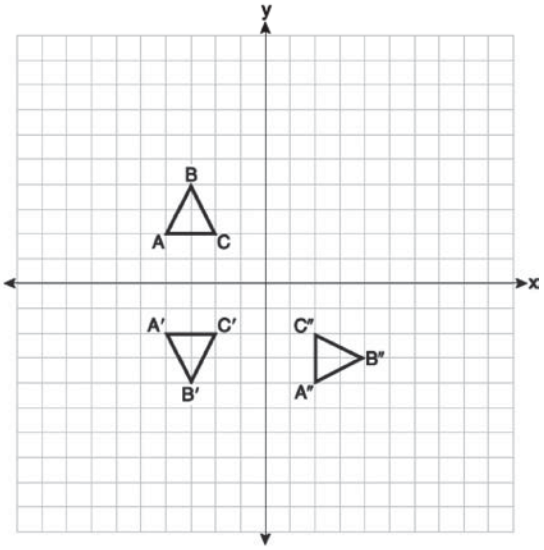
0619geo

1 On the set of axes below, triangle ABC is graphed. Triangles $A'B'C'$ and $A''B''C''$, the images of triangle ABC, are graphed after a sequence of rigid motions.



Identify which sequence of rigid motions maps $\triangle ABC$ onto $\triangle A'B'C'$ and then maps $\triangle A'B'C'$ onto $\triangle A''B''C''$.

1) a rotation followed by another rotation
2) a translation followed by a reflection
3) a reflection followed by a translation
4) a reflection followed by a rotation

2 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.

County	2000 Census Population	2000 Land Area $\left(\text{mi}^2\right)$
Broome	200,536	706.82
Dutchess	280,150	801.59
Niagara	219,846	522.95
Saratoga	200,635	811.84

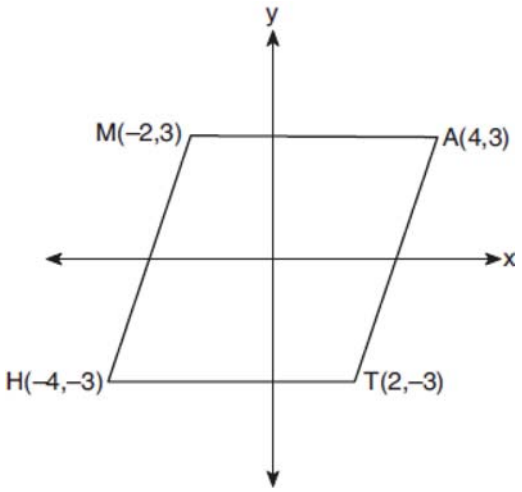
Which county had the greatest population density?

1) Broome
2) Dutchess
3) Niagara
4) Saratoga

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

1) rectangular prism
2) cylinder
3) sphere
4) cone

4 Which transformation carries the parallelogram below onto itself?



1) a reflection over $y = x$
2) a reflection over $y = -x$
3) a rotation of 90° counterclockwise about the origin
4) a rotation of 180° counterclockwise about the origin

5 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

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

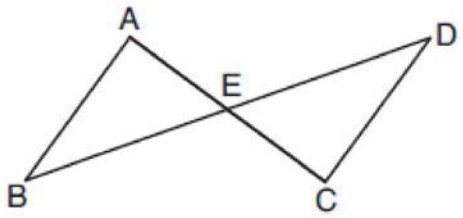
6 A tent is in the shape of a right pyramid with a square floor. The square floor has side lengths of 8 feet. If the height of the tent at its center is 6 feet, what is the volume of the tent, in cubic feet?

1) 48
2) 128
3) 192
4) 384

7 The line $-3x + 4y = 8$ is transformed by a dilation centered at the origin. Which linear equation could represent its image?

1) $y = \frac{4}{3}x + 8$
2) $y = \frac{3}{4}x + 8$
3) $y = -\frac{3}{4}x - 8$
4) $y = -\frac{4}{3}x - 8$

8 In the diagram below, $\overline{AC}$ and $\overline{BD}$ intersect at E.



Which information is always sufficient to prove $\triangle ABE \cong \triangle CDE$?

1) $\overline{AB} \parallel \overline{CD}$
2) $\overline{AB} \cong \overline{CD}$ and $\overline{BE} \cong \overline{DE}$
3) E is the midpoint of $\overline{AC}$.
4) $\overline{BD}$ and $\overline{AC}$ bisect each other.

