ACTAAP

Arkansas Comprehensive Testing, Assessment, and Accountability Program
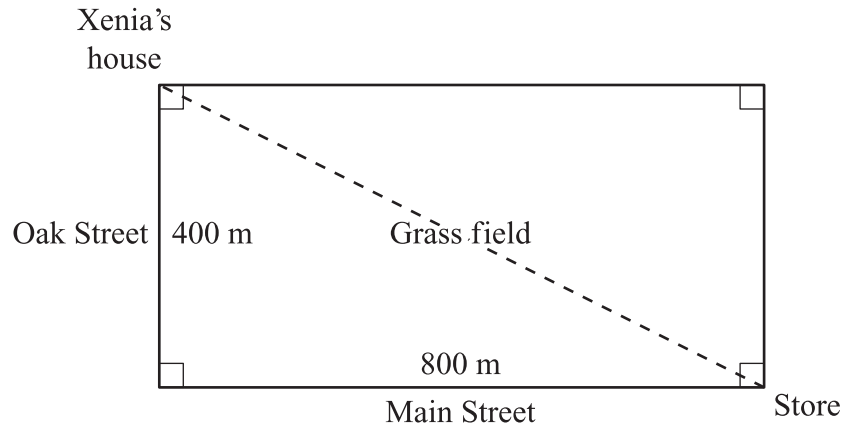
RELEASED ITEM BOOKLET

Geometry
End-of-Course Examinations

2012–2013 Administrations

Arkansas Department of Education

PART II MID-YEAR RELEASED GEOMETRY ITEMS

1. Xenia needs to get from her house to the store. Since she is in a hurry, she wants to cut diagonally across the grass field.
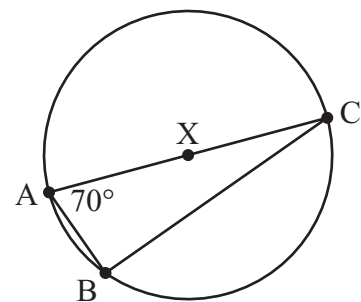

Xenia's house

Oak Street | 400 m

Grass field

800 m

Main Street

Store

Approximately how many meters will Xenia walk if she goes this way?

   A.   35 m
 * B.   894 m
   C.   1,200 m
   D. 400,000 m

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2. Peter is enlarging a photo that is 9 inches long and 6 inches wide to poster size. He enlarges the photo so that the sides are proportional.

If the width of the poster is 36 inches, what is the length of the poster?

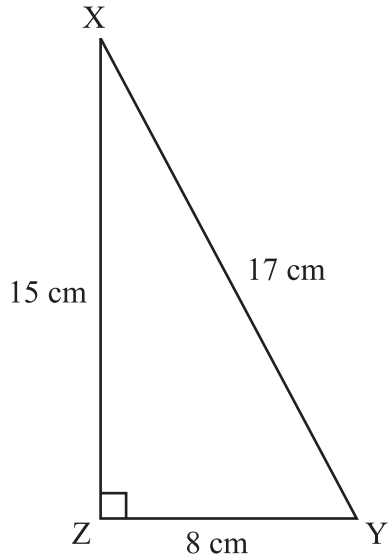   A. 24 inches
   B. 36 inches
   C. 45 inches
 * D. 54 inches

3. △ABC is inscribed in circle X and m∠BAC = 70°.

What is m∠ACB?

 * A.   20°
   B.   90°
   C. 110°
   D. 180°

6

4. In $\triangle$XYZ, which has the value $\dfrac{15}{17}$?

X

15 cm

17 cm

Z

8 cm

Y

A. sin X

* B. sin Y

C. tan X

D. tan Y

5. The graph below shows three vertices of a quadrilateral at the points $(-4, 1)$, $(4, -2)$, and $(-1, -2)$.

y

5
4
3
2
$(-4, 1)$
1

-5 -4 -3 -2 -1 1 2 3 4 5 x
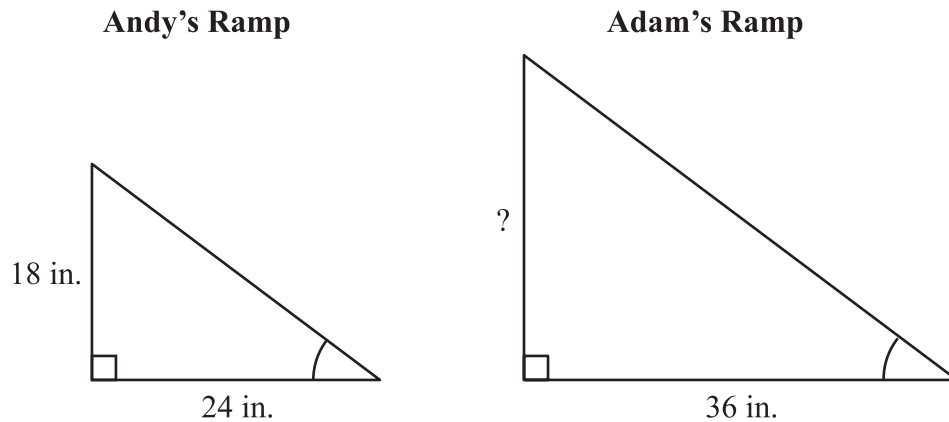-1
$(-1, -2)$ -2 $(4, -2)$
-3
-4
-5

