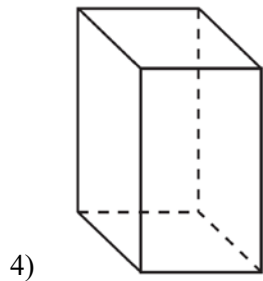
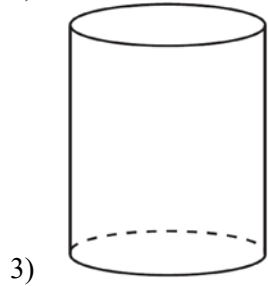
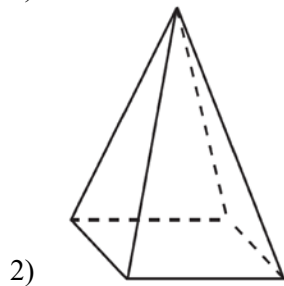
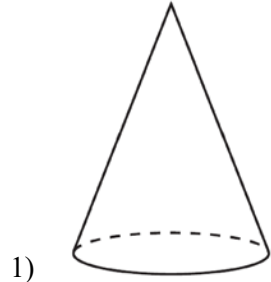


0616geo

- 1 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?



- 2 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?
- 1) 9 inches
  - 2) 2 inches
  - 3) 15 inches
  - 4) 18 inches

- 3 Kevin's work for deriving the equation of a circle is shown below.

$$x^2 + 4x = -(y^2 - 20)$$

STEP 1  $x^2 + 4x = -y^2 + 20$

STEP 2  $x^2 + 4x + 4 = -y^2 + 20 - 4$

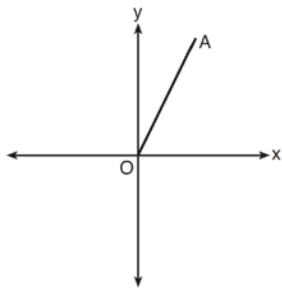
STEP 3  $(x + 2)^2 = -y^2 + 20 - 4$

STEP 4  $(x + 2)^2 + y^2 = 16$

In which step did he make an error in his work?

- 1) Step 1
- 2) Step 2
- 3) Step 3
- 4) Step 4

- 4 Which transformation of  $\overline{OA}$  would result in an image parallel to  $\overline{OA}$ ?



- 1) a translation of two units down
- 2) a reflection over the  $x$ -axis
- 3) a reflection over the  $y$ -axis
- 4) a clockwise rotation of  $90^\circ$  about the origin

- 5 Using the information given below, which set of triangles can *not* be proven similar?

1)

2)

3)

4)

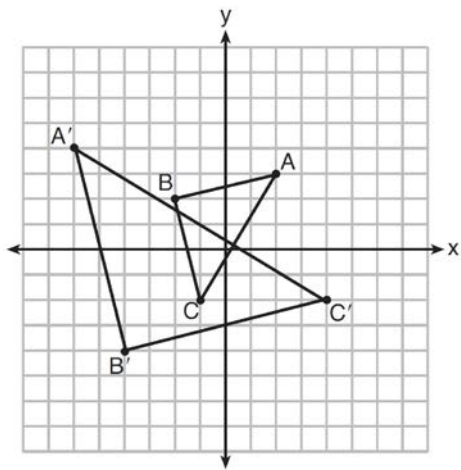
6 A company is creating an object from a wooden cube with an edge length of 8.5 cm. A right circular cone with a diameter of 8 cm and an altitude of 8 cm will be cut out of the cube. Which expression represents the volume of the remaining wood?

- 1)  $(8.5)^3 - \pi(8)^2(8)$
- 2)  $(8.5)^3 - \pi(4)^2(8)$
- 3)  $(8.5)^3 - \frac{1}{3}\pi(8)^2(8)$
- 4)  $(8.5)^3 - \frac{1}{3}\pi(4)^2(8)$

7 Two right triangles must be congruent if

- 1) an acute angle in each triangle is congruent
- 2) the lengths of the hypotenuses are equal
- 3) the corresponding legs are congruent
- 4) the areas are equal

8 Which sequence of transformations will map  $\triangle ABC$  onto  $\triangle A'B'C'$ ?

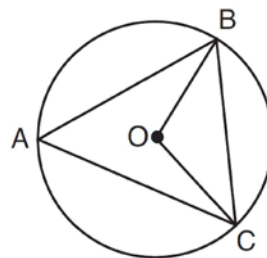


- 1) reflection and translation
- 2) rotation and reflection
- 3) translation and dilation
- 4) dilation and rotation

9 In parallelogram  $ABCD$ , diagonals  $\overline{AC}$  and  $\overline{BD}$  intersect at  $E$ . Which statement does *not* prove parallelogram  $ABCD$  is a rhombus?