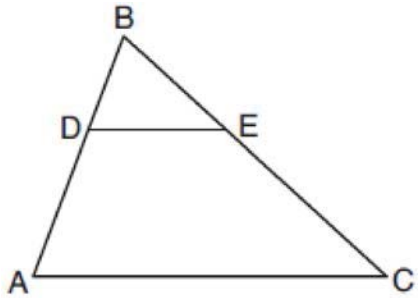
9 The expression $\sin 57°$ is equal to

1) $\tan 33°$
2) $\cos 33°$
3) $\tan 57°$
4) $\cos 57°$

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

1) 523.7
2) 1047.4
3) 4189.6
4) 8379.2

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



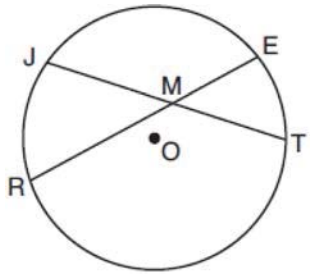
If $BD = 5$, $DA = 12$, and $BE = 7$, what is the length of $\overline{BC}$ so that $\overline{AC} \parallel \overline{DE}$?

1) 23.8
2) 16.8
3) 15.6
4) 8.6

12 A quadrilateral must be a parallelogram if

1) one pair of sides is parallel and one pair of angles is congruent
2) one pair of sides is congruent and one pair of angles is congruent
3) one pair of sides is both parallel and congruent
4) the diagonals are congruent

13 In the diagram below of circle O, chords $\overline{JT}$ and $\overline{ER}$ intersect at M.



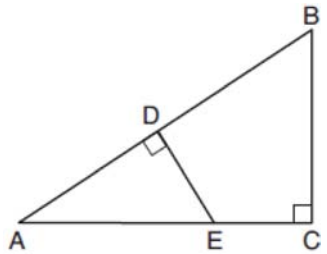
If $EM = 8$ and $RM = 15$, the lengths of $\overline{JM}$ and $\overline{TM}$ could be

1) 12 and 9.5
2) 14 and 8.5
3) 16 and 7.5
4) 18 and 6.5

14 Triangles JOE and SAM are drawn such that $\angle E \cong \angle M$ and $\overline{EJ} \cong \overline{MS}$. Which mapping would *not* always lead to $\triangle JOE \cong \triangle SAM$?

1) $\angle J$ maps onto $\angle S$
2) $\angle O$ maps onto $\angle A$
3) $\overline{EO}$ maps onto $\overline{MA}$
4) $\overline{JO}$ maps onto $\overline{SA}$

15 In $\triangle ABC$ shown below, $\angle ACB$ is a right angle, E is a point on $\overline{AC}$, and $\overline{ED}$ is drawn perpendicular to hypotenuse $\overline{AB}$.



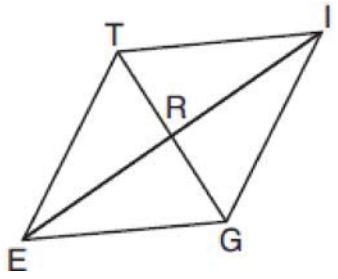
If $AB = 9$, $BC = 6$, and $DE = 4$, what is the length of $\overline{AE}$?

1) 5
2) 6
3) 7
4) 8

16 Which equation represents a line parallel to the line whose equation is $-2x + 3y = -4$ and passes through the point $(1,3)$?

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

17 In rhombus $TIGE$, diagonals $\overline{TG}$ and $\overline{IE}$ intersect at R. The perimeter of $TIGE$ is 68, and $TG = 16$.



What is the length of diagonal $\overline{IE}$?

1) 15
2) 30
3) 34
4) 52

18 In circle O two secants, $\overline{ABP}$ and $\overline{CDP}$, are drawn to external point P. If $m\widehat{AC} = 72°$, and $m\widehat{BD} = 34°$, what is the measure of $\angle P$?

1) 19º
2) 38º
3) 53º
4) 106º

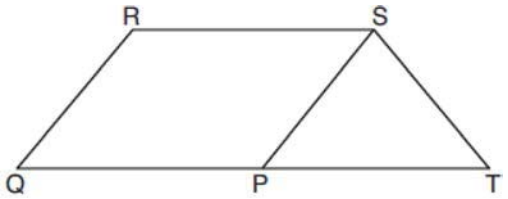
19 What are the coordinates of point C on the directed segment from $A(-8,4)$ to $B(10,-2)$ that partitions the segment such that $AC{:}CB$ is 2:1?

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

20 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?

1) center $(4,-6)$ and radius 12
2) center $(-4,6)$ and radius 12
3) center $(4,-6)$ and radius 14
4) center $(-4,6)$ and radius 14

21 In parallelogram $PQRS$, $\overline{QP}$ is extended to point T and $\overline{ST}$ is drawn.



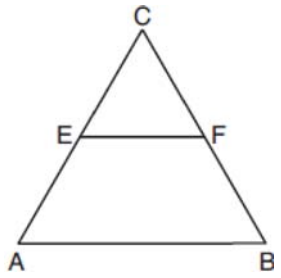
If $\overline{ST} \cong \overline{SP}$ and $m\angle R = 130°$, what is $m\angle PST$?