If the fourth vertex is at $(1, 1)$, what is the most precise name for the quadrilateral?
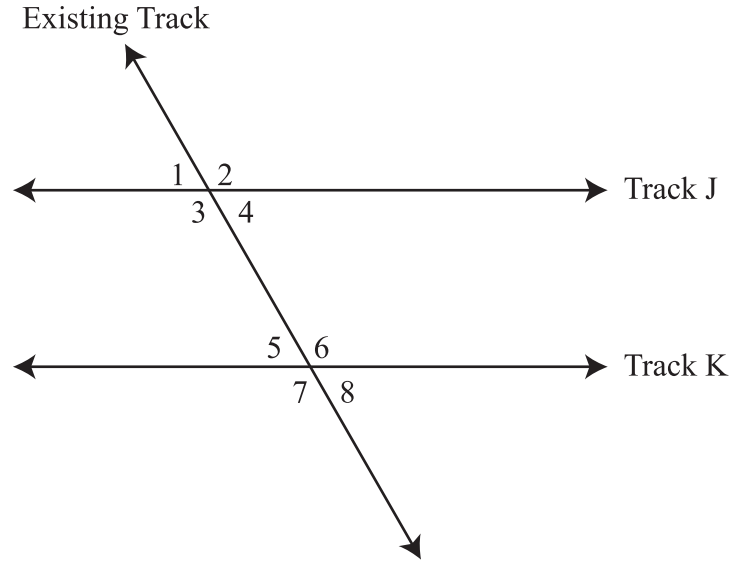
A. square

B. rectangle

C. trapezoid

* D. parallelogram

6. Over the weekend, Andy built a skateboard ramp that has a length of 24 inches and a height of 18 inches. Adam wants to build a geometrically similar ramp for his skateboard. Adam's ramp will have a length of 36 inches. What will be the height of Adam's ramp?

Andy's Ramp   **Adam's Ramp**

18 in.

24 in.

?

36 in.

* A.   27 inches

   B.   37 inches

   C.   48 inches

   D.   53 inches

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7. Jana wants to build a pyramid by stacking cups upside down on each other. If the top of the pyramid has 1 cup and the bottom of the pyramid has 6 cups, how many rows of cups are in Jana's pyramid?

   A.   3

   B.   5

* C.   6

   D.   7

8. Which best describes a polygon that tessellates?

   A.   When it covers an area, it leaves gaps and has overlaps.

   B.   When it covers an area, it leaves gaps but has no overlaps.

   C.   When it covers an area, it does not leave gaps but has overlaps.

* D.   When it covers an area, it does not leave gaps and has no overlaps.

9. Construction workers are laying new railroad tracks. They must lay parallel tracks for trains coming into town and trains going out. Both of the new railroad tracks will cross an existing track that runs through the town, as shown below.
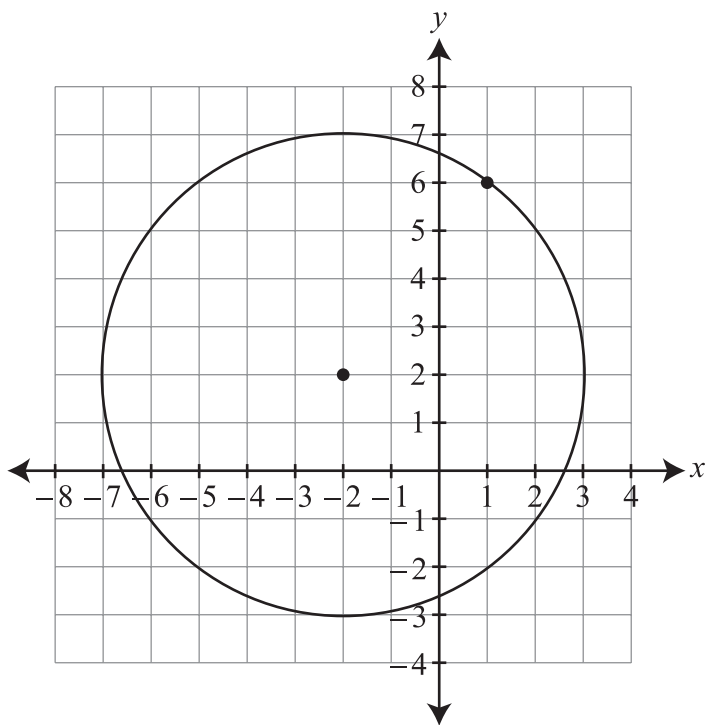

Existing Track

Track J

Track K

Which of the following pairs of angles must be equal so that Track J ∥ Track K?

A. ∠1 and ∠6

B. ∠2 and ∠8

* C. ∠3 and ∠6

D. ∠5 and ∠7

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10. What are the center and radius of a circle having the equation $(x - 3)^2 + (y + 1)^2 = 16$?