- 1)  $\overline{AC} \cong \overline{DB}$
- 2)  $\overline{AB} \cong \overline{BC}$
- 3)  $\overline{AC} \perp \overline{DB}$
- 4)  $AC$  bisects  $\angle DCB$

10 In the diagram below of circle  $O$ ,  $\overline{OB}$  and  $\overline{OC}$  are radii, and chords  $\overline{AB}$ ,  $\overline{BC}$ , and  $\overline{AC}$  are drawn.



Which statement must always be true?

- 1)  $\angle BAC \cong \angle BOC$
- 2)  $m\angle BAC = \frac{1}{2}m\angle BOC$
- 3)  $\triangle BAC$  and  $\triangle BOC$  are isosceles.
- 4) The area of  $\triangle BAC$  is twice the area of  $\triangle BOC$ .

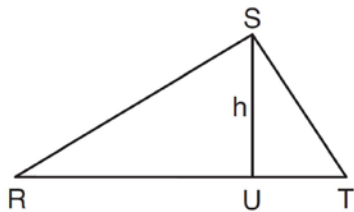
11 A 20-foot support post leans against a wall, making a  $70^\circ$  angle with the ground. To the *nearest tenth of a foot*, how far up the wall will the support post reach?

- 1) 6.8
- 2) 6.9
- 3) 18.7
- 4) 18.8

12 Line segment  $\overline{NY}$  has endpoints  $N(-11,5)$  and  $Y(5,-7)$ . What is the equation of the perpendicular bisector of  $\overline{NY}$ ?

- 1)  $y + 1 = \frac{4}{3}(x + 3)$
- 2)  $y + 1 = -\frac{3}{4}(x + 3)$
- 3)  $y - 6 = \frac{4}{3}(x - 8)$
- 4)  $y - 6 = -\frac{3}{4}(x - 8)$

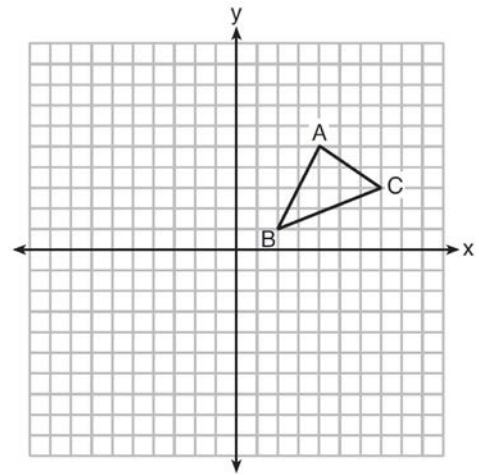
13 In  $\triangle RST$  shown below, altitude  $\overline{SU}$  is drawn to  $\overline{RT}$  at  $U$ .



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?

- 1)  $6\sqrt{3}$
- 2)  $6\sqrt{10}$
- 3)  $6\sqrt{14}$
- 4)  $6\sqrt{35}$

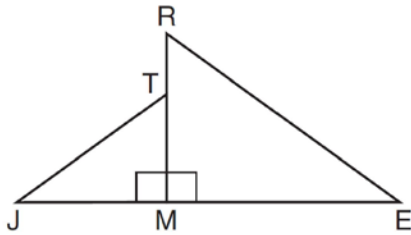
14 In the diagram below,  $\triangle ABC$  has vertices  $A(4,5)$ ,  $B(2,1)$ , and  $C(7,3)$ .



What is the slope of the altitude drawn from  $A$  to  $\overline{BC}$ ?

- 1)  $\frac{2}{5}$
- 2)  $\frac{3}{2}$
- 3)  $-\frac{1}{2}$
- 4)  $-\frac{5}{2}$

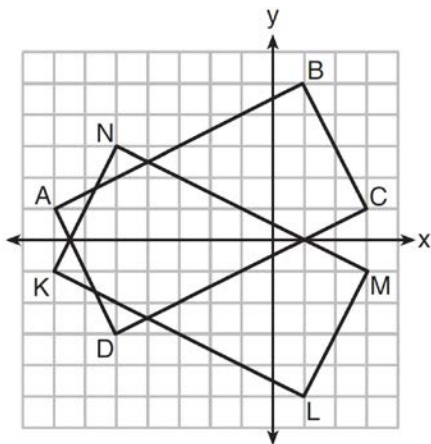
15 In the diagram below,  $\triangle ERM \sim \triangle JTM$ .



Which statement is always true?

