[
\sin 32 = \frac{x}{6.2}
\]
\[
x \approx 3.3
\]
PTS: 2 REF: 081719geo TOP: Using Trigonometry to Find a Side

11 ANS:
\[
1.2
\]
\[
V = \frac{1}{3}\pi \left(\frac{1.5}{2}\right)^2 \left(\frac{4}{2}\right) \approx 1.2
\]
PTS: 2 REF: 011724geo TOP: Volume KEY: cones
12 ANS:
\[
\frac{32\pi}{3}
\]
\[
\frac{60}{360} \cdot 8^2 \pi = \frac{1}{6} \cdot 64\pi = \frac{32\pi}{3}
\]

PTS: 2  REF: 061624geo  TOP: Sectors

13 ANS:

PTS: 2  REF: 061601geo  TOP: Rotations of Two-Dimensional Objects

14 ANS:
\[
V = \frac{1}{3} \cdot 6^2 \cdot 12 = 144
\]

PTS: 2  REF: 011607geo  TOP: Volume  KEY: pyramids

15 ANS:
a cone

PTS: 2  REF: 061501geo  TOP: Rotations of Two-Dimensional Objects

16 ANS:
\[
56
\]
\[
\sin x = \frac{10}{12}
\]
\[
x \approx 56
\]

PTS: 2  REF: 061922geo  TOP: Using Trigonometry to Find an Angle

17 ANS:
\[
102
\]
\[
V = 12 \cdot 8.5 \cdot 4 = 408
\]
\[
W = 408 \cdot 0.25 = 102
\]

PTS: 2  REF: 061507geo  TOP: Density
18. ANS:
\[ \frac{2}{4} = \frac{9-x}{x} \]
\[ 36 - 4x = 2x \]
\[ x = 6 \]
PTS: 2  REF: 061705geo  TOP: Side Splitter Theorem

19. ANS:
\[ 19^\circ \]
\[ \frac{72 - 34}{2} = 19 \]
PTS: 2  REF: 061918geo  TOP: Chords, Secants and Tangents
KEY: secants drawn from common point, angle

20. ANS:
\[ 6 \cdot 6 = x(x - 5) \]
\[ 36 = x^2 - 5x \]
\[ 0 = x^2 - 5x - 36 \]
\[ 0 = (x - 9)(x + 4) \]
\[ x = 9 \]
PTS: 2  REF: 061708geo  TOP: Chords, Secants and Tangents
KEY: intersecting chords, length

21. ANS:
\[ \frac{x}{x + 3} = \frac{14}{21} \]
\[ 14 - 6 = 8 \]
\[ 21x = 14x + 42 \]
\[ 7x = 42 \]
\[ x = 6 \]
PTS: 2  REF: 081812geo  TOP: Side Splitter Theorem
22 ANS: 
\[3\sqrt{6}\]
\[x^2 = 3 \cdot 18\]
\[x = \sqrt{3 \cdot 3 \cdot 6}\]
\[x = 3\sqrt{6}\]

PTS: 2 REF: 081712geo TOP: Chords, Secants and Tangents 
KEY: secant and tangent drawn from common point, length

23 ANS: 
\[-9 + \frac{1}{3} (9 - 9) = -9 + \frac{1}{3} (18) = -9 + 6 = -3\]
\[8 + \frac{1}{3} (-4 - 8) = 8 + \frac{1}{3} (-12) = 8 - 4 = 4\]

PTS: 2 REF: 081903geo TOP: Direct Line Segments

24 ANS: 
\[y + 1 = \frac{4}{3} (x + 3)\]
\[m = \left(\frac{-11 + 5}{2}, \frac{5 + 7}{2}\right) = (-3, -1)\]
\[m = \frac{5 - 7}{-11 - 5} = \frac{12}{-16} = \frac{3}{4}\]
\[m_\perp = \frac{4}{3}\]

PTS: 2 REF: 061612geo TOP: Parallel and Perpendicular Lines 
KEY: perpendicular bisector

25 ANS: 
\[5\sqrt{10}\]
\[\sqrt{(-1 - 2)^2 + (4 - 3)^2} = \sqrt{10}\]

PTS: 2 REF: 011615geo TOP: Polygons in the Coordinate Plane

26 ANS: 
\[8.25\]
\[\frac{6.6}{x} = \frac{4.2}{5.25}\]
\[4.2x = 34.65\]
\[x = 8.25\]

PTS: 2 REF: 081705geo TOP: Similarity KEY: basic

27 ANS: 
\[128\]
\[V = \frac{1}{3} (8)^2 \cdot 6 = 128\]

PTS: 2 REF: 061906geo TOP: Volume KEY: pyramids
28 ANS:
2
\[ SA = 6 \cdot 12^2 = 864 \]
\[ \frac{864}{450} = 1.92 \]

PTS: 2 REF: 061519geo TOP: Surface Area

29 ANS:
17,869
\[ 20 \cdot 12 \cdot 45 + \frac{1}{2} \pi (10)^2 (45) \approx 17869 \]

PTS: 2 REF: 061807geo TOP: Volume KEY: compositions

30 ANS:
5.6
\[ \tan \theta = \frac{2.4}{x} \]
\[ \frac{3}{7} = \frac{2.4}{x} \]
\[ x = 5.6 \]

PTS: 2 REF: 011707geo TOP: Using Trigonometry to Find a Side

31 ANS:
18 inches
\[ 3 \cdot 6 = 18 \]

PTS: 2 REF: 061602geo TOP: Line Dilations

32 ANS:
5.9
\[ \frac{x}{6.3} = \frac{3}{5} \quad \frac{y}{9.4} = \frac{6.3}{6.3+3.78} \]
\[ x = 3.78 \quad y \approx 5.9 \]

PTS: 2 REF: 081816geo TOP: Side Splitter Theorem

33 ANS:
135°

PTS: 2 REF: 081708geo TOP: Interior and Exterior Angles of Polygons
34 ANS: 
\( (5,1) \)
\[ 3 + \frac{2}{5}(8 - 3) = 3 + \frac{2}{5}(5) = 3 + 2 = 5 \]
\[ 5 + \frac{2}{5}(-5 - 5) = 5 + \frac{2}{5}(-10) = 5 - 4 = 1 \]