A. center at $(-3, 1)$, radius = 4 units

* B. center at $(3, -1)$, radius = 4 units

C. center at $(-3, 1)$, radius = 16 units
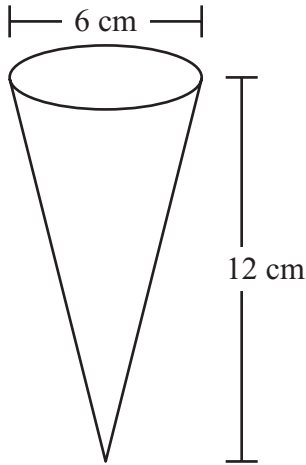
D. center at $(3, -1)$, radius = 16 units

11.   What is the radius of the circle shown below?

A. $\sqrt{15}$

B. $\sqrt{17}$

* C.   5

D.   7

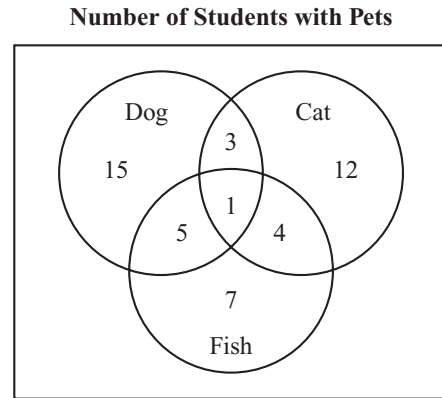**12.** The drain shown below has a diameter of 6 cm and a height of 12 cm.

6 cm

12 cm

If the diameter of the drain is shortened to 4 cm but the volume does not change, what must the height of the drain become?

A. 14 cm

B. 16 cm

C. 18 cm

* D. 27 cm

13. What is the equation of the line through $(8, 1)$ that is parallel to $y = -2x + 5$?

* A. $y = -2x + 17$

B. $y = \dfrac{1}{2}x - 3$

C. $y = 2x - 15$

D. $y = 8x + 1$

14. Kevin took a survey of students at lunch to determine the kinds of pets that they owned. The information that he collected is shown in the Venn diagram below.
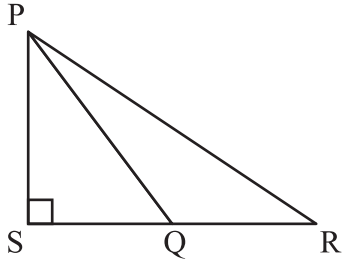
Number of Students with Pets

Dog   Cat

3

15   12

1

5   4

7

Fish

How many students in the survey owned a cat, a dog, or both, but no fish?

A. 27

* B. 30

C. 33

D. 40

15. In the figure shown below, $\overline{PQ}$ is a median of $\triangle PRS$, PS = 4 cm, and SQ = 3 cm.

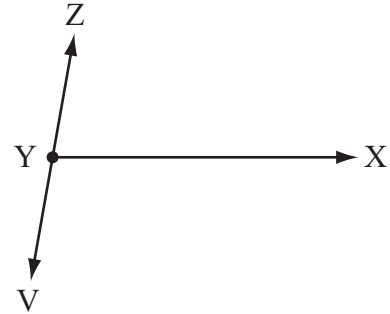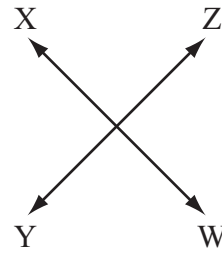
What is PR? Round your answer to the nearest tenth.

   A.   5.0 cm

   B.   5.8 cm

 * C.   7.2 cm

   D.   10.0 cm

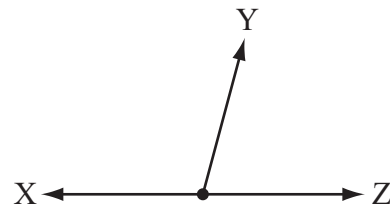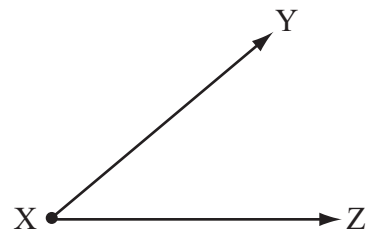**16.** Which of the following figures contains $\angle XYZ$?
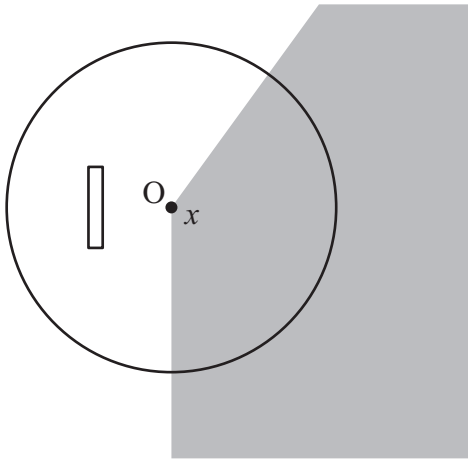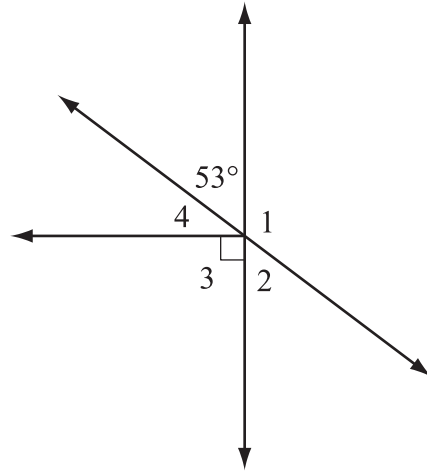
 * A.