1) 130°
2) 80°
3) 65°
4) 50°

22 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?

1) 34
2) 40
3) 50
4) 56

23 In the diagram of equilateral 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*?

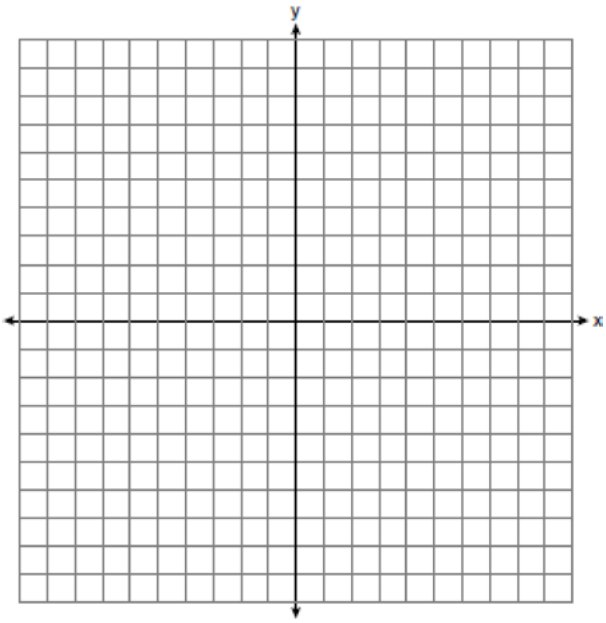
1) 36
2) 60
3) 100
4) 120

24 Which information is *not* sufficient to prove that a parallelogram is a square?

1) The diagonals are both congruent and perpendicular.
2) The diagonals are congruent and one pair of adjacent sides are congruent.
3) The diagonals are perpendicular and one pair of adjacent sides are congruent.
4) The diagonals are perpendicular and one pair of adjacent sides are perpendicular.

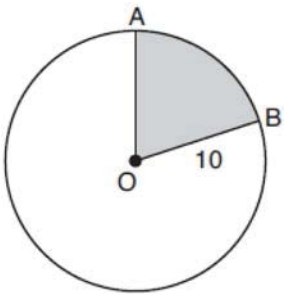
25 Triangle *A'B'C'* is the image of triangle *ABC* after a dilation with a scale factor of $\frac{1}{2}$ and centered at point *A*. Is triangle *ABC* congruent to triangle *A'B'C'*? Explain your answer.

26 Determine and state the area of triangle PQR, whose vertices have coordinates $P(-2,-5)$, $Q(3,5)$, and $R(6,1)$. [The use of the set of axes below is optional.]



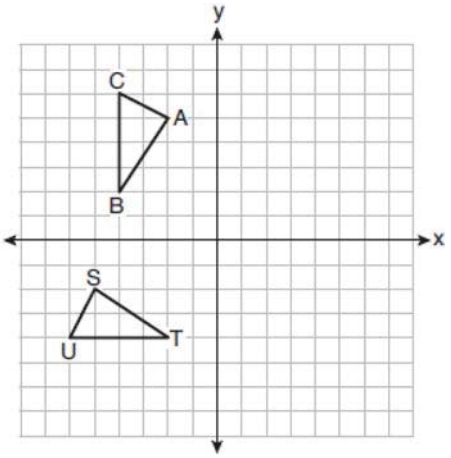
27 A support wire reaches from the top of a pole to a clamp on the ground. The pole is perpendicular to the level ground and the clamp is 10 feet from the base of the pole. The support wire makes a 68° angle with the ground. Find the length of the support wire to the *nearest foot*.

28 In the diagram below, circle O has a radius of 10.



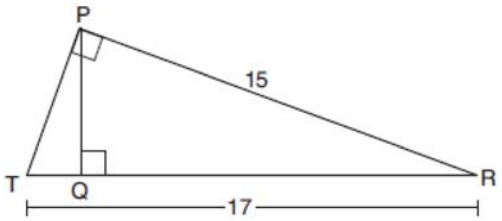
If $m\widehat{AB} = 72°$, find the area of shaded sector AOB, in terms of π.