PTS: 2 REF: 011720geo TOP: Directed Line Segments

35 ANS: 
\[ x^2 - 2x + y^2 - 8y = 8 \]
\[ (x - 1)^2 + (y - 4)^2 = \left( \frac{10}{2} \right)^2 \]
\[ x^2 - 2x + 1 + y^2 - 8y + 16 = 25 \]
\[ x^2 - 2x + y^2 - 8y = 8 \]

PTS: 2 REF: 011920geo TOP: Equations of Circles
KEY: write equation, given center and radius

36 ANS: 
\[ 19 \]
\[ \sin 71 = \frac{x}{20} \]
\[ x = 20 \sin 71 \approx 19 \]

PTS: 2 REF: 061721geo TOP: Using Trigonometry to Find a Side
KEY: without graphics

37 ANS: 
\[ 50 \]
\[ \cos A = \frac{9}{14} \]
\[ A \approx 50^\circ \]

PTS: 2 REF: 011616geo TOP: Using Trigonometry to Find an Angle

38 ANS: 
dilation

PTS: 2 REF: 081602geo TOP: Identifying Transformations
KEY: basic

39 ANS: 
\[ 16 \]
\[ x \text{ is } \frac{1}{2} \text{ the circumference. } \]
\[ \frac{C}{2} = \frac{10\pi}{2} \approx 16 \]

PTS: 2 REF: 061523geo TOP: Circumference

40 ANS: 
\[ 25 \]

PTS: 2 REF: 061702geo TOP: Polygons in the Coordinate Plane
41 ANS:  
555  
\[ \tan 11.87 = \frac{x}{0.5(5280)} \]  
x \approx 555  

PTS: 2 "Using Trigonometry to Find a Side"

42 ANS:  
12.5\pi  
\[ h = \sqrt{6.5^2 - 2.5^2} = 6, \quad V = \frac{1}{3}\pi(2.5)^26 = 12.5\pi \]  

PTS: 2 "Volume" "cones"

43 ANS:  
80°

PTS: 2 "Interior and Exterior Angles of Polygons"

44 ANS:  
I, II, and III

PTS: 2 "Medians, Altitudes and Bisectors"

45 ANS:  
28.2  
\[ \sin 16.5 = \frac{8}{x} \]  
x \approx 28.2  

PTS: 2 "Using Trigonometry to Find a Side"

46 ANS:  
center (2, -4) and radius 3  
\[ x^2 - 4x + 4 + y^2 + 8y + 16 = -11 + 4 + 16 \]  
\[ (x - 2)^2 + (y + 4)^2 = 9 \]  

PTS: 2 "Equations of Circles" "completing the square"
47 ANS:
8.5
2x - 1 = 16
x = 8.5

PTS: 2 REF: 011902geo TOP: Properties of Transformations KEY: graphics

48 ANS:
1808
2.5 \times 1.25 \times (27 \times 12) + \frac{1}{2} \pi (1.25)^2 (27 \times 12) \approx 1808

PTS: 2 REF: 061723geo TOP: Volume KEY: compositions

49 ANS:
4.2
24x = 10^2
24x = 100
x \approx 4.2

PTS: 2 REF: 061823geo TOP: Similarity KEY: leg

50 ANS:
y = 2x - 6
The line \( y = 2x - 4 \) does not pass through the center of dilation, so the dilated line will be distinct from \( y = 2x - 4 \). Since a dilation preserves parallelism, the line \( y = 2x - 4 \) and its image will be parallel, with slopes of 2. To obtain the \( y \)-intercept of the dilated line, the scale factor of the dilation, \( \frac{3}{2} \), can be applied to the \( y \)-intercept, \((0, -4)\). Therefore, \( \left(0, \frac{3}{2}, -4 \cdot \frac{3}{2}\right) \rightarrow (0, -6) \). So the equation of the dilated line is \( y = 2x - 6 \).

PTS: 2 REF: fall1403geo TOP: Line Dilations

51 ANS:
523.7
\[ V = \frac{1}{2} \times \frac{4}{3} \pi r^3 = \frac{1}{2} \times \frac{4}{3} \pi \left(\frac{12.6}{2}\right)^3 \approx 523.7 \]

PTS: 2 REF: 061910geo TOP: Volume KEY: spheres

52 ANS:
44°
180 - (68 \cdot 2)

PTS: 2 REF: 081624geo TOP: Interior and Exterior Angles of Polygons
53 ANS:
20
\[12^2 = 9 \cdot GM \quad IM^2 = 16 \cdot 25\]
\[GM = 16 \quad IM = 20\]

PTS: 2  REF: 011910geo  TOP: Similarity  KEY: leg

54 ANS:
a right triangle

PTS: 2  REF: 081904geo  TOP: Centroid, Orthocenter, Incenter and Circumcenter

55 ANS:
6.25
\[\frac{x}{15} = \frac{5}{12}\]
\[x = 6.25\]

PTS: 2  REF: 011906geo  TOP: Side Splitter Theorem

56 ANS:
3.5
\[\frac{1}{1.2 \text{ oz}} \left( \frac{16 \text{ oz}}{1 \text{ lb}} \right) = \frac{13.31}{1 \text{ lb}} \left( \frac{1 \text{ g}}{3.7851} \right) \approx \frac{3.5 \text{ g}}{1 \text{ lb}}\]

PTS: 2  REF: 061618geo  TOP: Density

57 ANS:
y = -2x + 4
The given line \(h, 2x + y = 1\), does not pass through the center of dilation, the origin, because the \(y\)-intercept is at \((0,1)\). The slope of the dilated line, \(m\), will remain the same as the slope of line \(h\), -2. All points on line \(h\), such as \((0,1)\), the \(y\)-intercept, are dilated by a scale factor of 4; therefore, the \(y\)-intercept of the dilated line is \((0,4)\) because the center of dilation is the origin, resulting in the dilated line represented by the equation \(y = -2x + 4\).

PTS: 2  REF: spr1403geo  TOP: Line Dilations

58 ANS:
right
\[m_{RT} = \frac{5 - 3}{4 - 2} = \frac{8}{6} = \frac{4}{3} \quad m_{ST} = \frac{5 - 2}{4 - 8} = \frac{3}{-4} = \frac{3}{4}\]
Slopes are opposite reciprocals, so lines form a right angle.