   B.

   C.

   D.

17. The stands at a baseball stadium cast a shadow that covers $\frac{2}{5}$ of the pitcher's mound, with two sides of the shadow meeting at the center of the mound, shown below.

What is the measure of the smaller angle x made by the two sides of the shadow?

  A.   72°
* B.   144°
  C.   216°
  D.   288°

18. Use the drawing below for this problem.

Which of the following angles has a measurement equal to 127°?

* A.   ∠1
  B.   ∠2
  C.   ∠3
  D.   ∠4

19. Sarah is building an exercise ramp for her hamsters. She plans to use a triangular frame for the ramp and has several pieces of wood to choose from. Which lengths of wood can Sarah use to form a triangle?

  A.   5 in., 8 in., 13 in.
  B.   5 in., 9 in., 15 in.
  C.   6 in., 8 in., 15 in.
* D.   6 in., 9 in., 12 in.

20. In a game of chance, a computer randomly places a dot in one of the 64 squares shown below. If the dot falls inside a white square, the player loses the game.

Rounded to the nearest percent, what is the probability that the person playing the game will lose?
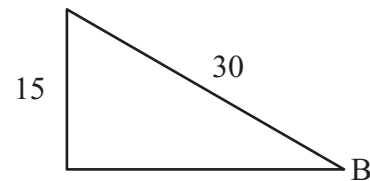
   A.   32%

* B.   50%

   C.   64%

   D.   80%

21. Which statement is false in Euclidean geometry but is true in spherical geometry?

   A.   Every pair of vertical angles is congruent.

   B.   The sum of the angles of any triangle is 180°.

   C.   A triangle cannot have more than one right angle.

* D.   Two intersecting lines intersect in exactly two points.

22. Which of the following is the equation of a line perpendicular to the line whose equation is $y = \dfrac{1}{3}x + 2$ and passing through the point $(6, \ -10)$?

* A. $y = -3x + 8$

   B. $y = -\dfrac{1}{3}x - 8$

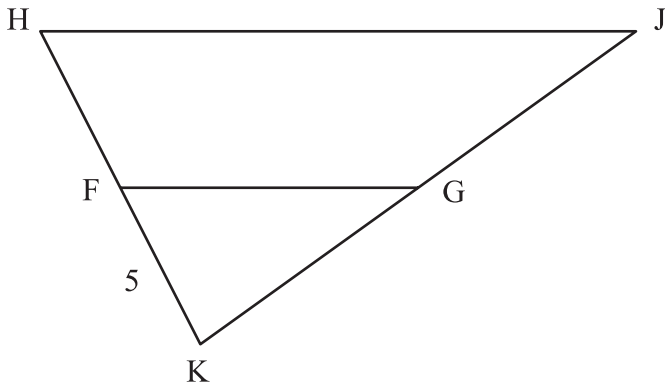   C. $y = \dfrac{1}{3}x - 12$

   D. $y = 3x - 28$

23. Use the figure below to answer the following question.

If the above triangle is a right triangle and the hypotenuse is 30 units long, what is the measure of $\angle B$?

   A.   60°

   B.   45°

* C.   30°
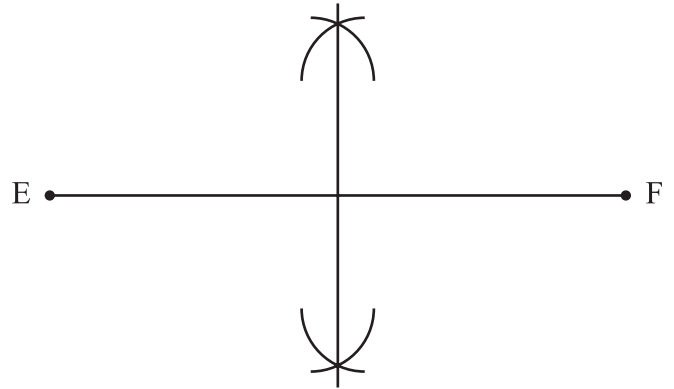
   D.   15°

24. In the figure below, $\overline{FG} \parallel \overline{HJ}$ and HK = 2FK.

Which of the following is true?

   A.   GK = 5

   B.   GK > GJ

   C.   GF = HJ

* D.   GK = GJ

25. Michelle puts the sharp point of her compass on point E of the 12-cm line segment $\overline{EF}$. She draws one arc above $\overline{EF}$ and another arc below $\overline{EF}$, repeating this process with the sharp point of her compass on point F and then drawing a line perpendicular to $\overline{EF}$ as shown.
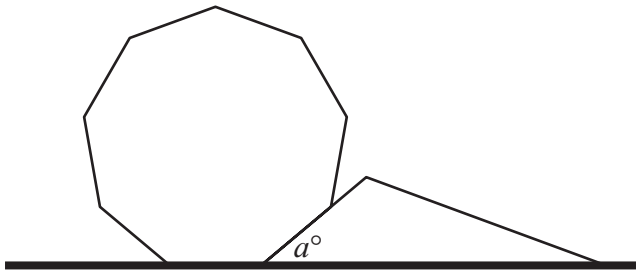

What is the distance between point E and the perpendicular line?