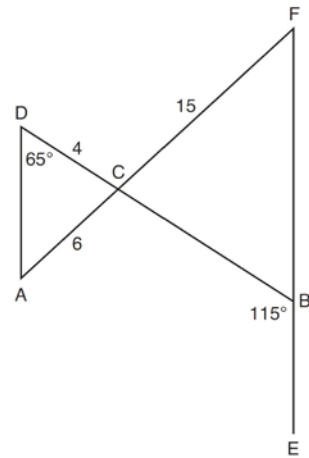
- 1)  $\cos J = \frac{RM}{RE}$
- 2)  $\cos R = \frac{JM}{JT}$
- 3)  $\tan T = \frac{RM}{EM}$
- 4)  $\tan E = \frac{TM}{JM}$

16 On the set of axes below, rectangle  $ABCD$  can be proven congruent to rectangle  $KLMN$  using which transformation?



- 1) rotation
- 2) translation
- 3) reflection over the  $x$ -axis
- 4) reflection over the  $y$ -axis

17 In the diagram below,  $\overline{DB}$  and  $\overline{AF}$  intersect at point  $C$ , and  $\overline{AD}$  and  $\overline{FBE}$  are drawn.



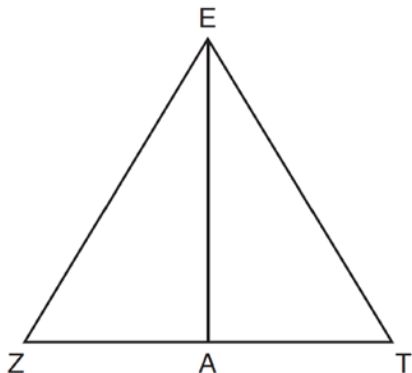
If  $AC = 6$ ,  $DC = 4$ ,  $FC = 15$ ,  $m\angle D = 65^\circ$ , and  $m\angle CBE = 115^\circ$ , what is the length of  $CB$ ?

- 1) 10
- 2) 12
- 3) 17
- 4) 22.5

18 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?

- 1) 3.3
- 2) 3.5
- 3) 4.7
- 4) 13.3

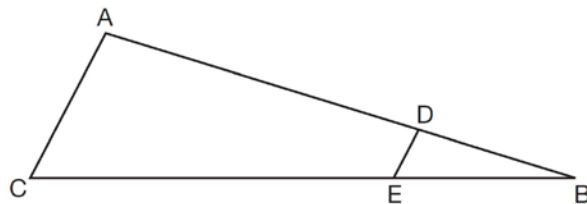
- 19 Line segment  $\overline{EA}$  is the perpendicular bisector of  $\overline{ZT}$ , and  $\overline{ZE}$  and  $\overline{TE}$  are drawn.



Which conclusion can *not* be proven?

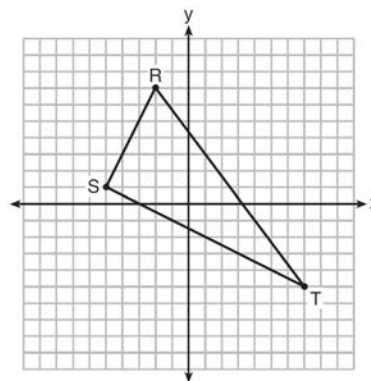
- 1)  $\overline{EA}$  bisects angle  $ZET$ .
  - 2) Triangle  $EZT$  is equilateral.
  - 3)  $\overline{EA}$  is a median of triangle  $EZT$ .
  - 4) Angle  $Z$  is congruent to angle  $T$ .
- 20 A hemispherical water tank has an inside diameter of 10 feet. If water has a density of 62.4 pounds per cubic foot, what is the weight of the water in a full tank, to the *nearest pound*?
- 1) 16,336
  - 2) 32,673
  - 3) 130,690
  - 4) 261,381

- 21 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  $\overline{AC}$ ?

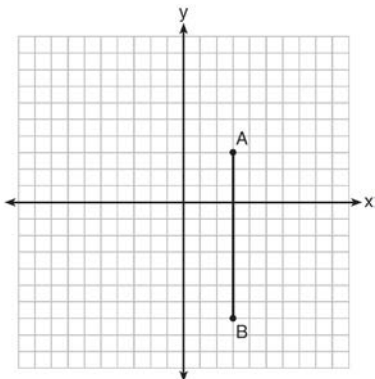
- 1) 8
  - 2) 12
  - 3) 16
  - 4) 72
- 22 Triangle  $RST$  is graphed on the set of axes below.