PTS: 2  REF: 011618geo  TOP: Triangles in the Coordinate Plane

59 ANS:
25
\[40 - x + 3x = 90\]
\[2x = 50\]
\[x = 25\]

PTS: 2  REF: 081721geo  TOP: Cofunctions
60 ANS: 108°

PTS: 2 REF: 081515geo TOP: Inscribed Quadrilaterals

61 ANS: \[
\left( -4, -\frac{1}{2} \right)
\]

\[
x = -6 + \frac{1}{6} (6 - 6) = -6 + 2 = -4 \\
y = -2 + \frac{1}{6} (7 - 2) = -2 + \frac{9}{6} = -\frac{1}{2}
\]

PTS: 2 REF: 081618geo TOP: Directed Line Segments

62 ANS: \[
\overline{AD} \cong \overline{CE}
\]

PTS: 2 REF: 081622geo TOP: Triangle Proofs

KEY: statements

63 ANS: 10

\[
\frac{f}{4} = \frac{15}{6}
\]

\[
f = 10
\]

PTS: 2 REF: 061617geo TOP: Lines and Angles

64 ANS: \[
(−2, −2)
\]

\[
x = -5 + \frac{1}{3} (4 - 5) = -5 + 3 = -2 \\
y = 2 + \frac{1}{3} (-10 - 2) = 2 - 4 = -2
\]

PTS: 2 REF: 011806geo TOP: Directed Line Segments

65 ANS: \[
y = x - 1 \\
m_{TA} = -1 \\
m_{EM} = 1
\]

\[
y = mx + b \\
1 = 1(2) + b \\
-1 = b
\]

PTS: 2 REF: 081614geo TOP: Quadrilaterals in the Coordinate Plane

KEY: general

66 ANS: \[
\text{center } (0, 3) \text{ and radius } 2\sqrt{2}
\]

\[
x^2 + y^2 - 6y + 9 = -1 + 9 \\
x^2 + (y - 3)^2 = 8
\]

PTS: 2 REF: 011718geo TOP: Equations of Circles

KEY: completing the square
67 ANS: 
\[ \sqrt{20^2 - 10^2} \approx 17.3 \]

PTS: 2  REF: 081608geo  TOP: 30-60-90 Triangles

68 ANS: 
reflection over the x-axis

PTS: 2  REF: 061616geo  TOP: Identifying Transformations

69 ANS: 
\[ \frac{3}{2} \]

PTS: 2  REF: 061905geo  TOP: Line Dilations

70 ANS: 
\[ \frac{12}{4} = \frac{36}{x} \]
\[ 12x = 144 \]
\[ x = 12 \]

PTS: 2  REF: 061621geo  TOP: Side Splitter Theorem

71 ANS: 
\[ 5 \cdot \frac{10}{4} = \frac{50}{4} = 12.5 \]

PTS: 2  REF: 081512geo  TOP: Chords, Secants and Tangents

72 ANS: 
center (0,6) and radius 4
\[ x^2 + y^2 - 12y + 36 = -20 + 36 \]
\[ x^2 + (y - 6)^2 = 16 \]

PTS: 2  REF: 061712geo  TOP: Equations of Circles

73 ANS: 
\[ \frac{7}{12} \cdot 30 = 17.5 \]

PTS: 2  REF: 061521geo  TOP: Similarity  KEY: perimeter and area
74 ANS: 
40°
\[
\frac{x}{360} \cdot 3^2 \pi = 2\pi \quad 180 - 80 = 100
\]
x = 80 \quad \frac{180 - 100}{2} = 40

PTS: 2  REF: 011612geo  TOP: Sectors

75 ANS: 
4.0
\[
\frac{1}{3.5} = \frac{x}{18-x}
\]
3.5x = 18 - x
4.5x = 18
x = 4

PTS: 2  REF: 081707geo  TOP: Side Splitter Theorem

76 ANS: 
13.5
\[
\tan 34 = \frac{T}{20}
\]
T \approx 13.5

PTS: 2  REF: 061505geo  TOP: Using Trigonometry to Find a Side

77 ANS: 
40
\[
\sqrt{8^2 + 6^2} = 10 \text{ for one side}
\]

PTS: 2  REF: 011907geo  TOP: Special Quadrilaterals

78 ANS: 
\[
\frac{5}{2}
\]
The slope of BC is \(\frac{2}{5}\). Altitude is perpendicular, so its slope is \(-\frac{5}{2}\).

PTS: 2  REF: 061614geo  TOP: Triangles in the Coordinate Plane
79 ANS: 45

\[ \sqrt{45} = 3\sqrt{5} \quad a = \frac{1}{2} \left( 3\sqrt{5} \right) \left( 6\sqrt{5} \right) = \frac{1}{2} (18)(5) = 45 \]

\[ \sqrt{180} = 6\sqrt{5} \]

PTS: 2 REF: 061622geo TOP: Polygons in the Coordinate Plane

80 ANS: 77

\[ 4 \times 4 \times 6 - \pi (1)^2 (6) \approx 77 \]

PTS: 2 REF: 011711geo TOP: Volume KEY: compositions

81 ANS: 40

\[ \sqrt{(32 - 8)^2 + (28 - 4)^2} = \sqrt{576 + 1024} = \sqrt{1600} = 40 \]

PTS: 2 REF: 081621geo TOP: Line Dilations

82 ANS: Illinois, Florida, New York, Pennsylvania

Illinois: \( \frac{12830632}{231.1} \approx 55520 \) Florida: \( \frac{18801310}{350.6} \approx 53626 \) New York: \( \frac{19378102}{411.2} \approx 47126 \) Pennsylvania: \( \frac{12702379}{283.9} \approx 44742 \)

PTS: 2 REF: 081720geo TOP: Density

83 ANS: \( \frac{2}{3} \)

\[ \frac{4}{6} = \frac{3}{4.5} = \frac{2}{3} \]

PTS: 2 REF: 081523geo TOP: Dilations

84 ANS: 120°

\[ \frac{x}{360} (15)^2 \pi = 75 \pi \]

\[ x = 120 \]

PTS: 2 REF: 011914geo TOP: Sectors
85 ANS: 1:4

PTS: 2       REF: 081716geo       TOP: Midsegments

86 ANS:  

\[ y = 3x - 1 \]

The line \( y = 3x - 1 \) passes through the center of dilation, so the dilated line is not distinct.