   A.   3 cm

   B.   4 cm

* C.   6 cm

   D.   9 cm

26. A stained-glass artist cuts pieces of glass in the shapes of a regular nonagon and a triangle to use along the straight edge of a window he is building.

What is the value of *a*?

  A.   12°

* B.   40°

  C.   60°

  D.   140°

27. Oliver uses a tabletop chess set as a model to build an oversized chess set in a park. Each king in the tabletop set is 8 cm tall. Each king in the park set is 1.2 m tall. Each pawn in the tabletop set is 4.5 cm tall. What is the height of each pawn in the park set?

  A.   0.150 m
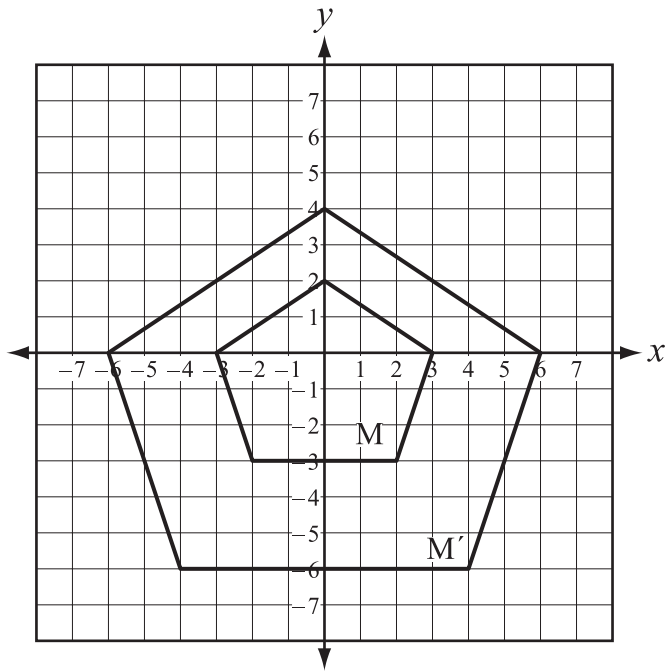
* B.   0.675 m

  C.   1.778 m

  D.   5.400 m

28. Barney drew a quadrilateral with the following characteristics.

- Only two of the four sides are congruent.
- The diagonals do not bisect each other.
- Only two of the four sides are parallel.

What type of quadrilateral did Barney draw?

  A.   kite

  B.   square

  C.   rhombus

* D.   trapezoid

29. A cone has a height of 14 centimeters and a base radius of 3 centimeters. What is its volume? Round your answer to the nearest cubic cm.

  A.   28 cm^3

  B.   57 cm^3

* C.   132 cm^3

  D.   396 cm^3

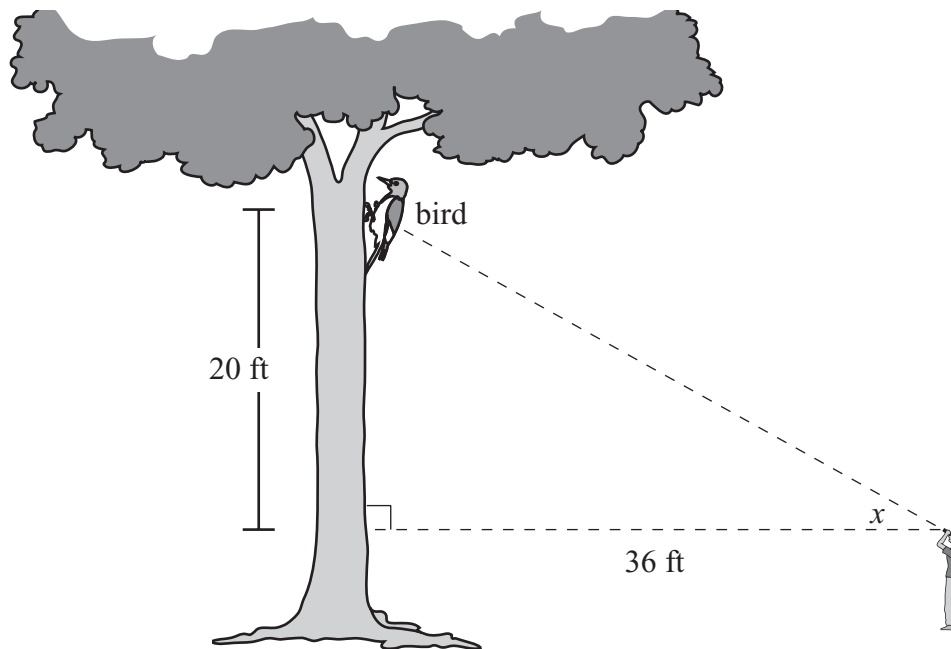**30.**   The transformation of pentagon M to pentagon M′ is shown below.

Which of the following is the correct name for the transformation?