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

- 1)  $9\sqrt{3} + 15$
- 2)  $9\sqrt{5} + 15$
- 3) 45
- 4) 90

- 23 The graph below shows  $\overline{AB}$ , which is a chord of circle  $O$ . The coordinates of the endpoints of  $\overline{AB}$  are  $A(3,3)$  and  $B(3,-7)$ . The distance from the midpoint of  $\overline{AB}$  to the center of circle  $O$  is 2 units.

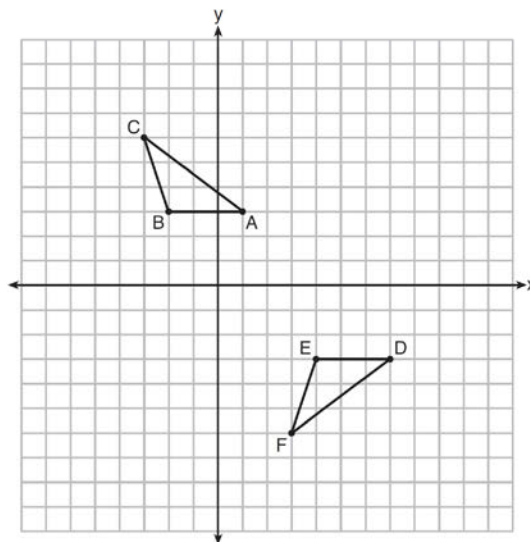


What could be a correct equation for circle  $O$ ?

- 1)  $(x - 1)^2 + (y + 2)^2 = 29$
  - 2)  $(x + 5)^2 + (y - 2)^2 = 29$
  - 3)  $(x - 1)^2 + (y - 2)^2 = 25$
  - 4)  $(x - 5)^2 + (y + 2)^2 = 25$
- 24 What is the area of a sector of a circle with a radius of 8 inches and formed by a central angle that measures  $60^\circ$ ?

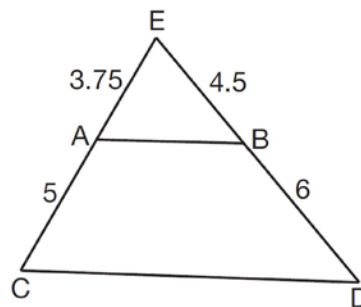
- 1)  $\frac{8\pi}{3}$
- 2)  $\frac{16\pi}{3}$
- 3)  $\frac{32\pi}{3}$
- 4)  $\frac{64\pi}{3}$

- 25 Describe a sequence of transformations that will map  $\triangle ABC$  onto  $\triangle DEF$  as shown below.



- 26 Point  $P$  is on segment  $AB$  such that  $AP:PB$  is  $4:5$ . If  $A$  has coordinates  $(4,2)$ , and  $B$  has coordinates  $(22,2)$ , determine and state the coordinates of  $P$ .

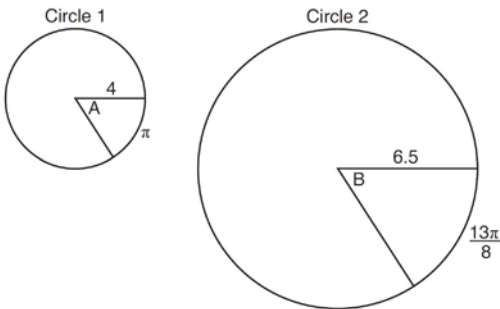
- 27 In  $\triangle CED$  as shown below, points  $A$  and  $B$  are located on sides  $CE$  and  $ED$ , respectively. Line segment  $AB$  is drawn such that  $AE = 3.75$ ,  $AC = 5$ ,  $EB = 4.5$ , and  $BD = 6$ .



Explain why  $\overline{AB}$  is parallel to  $\overline{CD}$ .

28 Find the value of  $R$  that will make the equation  $\sin 73^\circ = \cos R$  true when  $0^\circ < R < 90^\circ$ . Explain your answer.

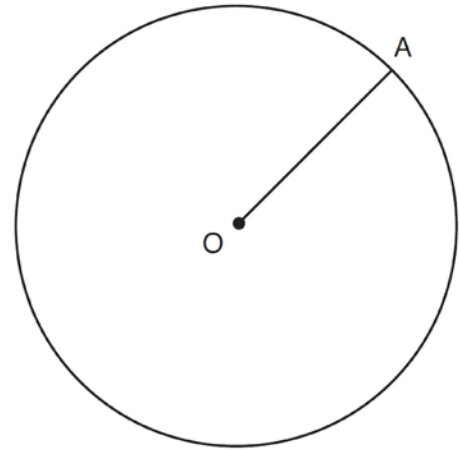
29 In the diagram below, Circle 1 has radius 4, while Circle 2 has radius 6.5. Angle  $A$  intercepts an arc of length  $\pi$ , and angle  $B$  intercepts an arc of length  $\frac{13\pi}{8}$ .