PTS: 2       REF: 081524geo       TOP: Line Dilations

87 ANS:  

center \((3, -1)\) and radius 4  

\[ x^2 + y^2 - 6x + 2y = 6 \]

\[ x^2 - 6x + 9 + y^2 + 2y + 1 = 6 + 9 + 1 \]

\[ (x - 3)^2 + (y + 1)^2 = 16 \]

PTS: 2       REF: 011812geo       TOP: Equations of Circles  

KEY: completing the square

88 ANS: rotation

PTS: 2       REF: 081513geo       TOP: Identifying Transformations  

KEY: graphics

89 ANS:  

\[ 2\sqrt{10} \]

\[ x^2 = 4 \cdot 10 \]

\[ x = \sqrt{40} \]

\[ x = 2\sqrt{10} \]

PTS: 2       REF: 081610geo       TOP: Similarity  

KEY: leg

90 ANS:  

center \((0, -3)\) and radius 4  

\[ x^2 + y^2 + 6y + 9 = 7 + 9 \]

\[ x^2 + (y + 3)^2 = 16 \]

PTS: 2       REF: 061514geo       TOP: Equations of Circles  

KEY: completing the square

91 ANS:  

center \((-4, 6)\) and radius 14  

\[ x^2 + 8x + 16 + y^2 - 12y + 36 = 144 + 16 + 36 \]

\[ (x + 4)^2 + (y - 6)^2 = 196 \]

PTS: 2       REF: 061920geo       TOP: Equations of Circles  

KEY: completing the square
92 ANS:
Step 2

PTS: 2 REF: 061603geo TOP: Equations of Circles
KEY: find center and radius | completing the square

93 ANS:
a translation

PTS: 2 REF: 061803geo TOP: Identifying Transformations
KEY: graphics

94 ANS:
Niagara

Broome: \(\frac{200536}{706.82} \approx 284\) Dutchess: \(\frac{280150}{801.59} \approx 349\) Niagara: \(\frac{219846}{522.95} \approx 420\) Saratoga: \(\frac{200635}{811.84} \approx 247\)

PTS: 2 REF: 061902geo TOP: Density

95 ANS:
\(y = -\frac{2}{3}x - 3\)

\(m = \frac{3}{2}\) . \(1 = -\frac{2}{3}(-6) + b\)

\(m_{\perp} = -\frac{2}{3}\) \(1 = 4 + b\)

\(-3 = b\)

PTS: 2 REF: 061719geo TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

96 ANS:
46°

\(\frac{1}{2}(360 - 268) = 46\)

PTS: 2 REF: 061704geo TOP: Chords, Secants and Tangents
KEY: inscribed

97 ANS:
6.3

\(\cos 65^\circ = \frac{x}{15}\)

\(x \approx 6.3\)

PTS: 2 REF: 081924geo TOP: Using Trigonometry to Find a Side

98 ANS:
\(\angle DCB\)

PTS: 2 REF: 011621geo TOP: Chords, Secants and Tangents
KEY: inscribed
99 ANS:  
\((-3,2)\) and 6  
\(x^2 + 6x + 9 + y^2 - 4y + 4 = 23 + 9 + 4\)  
\((x + 3)^2 + (y - 2)^2 = 36\)

PTS: 2  REF: 011617geo  TOP: Equations of Circles  
KEY: completing the square

100 ANS:  
53°  
\(360 - (82 + 104 + 121) = 53\)

PTS: 2  REF: 011801geo  TOP: Properties of Transformations  
KEY: graph

101 ANS:  
105°

PTS: 2  REF: 081801geo  TOP: Lines and Angles

102 ANS:  
230  
\(2592276 = \frac{1}{3} \cdot s^2 \cdot 146.5\)  
\(230 \approx s\)

PTS: 2  REF: 081521geo  TOP: Volume  
KEY: pyramids

103 ANS:  
(1,1)  
\(-8 + \frac{3}{8} (16 - 8) = -8 + \frac{3}{8} (24) = -8 + 9 = 1\)  
\(-2 + \frac{3}{8} (6 - 2) = -2 + \frac{3}{8} (8) = -2 + 3 = 1\)

PTS: 2  REF: 081724geo  TOP: Directed Line Segments

104 ANS:  
2y - x = 0  
The segment’s midpoint is the origin and slope is -2. The slope of a perpendicular line is \(\frac{1}{2}\)  
\(y = \frac{1}{2} x + 0\)  
\(2y = x\)  
\(2y - x = 0\)

PTS: 2  REF: 081724geo  TOP: Parallel and Perpendicular Lines  
KEY: perpendicular bisector
105 ANS:
\[ x^2 - 10x + y^2 - 4y = -13 \]
\[ (x - 5)^2 + (y - 2)^2 = 16 \]
\[ x^2 - 10x + 25 + y^2 - 4y + 4 = 16 \]
\[ x^2 - 10x + y^2 - 4y = -13 \]

PTS: 2 REF: 061820geo TOP: Equations of Circles
KEY: write equation, given graph

106 ANS:
20

PTS: 2 REF: 011918geo TOP: Compositions of Polygons and Circles
KEY: area

107 ANS:
19
\[ (8 \times 2) + (3 \times 2) - \left( \frac{18}{12} \times \frac{21}{12} \right) \approx 19 \]

PTS: 2 REF: 081917geo TOP: Compositions of Polygons and Circles
KEY: area

108 ANS:
64

PTS: 2 REF: 081814geo TOP: Chords, Secants and Tangents
KEY: tangents drawn from common point, length

109 ANS:
6
\[ \frac{4}{x} = \frac{6}{9} \]
\[ x = 6 \]

PTS: 2 REF: 061915geo TOP: Similarity KEY: basic
110 ANS: 
\[-3, 2\]

\[M_x = \frac{-5 + (-1)}{2} = -\frac{6}{2} = -3 \quad M_y = \frac{5 + (-1)}{2} = \frac{4}{2} = 2\]

PTS: 2       REF: 081902geo       TOP: Quadrilaterals in the Coordinate Plane

KEY: general

111 ANS: 
16,336

\[\frac{1}{2} \left( \frac{4}{3} \right) \pi \cdot 5^3 \cdot 62.4 \approx 16,336\]