* A.   dilation
   B.   rotation
   C.   reflection
   D.   translation

PART II MID-YEAR RELEASED GEOMETRY ITEMS

A. Maria is observing a woodpecker near the top of a tree, as shown in the diagram below.
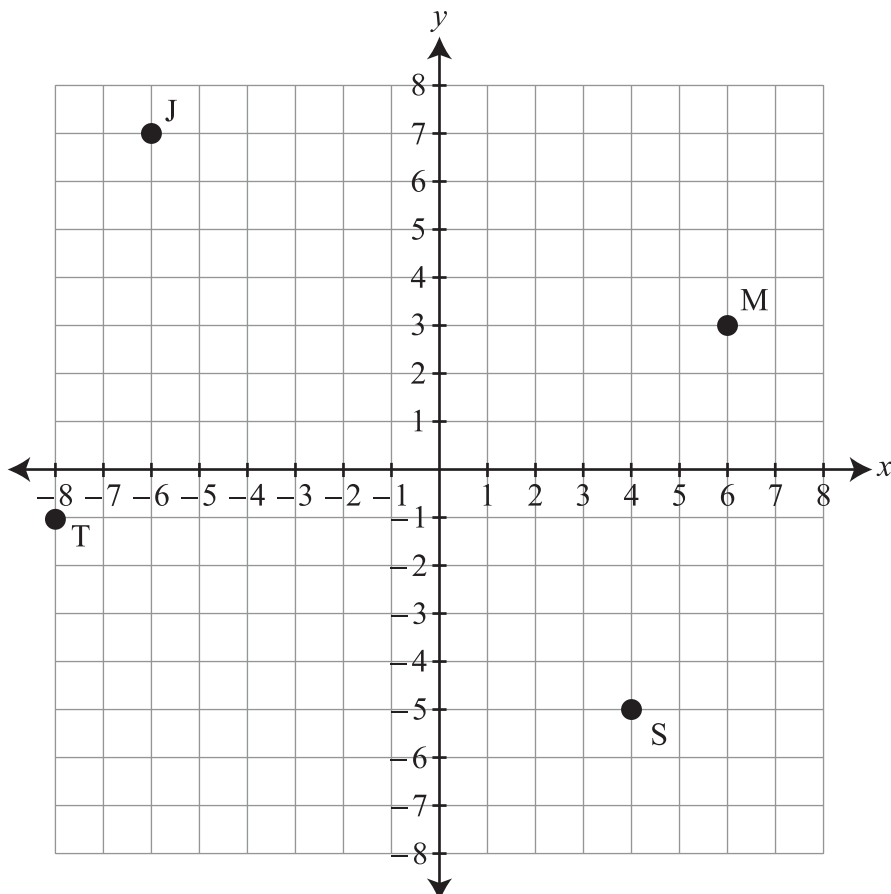

1. What is the distance between Maria and the woodpecker? Show all of your work, and round to the nearest foot.

2. What is the measure of angle x, the angle of elevation, rounded to the nearest degree? Show all of your work to justify your answer.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

	Item A Scoring Rubric—2013 Geometry

Score	Description
4	The student earns 4 points. The response contains no incorrect work.
3	The student earns 3 – 3½ points.
2	The student earns 2 – 2½ points.
1	The student earns 1 – 1½ points, or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank — No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" is assigned for the item.)

B.   The marching band director is using a coordinate grid to help him design a formation for the marching band. He begins by placing the four section leaders, Jodi, Mark, Sandra, and Terrence, at the locations J, M, S, and T, as shown below.
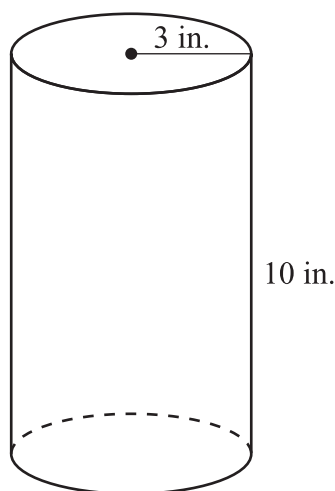

1.   The band director wants to place another key band member, Zach, halfway between Sandra (S) and Terrence (T). What will be the coordinates of Zach's location? Show your work or explain how you found your answer.

2.   The band director plans to scale the graphic as 1 grid unit = 3 yards. How far, in yards, will Sandra be from Jodi? Round your answer to the nearest tenth of a yard. Show your work and/or explain how you found your answer.

3.   Except for Zach, the other band members will be placed along the segments from Jodi to Sandra and from Mark to Terrence. Determine whether these two segments, $\overline{JS}$ and $\overline{TM}$, are perpendicular. Show your work or explain how you found your answer.

BE SURE TO LABEL YOUR RESPONSES 1, 2, AND 3.