Dominic thinks that angles  $A$  and  $B$  have the same radian measure. State whether Dominic is correct or not. Explain why.

30 A ladder leans against a building. The top of the ladder touches the building 10 feet above the ground. The foot of the ladder is 4 feet from the building. Find, to the *nearest degree*, the angle that the ladder makes with the level ground.

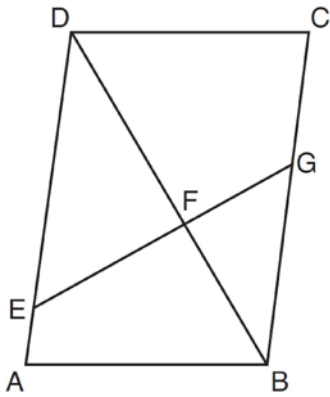
31 In the diagram below, radius  $\overline{OA}$  is drawn in circle  $O$ . Using a compass and a straightedge, construct a line tangent to circle  $O$  at point  $A$ . [Leave all construction marks.]



32 A barrel of fuel oil is a right circular cylinder where the inside measurements of the barrel are a diameter of 22.5 inches and a height of 33.5 inches. There are 231 cubic inches in a liquid gallon. Determine and state, to the *nearest tenth*, the gallons of fuel that are in a barrel of fuel oil.

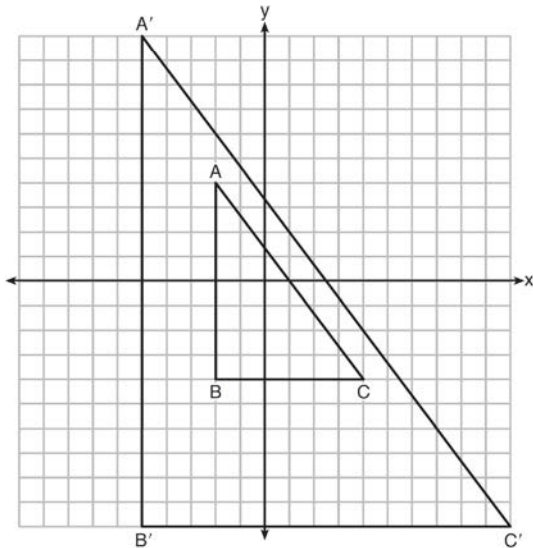


- 33 Given: Parallelogram  $ABCD$ ,  $\overline{EFG}$ , and diagonal  $\overline{DFB}$



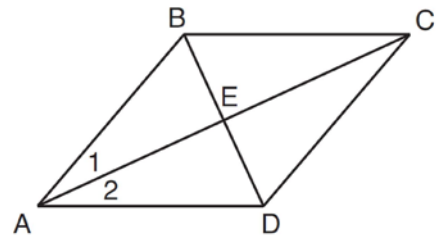
Prove:  $\triangle DEF \sim \triangle BGF$

- 34 In the diagram below,  $\triangle A'B'C'$  is the image of  $\triangle ABC$  after a transformation.



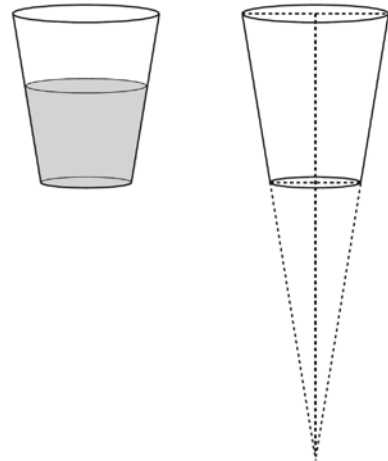
Describe the transformation that was performed.  
Explain why  $\triangle A'B'C' \sim \triangle ABC$ .

- 35 Given: Quadrilateral  $ABCD$  with diagonals  $\overline{AC}$  and  $\overline{BD}$  that bisect each other, and  $\angle 1 \cong \angle 2$



Prove:  $\triangle ACD$  is an isosceles triangle and  $\triangle AEB$  is a right triangle

- 36 A water glass can be modeled by a truncated right cone (a cone which is cut parallel to its base) as shown below.



The diameter of the top of the glass is 3 inches, the diameter at the bottom of the glass is 2 inches, and the height of the glass is 5 inches. The base with a diameter of 2 inches must be parallel to the base with a diameter of 3 inches in order to find the height of the cone. Explain why. Determine and state, in inches, the height of the larger cone. Determine and state, to the nearest tenth of a cubic inch, the volume of the water glass.