PTS: 2       REF: 061620geo       TOP: Density

112 ANS: 
\((-2, 2)\)

\[-4 + \frac{2}{5} (1 - 4) = -4 + \frac{2}{5} (5) = -4 + 2 = -2 \quad -2 + \frac{2}{5} (8 - 2) = -2 + \frac{2}{5} (10) = -2 + 4 = 2\]

PTS: 2       REF: 061814geo       TOP: Directed Line Segments

113 ANS: 
32,768.0

\[\sqrt{40^2 - \left( \frac{64}{2} \right)^2} = 24 \quad V = \frac{1}{3} (64)^2 \cdot 24 = 32768\]

PTS: 2       REF: 081921geo       TOP: Volume       KEY: pyramids

114 ANS: 
cone

PTS: 2       REF: 081603geo       TOP: Rotations of Two-Dimensional Objects

115 ANS: 
15

\[2x + 7 + 4x - 7 = 90\]

\[6x = 90\]

\[x = 15\]

PTS: 2       REF: 081824geo       TOP: Cofunctions

116 ANS: 
\((4, 0)\)

\[-8 + \frac{2}{3} (10 - 8) = -8 + \frac{2}{3} (18) = -8 + 12 = 4 \quad 4 + \frac{2}{3} (-2 - 4) = 4 + \frac{2}{3} (-6) = 4 - 4 = 0\]

PTS: 2       REF: 061919geo       TOP: Directed Line Segments
117 ANS: 
\[ \cos 40 = \frac{14}{x} \]  
\[ x \approx 18 \] 
PTS: 2 REF: 011712geo TOP: Using Trigonometry to Find a Side

118 ANS: 
\[ \tan x = \frac{12}{1} \]  
\[ x \approx 4.76 \] 
PTS: 2 REF: 081715geo TOP: Using Trigonometry to Find an Angle

119 ANS: 
\[ 127.5^\circ \] 
PTS: 2 REF: 081907geo TOP: Interior and Exterior Angles of Polygons

120 ANS: 
\[ \frac{360 - 120}{360} \times \pi \times 9^2 = 54\pi \] 
PTS: 2 REF: 081912geo TOP: Sectors

121 ANS: 
\[ y - 9 = \frac{3}{2} (x - 6) \]  
\[ m = \frac{-4}{-6} = \frac{2}{3} \]  
\[ m_\perp = -\frac{3}{2} \] 
PTS: 2 REF: 011820geo TOP: Parallel and Perpendicular Lines

KEY: write equation of perpendicular line
122 ANS:
\[ (0,11) \]
\[ -4 + \frac{2}{5}(6 - 4) = -4 + \frac{2}{5}(10) = -4 + 4 = 0 \]
\[ 5 + \frac{2}{5}(20 - 5) = 5 + \frac{2}{5}(15) = 5 + 6 = 11 \]

PTS: 2  REF: 061715geo  TOP: Directed Line Segments

123 ANS:
\[ y = \frac{1}{2}x + 3 \]
\[ y = mx + b \]
\[ 2 = \frac{1}{2}(-2) + b \]
\[ 3 = b \]

PTS: 2  REF: 011701geo  TOP: Parallel and Perpendicular Lines
KEY: write equation of parallel line

124 ANS:
\[ (1,-1) \]
\[ -5 + \frac{3}{5}(5 - (-5)) = -4 + \frac{3}{5}(1 - 4) \]
\[ -5 + \frac{3}{5}(10) = -4 + \frac{3}{5}(5) \]
\[ -5 + 6 = -4 + 3 \]
\[ 1 = -1 \]

PTS: 2  REF: spr1401geo  TOP: Directed Line Segments

125 ANS:
\[ 25 \]
\[ 14 \times 16 \times 10 = 2240 \]
\[ \frac{2240 - 1680}{2240} = 0.25 \]

PTS: 2  REF: 011604geo  TOP: Volume  KEY: prisms

126 ANS:
\[ 72^\circ \]
Segments drawn from the center of the regular pentagon bisect each angle of the pentagon, and create five isosceles triangles as shown in the diagram below. Since each exterior angle equals the angles formed by the segments drawn from the center of the regular pentagon, the minimum degrees necessary to carry a regular polygon onto itself are equal to the measure of an exterior angle of the regular polygon.

PTS: 2  REF: spr1402geo  TOP: Mapping a Polygon onto Itself
127 ANS: 6

\[ 82.8 = \frac{1}{3} (4.6)(9)h \]

\[ h = 6 \]

PTS: 2 REF: 061810geo TOP: Volume KEY: pyramids

128 ANS: 6

\[ 84 = \frac{1}{3} \cdot s^2 \cdot 7 \]

\[ 6 = s \]

PTS: 2 REF: 061716geo TOP: Volume KEY: pyramids

129 ANS: 

\[ \text{PTS: 2 REF: 061816geo TOP: Rotations of Two-Dimensional Objects} \]

\[ \text{cylinder} \]

\[ \text{PTS: 2 REF: 061903geo TOP: Rotations of Two-Dimensional Objects} \]

\[ \text{Beth and Carl} \]

\[ \text{PTS: 2 REF: 081619geo TOP: Sectors} \]

130 ANS: 20

\[ 2x + 4 + 46 = 90 \]

\[ 2x = 40 \]

\[ x = 20 \]

PTS: 2 REF: 061808geo TOP: Cofunctions

131 ANS: 108

\[ 9 \cdot 3 = 27, 27 \cdot 4 = 108 \]

PTS: 2 REF: 061805geo TOP: Dilations
134 ANS: 
15
\[ V = \frac{1}{3} \pi r^2 h \]
\[ 54.45 \pi = \frac{1}{3} \pi (3.3)^2 h \]
\[ h = 15 \]

PTS: 2  REF: 011807geo  TOP: Volume  KEY: cones

135 ANS: 
I, II, and III

PTS: 2  REF: 061711geo  TOP: Special Quadrilaterals

136 ANS: 
32.8
\[ 6 + 6\sqrt{3} + 6 + 6\sqrt{3} \approx 32.8 \]

PTS: 2  REF: 011709geo  TOP: 30-60-90 Triangles

137 ANS: 
trapezoid
\[ \frac{-2-1}{-1-3} = \frac{-3}{2} \quad \frac{3-2}{0-5} = \frac{1}{-5} \quad \frac{3-1}{0-3} = \frac{2}{3} \quad \frac{2-2}{5-1} = \frac{4}{6} = \frac{2}{3} \]

PTS: 2  REF: 081522geo  TOP: Quadrilaterals in the Coordinate Plane  KEY: general

138 ANS: 
y = -3x + 6
The line \( y = -3x + 6 \) passes through the center of dilation, so the dilated line is not distinct.