C. Ike's Ice Cream Company sells its ice cream in cylindrical containers, with the dimensions shown below.

Ike's Ice Cream Company plans to create a new container by decreasing the volume of its current ice cream containers by 20%.
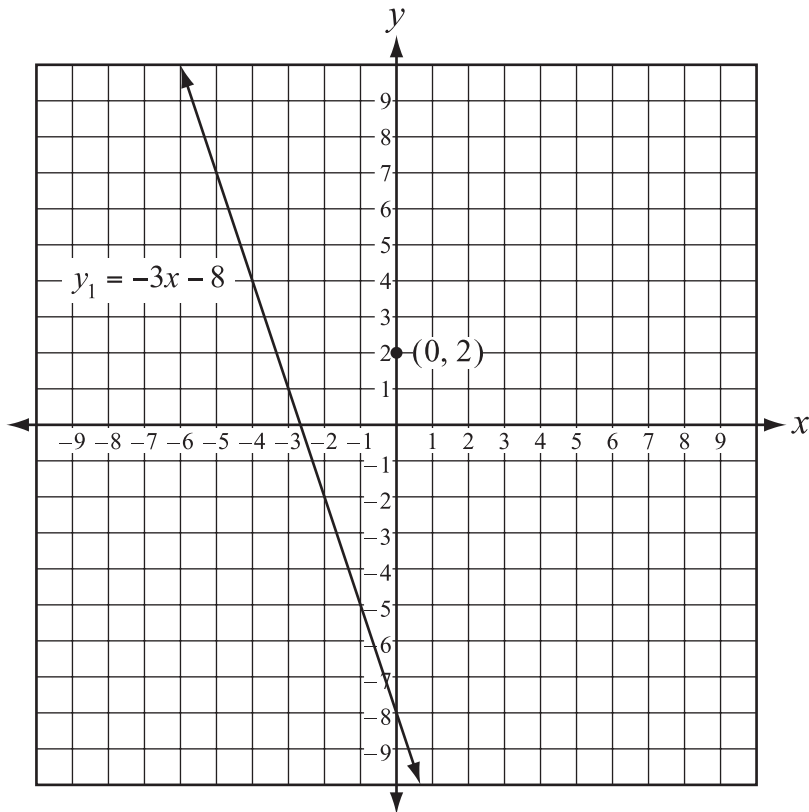
1. Find the volume of the new container. Leave your answer in terms of pi or round to the nearest hundredth of a cubic inch. Show your work.

2. If Ike's Ice Cream Company decides to change the height of the current container but keep the radius the same, what will be the height of the new container whose volume was found in Part 1? Show your work or explain how you found your answer.

3. If Ike's Ice Cream Company decides to change the radius of the current container but keep the height the same, what will be the radius of the new container whose volume was found in Part 1? Show your work or explain how you found your answer.

BE SURE TO LABEL YOUR RESPONSES 1, 2, AND 3.

Item C Scoring Rubric—2013 Geometry

Score	Description
4	The student earns 4 points. The response contains no incorrect work. Correct label of "inches" in Parts 2 and 3.
3	The student earns 3 – 3½ points.
2	The student earns 2 – 2½ points.
1	The student earns ½ – 1½ points, or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank — No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" is assigned for the item.)

1. Look at the coordinate plane below.

What is the equation of a line perpendicular to line y_1 and passing through $(0, 2)$?

* A. $y = \dfrac{1}{3}x + 2$

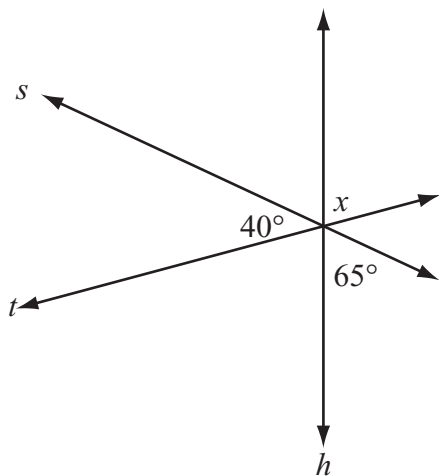B. $y = -3x + 2$

C. $y = 3x - 2$

D. $y = -\dfrac{1}{3}x - 2$

2. The equation below describes a circle.

$$(x-5)^2 + (y+2)^2 = 16$$

What circle could this equation represent?

  A. a circle with center $(-2, 5)$ and radius 4
* B. a circle with center $(5, -2)$ and radius 4
  C. a circle with center $(5, -2)$ and radius 16
  D. a circle with center $(-2, 5)$ and radius 16

3. What is the value of x?
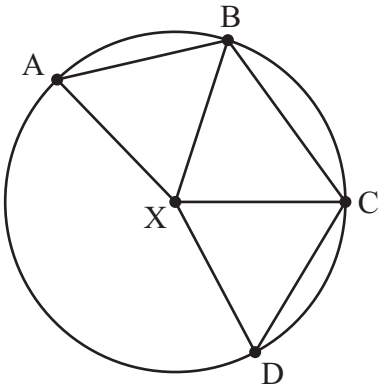

  A.   40°
  B.   65°
* C.   75°
  D.   105°

4. At Fulton Middle School, students' schedules follow these rules:

- If a student has Math during first period, the student must have PE before lunch.
- If a student has PE before lunch, the student must have English after lunch.
- Students eat lunch between third period and fourth period.
- A school day has six periods.

Michelle's first-period class is Math. Which conclusion must be true?
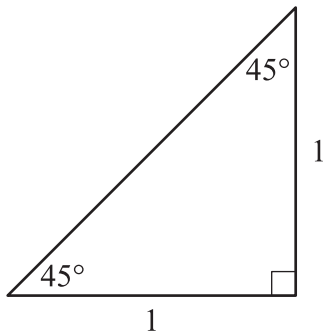
  A. Michelle has PE during third period.
  B. Michelle has PE during fourth, fifth, or sixth period.
  C. Michelle has English during sixth period.
* D. Michelle has English during fourth, fifth, or sixth period.