29 On the set of axes below, $\triangle ABC \cong \triangle STU$.



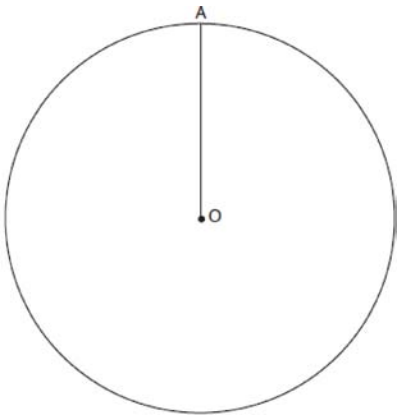
Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle STU$.

30 In right triangle PRT, $m\angle P = 90°$, altitude $\overline{PQ}$ is drawn to hypotenuse $\overline{RT}$, $RT = 17$, and $PR = 15$.

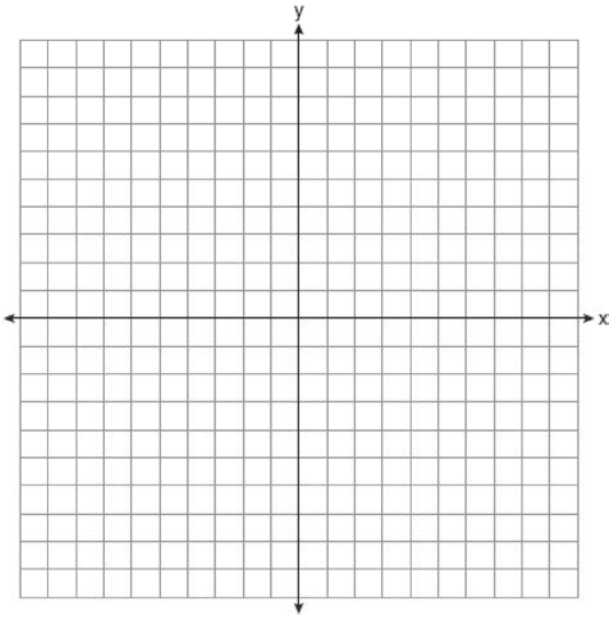


Determine and state, to the *nearest tenth*, the length of $\overline{RQ}$.

31 Given circle O with radius $\overline{OA}$, use a compass and straightedge to construct an equilateral triangle inscribed in circle O. [Leave all construction marks.]

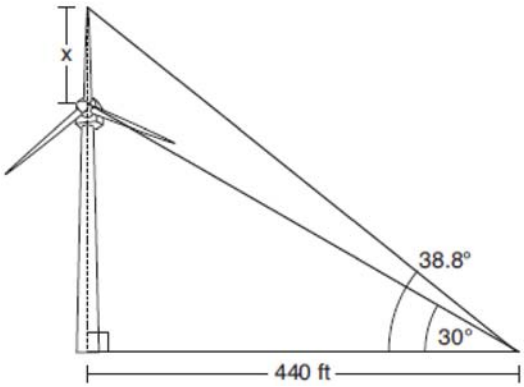


32 Riley plotted $A(-1,6)$, $B(3,8)$, $C(6,-1)$, and $D(1,0)$ to form a quadrilateral. Prove that Riley's quadrilateral *ABCD* is a trapezoid. [The use of the set of axes on the next page is optional.] Riley defines an isosceles trapezoid as a trapezoid with congruent diagonals. Use Riley's definition to prove that *ABCD* is *not* an isosceles trapezoid.



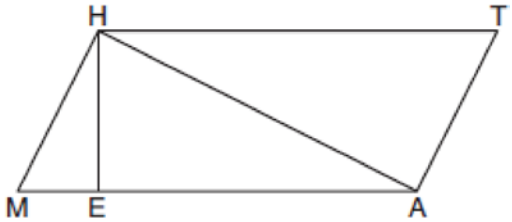
33 A child-sized swimming pool can be modeled by a cylinder. The pool has a diameter of $6\frac{1}{2}$ feet and a height of 12 inches. The pool is filled with water to $\frac{2}{3}$ of its height. Determine and state the volume of the water in the pool, to the *nearest cubic foot*. One cubic foot equals 7.48 gallons of water. Determine and state, to the *nearest gallon*, the number of gallons of water in the pool.

34 Nick wanted to determine the length of one blade of the windmill pictured below. He stood at a point on the ground 440 feet from the windmill's base. Using surveyor's tools, Nick measured the angle between the ground and the highest point reached by the top blade and found it was 38.8°. He also measured the angle between the ground and the lowest point of the top blade, and found it was 30°.



Determine and state a blade's length, *x*, to the *nearest foot*.

35 Given: Quadrilateral *MATH*, $\overline{HM} \cong \overline{AT}$, $\overline{HT} \cong \overline{AM}$, $\overline{HE} \perp \overline{MEA}$, and $\overline{HA} \perp \overline{AT}$



Prove: $TA \bullet HA = HE \bullet TH$