PTS: 2  REF: 061824geo  TOP: Line Dilations

139 ANS: 
25
\[ \frac{24}{40} = \frac{15}{x} \]
\[ 24x = 600 \]
\[ x = 25 \]

PTS: 2  REF: 011813geo  TOP: Side Splitter Theorem

140 ANS: 
11
\[ \frac{x}{10} = \frac{6}{4} \quad CD = 15 - 4 = 11 \]
\[ x = 15 \]

PTS: 2  REF: 081612geo  TOP: Similarity  KEY: basic
141 ANS: 
\[ \frac{4\pi}{3} \]
\[ \frac{512\pi}{3} \]
\[ \frac{32^2}{\pi} \]
\[ \cdot 2\pi = \frac{4\pi}{3} \]

PTS: 2 REF: 081723geo TOP: Sectors

142 ANS: 
\[ EC \]
\[ EA \]

PTS: 2 REF: 061518geo TOP: Line Dilations

143 ANS: 
\[ 9694 \]
\[ C = \pi d \quad V = \pi \left( \frac{2.25}{\pi} \right)^2 \cdot 8 \approx 12.8916 \quad W = 12.8916 \cdot 752 \approx 9694 \]
\[ 4.5 = \pi d \]
\[ \frac{4.5}{\pi} = d \]
\[ \frac{2.25}{\pi} = r \]

PTS: 2 REF: 081617geo TOP: Density

144 ANS: 
\[ y = 2x - 16 \]
\[ m = -\frac{1}{2} \quad -4 = 2(6) + b \]
\[ m_{\perp} = 2 \quad -4 = 12 + b \]
\[ -16 = b \]

PTS: 2 REF: 011602geo TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

145 ANS: 
\[ 60 \]
\[ (12 \cdot 11) - \left( \frac{1}{2} (12 \cdot 4) + \frac{1}{2} (7 \cdot 9) + \frac{1}{2} (11 \cdot 3) \right) = 60 \]

PTS: 2 REF: 061815geo TOP: Polygons in the Coordinate Plane
\[ \frac{1000}{20\pi} \approx 15.9 \]

PTS: 2  
REF: 011623geo  
TOP: Circumference

\[ \frac{180 - 130}{2} = 25 \]

PTS: 2  
REF: 081704geo  
TOP: Chords, Secants and Tangents

KEY: parallel lines

\[ y = 3 \frac{3}{2} x - 3 \]

The line \( y = \frac{3}{2} x - 4 \) does not pass through the center of dilation, so the dilated line will be distinct from \( y = \frac{3}{2} x - 4 \). Since a dilation preserves parallelism, the line \( y = \frac{3}{2} x - 4 \) and its image will be parallel, with slopes of \( \frac{3}{2} \). To obtain the \( y \)-intercept of the dilated line, the scale factor of the dilation, \( \frac{3}{4} \), can be applied to the \( y \)-intercept, \((0,-4)\). Therefore, \( \left( 0 \cdot \frac{3}{4}, -4 \cdot \frac{3}{4} \right) \) \( \rightarrow \) \((0,-3)\). So the equation of the dilated line is \( y = \frac{3}{2} x - 3 \).

PTS: 2  
REF: 011704geo  
TOP: Line Dilations

ANSS:

\[ \triangle GRS \] is not similar to \( \triangle ART \).
152 ANS: 18.8
\[ \sin 70 = \frac{x}{20} \]
x \approx 18.8

PTS: 2    REF: 061611geo    TOP: Using Trigonometry to Find a Side
KEY: without graphics

153 ANS: 34.1
The man’s height, 69 inches, is opposite to the angle of elevation, and the shadow length, 102 inches, is adjacent
to the angle of elevation. Therefore, tangent must be used to find the angle of elevation.
\[ \tan x = \frac{69}{102} \]
x \approx 34.1

PTS: 2    REF: fall1401geo    TOP: Using Trigonometry to Find an Angle

154 ANS: triangle

PTS: 2    REF: 081613geo    TOP: Cross-Sections of Three-Dimensional Objects

155 ANS: \[ \overline{AN} \parallel \overline{SC} \]

PTS: 2    REF: 081810geo    TOP: Triangle Proofs
KEY: statements

156 ANS: 14.3
\[ \frac{9}{5} = \frac{9.2}{x} \]
5.1 + 9.2 = 14.3
9x = 46
x \approx 5.1

PTS: 2    REF: 061511geo    TOP: Side Splitter Theorem

157 ANS: 20
\[ \frac{1}{2} = \frac{x + 3}{3x - 1} \]
GR = 3(7) − 1 = 20
3x − 1 = 2x + 6
x = 7

PTS: 2    REF: 011620geo    TOP: Similarity    KEY: basic
158 ANS:
22
8(x + 8) = 6(x + 18)
8x + 64 = 6x + 108
2x = 44
x = 22

PTS: 2 REF: 011715geo TOP: Chords, Secants and Tangents
KEY: secants drawn from common point, length

159 ANS:
7
\[ \tan 36 = \frac{x}{8} \quad 5.8 + 1.5 \approx 7 \]
\[ x \approx 5.8 \]

PTS: 2 REF: 081915geo TOP: Using Trigonometry to Find a Side

160 ANS:
II, only
NYSED accepts either (1) or (3) as a correct answer. Statement III is not true if A, B, A’ and B’ are collinear.

PTS: 2 REF: 061714geo TOP: Compositions of Transformations
KEY: basic

161 ANS:
a right cylinder with a radius of 7 inches

PTS: 2 REF: 081911geo TOP: Rotations of Two-Dimensional Objects

162 ANS:
\[ 17 \frac{1}{2} \]
\[ \frac{5}{7} = \frac{x}{x + 5} \quad 12 \frac{1}{2} + 5 = 17 \frac{1}{2} \]
\[ 5x + 25 = 7x \]
\[ 2x = 25 \]
\[ x = 12 \frac{1}{2} \]

PTS: 2 REF: 061821geo TOP: Side Splitter Theorem
163 ANS:
68.75°

PTS: 2 REF: 011818geo TOP: Lines and Angles

164 ANS:
58°

PTS: 2 REF: 081905geo TOP: Exterior Angle Theorem

165 ANS:
121°

PTS: 2 REF: 081711geo TOP: Exterior Angle Theorem

166 ANS:
70°

PTS: 2 REF: 061717geo TOP: Interior and Exterior Angles of Triangles
167 ANS:
\[ \frac{4}{3} \pi \times \left( \frac{1.68}{2} \right)^3 \times 0.6523 \approx 1.62 \]

PTS: 2    REF: 081914geo    TOP: Density

168 ANS:
\[ (8.5)^3 - \frac{1}{3} \pi (4)^2 (8) \]

PTS: 2    REF: 061606geo    TOP: Volume    KEY: compositions

169 ANS:
\[ 8 \]
\[ x(x - 6) = 4^2 \]
\[ x^2 - 6x - 16 = 0 \]
\[ (x - 8)(x + 2) = 0 \]
\[ x = 8 \]

PTS: 2    REF: 081807geo    TOP: Similarity    KEY: altitude

170 ANS:
\[ 32\pi \]
\[ V = \frac{1}{3} \pi (4)^2 (6) = 32\pi \]

PTS: 2    REF: 061718geo    TOP: Rotations of Two-Dimensional Objects

171 ANS:
\[ 4.9 \]
\[ s^2 + s^2 = 7^2 \]
\[ 2s^2 = 49 \]
\[ s^2 = 24.5 \]
\[ s \approx 4.9 \]

PTS: 2    REF: 081511geo    TOP: Inscribed Quadrilaterals

172 ANS:
\[ VA \]
\[ \angle N \text{ is the smallest angle in } \triangle NYA, \text{ so side } \overline{AY} \text{ is the shortest side of } \triangle NYA. \quad \angle VYA \text{ is the smallest angle in } \triangle VYA, \text{ so side } \overline{VA} \text{ is the shortest side of both triangles.} \]

PTS: 2    REF: 011919geo    TOP: Angle Side Relationship
173 ANS: 945
\[ V = \pi \left( \frac{6.7}{2} \right)^2 (4 \cdot 6.7) \approx 945 \]

PTS: 2 REF: 081620geo TOP: Volume KEY: cylinders

174 ANS: (1, −5)
\[-8 + \frac{3}{5} (7 -8) = -8 + 9 = 1 \quad 7 + \frac{3}{5} (-13 - 7) = 7 - 12 = -5\]

PTS: 2 REF: 081815geo TOP: Directed Line Segments

175 ANS: 4
\[ \frac{18}{4.5} = 4 \]

PTS: 2 REF: 011901geo TOP: Line Dilations

176 ANS: 58
\[ V = \frac{1}{3} \left( \frac{60}{12} \right)^2 \left( \frac{84}{12} \right) \approx 58 \]

PTS: 2 REF: 081819geo TOP: Volume KEY: pyramids

177 ANS: \[ \frac{\pi}{5} \]
\[ \theta = \frac{s}{r} = \frac{2\pi}{10} = \frac{\pi}{5} \]

PTS: 2 REF: fall1404geo TOP: Arc Length KEY: angle

178 ANS: 23°
\[ \cos x = \frac{12}{13} \]
\[ x \approx 23 \]

PTS: 2 REF: 081809ai TOP: Using Trigonometry to Find an Angle

179 ANS: rectangle

PTS: 2 REF: 011723geo TOP: Cross-Sections of Three-Dimensional Objects
180 ANS: \[ \frac{160\pi}{3} \]
\[ \frac{300 \cdot 8^2 \pi}{360} = \frac{160\pi}{3} \]

PTS: 2 REF: 011721geo TOP: Sectors

181 ANS: \[ A \]

PTS: 2 REF: 081605geo TOP: Rotations KEY: grids

182 ANS: 16.2
\[ \triangle CFB \sim \triangle CAD \]
\[ \frac{CB}{CF} = \frac{CD}{CA} \]
\[ \frac{x}{21.6} = \frac{7.2}{9.6} \]
\[ x = 16.2 \]

PTS: 2 REF: 061804geo TOP: Similarity KEY: basic

183 ANS: 100
\[ 2(2x + 8) = 7x - 2 \quad AB = 7(6) - 2 = 40. \]
\[ 4x + 16 = 7x - 2 \]
\[ 18 = 3x \]
\[ 6 = x \]
\[ AE = BF = \frac{40}{2} = 20. \quad 40 + 20 + 20 + 20 = 100 \]

PTS: 2 REF: 061923geo TOP: Midsegments

184 ANS: center \((4, -3)\) and radius 8
\[ x^2 - 8x + y^2 + 6y = 39 \]
\[ x^2 - 8x + 16 + y^2 + 9 + 9 = 39 + 16 + 9 \]
\[ (x - 4)^2 + (y + 3)^2 = 64 \]

PTS: 2 REF: 081906geo TOP: Equations of Circles KEY: completing the square
ANS: 8
\[
\frac{10}{x} = \frac{15}{12}
\]
\[x = 8\]

PTS: 2  REF: 081918geo  TOP: Similarity  KEY: basic

ANS: octagon
\[
\frac{360^\circ}{45^\circ} = 8
\]

PTS: 2  REF: 061510geo  TOP: Mapping a Polygon onto Itself

ANS:
\[
4\sqrt{20}
\]
\[
4\sqrt{(-1-\cdots3)^2 + (5-1)^2} = 4\sqrt{20}
\]

PTS: 2  REF: 081703geo  TOP: Polygons in the Coordinate Plane

ANS: 72°

PTS: 2  REF: 011603geo  TOP: Interior and Exterior Angles of Polygons

ANS: rectangle

PTS: 2  REF: 081805geo  TOP: Cross-Sections of Three-Dimensional Objects

ANS: 44°
\[
\frac{x + 72}{2} = 58
\]
\[x + 72 = 116\]
\[x = 44\]

PTS: 2  REF: 061817geo  TOP: Chords, Secants and Tangents  KEY: intersecting chords, angle
191 ANS:  
16,336  
\[
V = \frac{4}{3} \pi \left( \frac{10}{2} \right)^3  
\approx 261.8 \cdot 62.4 = 16,336
\]

PTS: 2  REF: 081516geo  TOP: Density

192 ANS:  
y = -\frac{2}{3} x + 5

\[
m = -\frac{2}{3} \quad 1 = -\left(\frac{2}{3}\right) 6 + b
\]

\[
1 = -4 + b
\]

\[
5 = b
\]

PTS: 2  REF: 081510geo  TOP: Parallel and Perpendicular Lines
KEY: write equation of parallel line

193 ANS:  
23.8  
\[
5x = 12 \cdot 7 \quad 16.8 + 7 = 23.8
\]

\[
5x = 84
\]

\[
x = 16.8
\]

PTS: 2  REF: 061911geo  TOP: Side Splitter Theorem

194 ANS:  
y - 8 = -\frac{2}{3} (x - 6)

\[
m = \frac{3}{2}
\]

\[
m_{\perp} = -\frac{2}{3}
\]

PTS: 2  REF: 061812geo  TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

195 ANS:  
10  
\[
r = \sqrt{(7 - 3)^2 + (1 - -2)^2} = \sqrt{16 + 9} = 5
\]

PTS: 2  REF: 061503geo  TOP: Circles in the Coordinate Plane
\[ \sqrt{21} \]

\[ \frac{5}{5} \]

PTS: 2  REF: 081606geo  TOP: Cofunctions

\[ 640 \]

\[ 8 \times 8 \times 9 + \frac{1}{3}(8 \times 8 \times 3) = 640 \]

PTS: 2  REF: 011909geo  TOP: Volume  KEY: compositions

\[ 4\sqrt{10} \]

\[ 4\sqrt{(-1 - 2)^2 + (2 - 3)^2} = 4\sqrt{10} \]

PTS: 2  REF: 081808geo  TOP: Polygons in the Coordinate Plane

\[ 6\sqrt{10} \]

\[ h^2 = 30 \cdot 12 \]

\[ h^2 = 360 \]

\[ h = 6\sqrt{10} \]

PTS: 2  REF: 061613geo  TOP: Similarity  KEY: altitude

\[ 6\pi \]

\[ \frac{60}{360} \cdot 6^2 \pi = 6\pi \]

PTS: 2  REF: 081518geo  TOP: Sectors

\[ \text{rectangle} \]

PTS: 2  REF: 011805geo  TOP: Cross-Sections of Three-Dimensional Objects

\[ \text{hemisphere} \]

PTS: 2  REF: 011810geo  TOP: Rotations of Two-Dimensional Objects

\[ V = \frac{1}{3} \left( \frac{36}{4} \right)^2 \cdot 15 = 405 \]

PTS: 2  REF: 011822geo  TOP: Volume  KEY: pyramids
204 ANS: 
\[ 47^\circ \]
\[
\cos B = \frac{17.6}{26}
\]
\[ B \approx 47 \]

PTS: 2 REF: 061806geo TOP: Using Trigonometry to Find an Angle

205 ANS: 
\[ 54^\circ \]
\[ \angle B = 180 - (82 + 26) = 72; \quad \angle DEC = 180 - 26 = 154; \quad \angle EDB = 360 - (154 + 26 + 72) = 108; \quad \angle BDF = \frac{108}{2} = 54; \quad \angle DFB = 180 - (54 + 72) = 54 \]

PTS: 2 REF: 061710geo TOP: Interior and Exterior Angles of Triangles

206 ANS: 
\[ 68.6 \]
\[
\sin 32 = \frac{O}{129.5}
\]
\[ O \approx 68.6 \]

PTS: 2 REF: 011804geo TOP: Using Trigonometry to Find a Side

207 ANS: 
area of 54 and perimeter of 36
\[ 6 \cdot 3^2 = 54 \quad 12 \cdot 3 = 36 \]

PTS: 2 REF: 081823geo TOP: Dilations

208 ANS: 
\[ 5 \]
\[ x^2 + 4x + 4 + y^2 - 6y + 9 = 12 + 4 + 9 \]
\[ (x + 2)^2 + (y - 3)^2 = 25 \]

PTS: 2 REF: 081509geo TOP: Equations of Circles KEY: completing the square

209 ANS: 
\[ \frac{1}{3}(12\pi) \]
\[ C = 12\pi \frac{120}{360} (12\pi) = \frac{1}{3} (12\pi) \]

PTS: 2 REF: 061822geo TOP: Arc Length KEY: arc length

210 ANS: 
a cylinder with a radius of 5 inches and a height of 6 inches

PTS: 2 REF: 011911geo TOP: Rotations of Two-Dimensional Objects
211 ANS: 
68°

PTS: 2  REF: 081508geo  TOP: Interior and Exterior Angles of Polygons

212 ANS: 
(2, 1)

\[-1 + \frac{1}{3}(8 - 1) = -1 + \frac{1}{3}(9) = -1 + 3 = 2 \quad -3 + \frac{1}{3}(9 - 3) = -3 + \frac{1}{3}(12) = -3 + 4 = 1\]

PTS: 2  REF: 011915geo  TOP: Directed Line Segments

213 ANS: 
30

\[ER = \sqrt{17^2 - 8^2} = 15\]

PTS: 2  REF: 061917geo  TOP: Special Quadrilaterals

214 ANS: 
the vertical line of symmetry

\[v = \pi r^2 h\]

(1) \[6^2 \cdot 10 = 360\]

(2) \[10^2 \cdot 6 = 600\]

(3) \[5^2 \cdot 6 = 150\]

(4) \[3^2 \cdot 10 = 900\]

PTS: 2  REF: 081713geo  TOP: Rotations of Two-Dimensional Objects

215 ANS: 
6.5

\[\frac{30}{360} (5^2 \cdot \pi) \approx 6.5\]

PTS: 2  REF: 081818geo  TOP: Sectors

216 ANS: 
23°

\[\cos S = \frac{60}{65}\]

\[S \approx 23°\]

PTS: 2  REF: 061713geo  TOP: Using Trigonometry to Find an Angle

217 ANS: 
cylinder

PTS: 2  REF: 081503geo  TOP: Rotations of Two-Dimensional Objects