5. In circle X below, $\angle AXB \cong \angle CXD$.
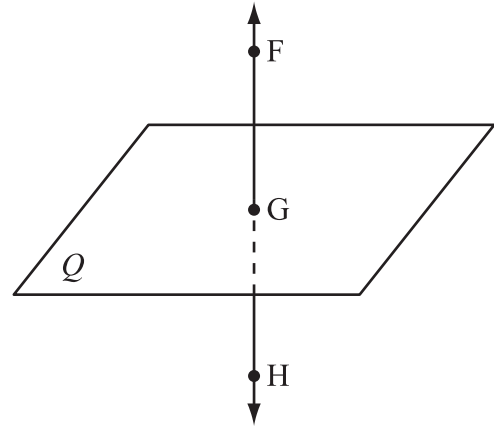

Which **must** be true?

   A. $\overline{AB} \cong \overline{BX}$

   B. $\overline{AB} \cong \overline{CX}$

* C. $\overline{CD} \cong \overline{AB}$

   D. $\overline{CD} \cong \overline{CX}$

6. Look at the triangle below.

What is the length of the hypotenuse in the triangle?

   A.   1

* B. $\sqrt{2}$

   C.   2
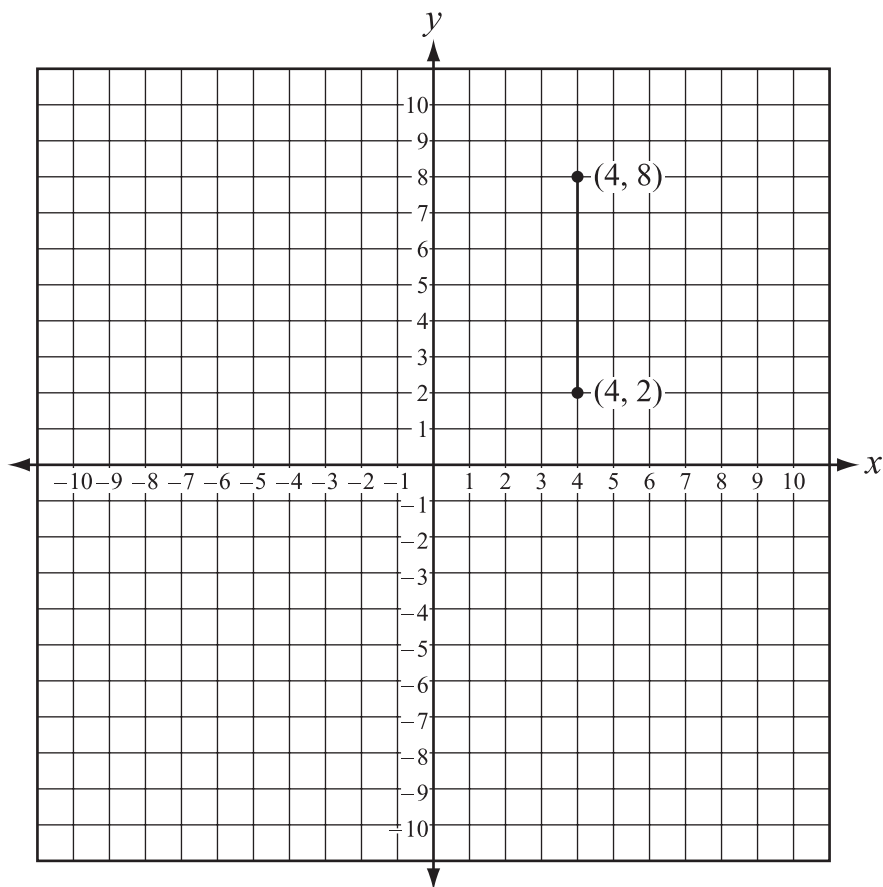
   D. $2\sqrt{2}$

7. Look at the figure below.

What represents the intersection of plane Q and $\overleftrightarrow{FH}$?

   A. $\overline{FG}$

   B. $\overline{QG}$

   C. $\angle QGF$

* D.   point G

PART II   Spring Released Geometry Items

8. Look at the coordinate plane below.

What is the equation for the perpendicular bisector of the segment shown above?

* A. $y = 5$
  B. $x = 5$
  C. $y = 4$
  D. $x = 4$

9. A cylindrical oatmeal container has a height of 13 inches and a radius of 3.5 inches. What is the approximate volume of oatmeal that the container will hold?
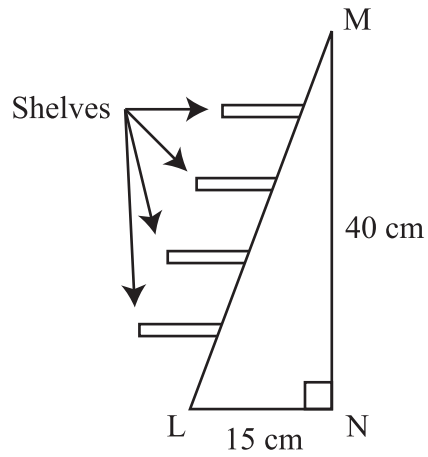
    A.   286 in.^{3}

    B.   363 in.^{3}

 * C.   500 in.^{3}

    D.   1,592 in.^{3}

10. Which is another name for a quadrilateral with four congruent sides and four right angles?

 * A.   square

    B.   rectangle
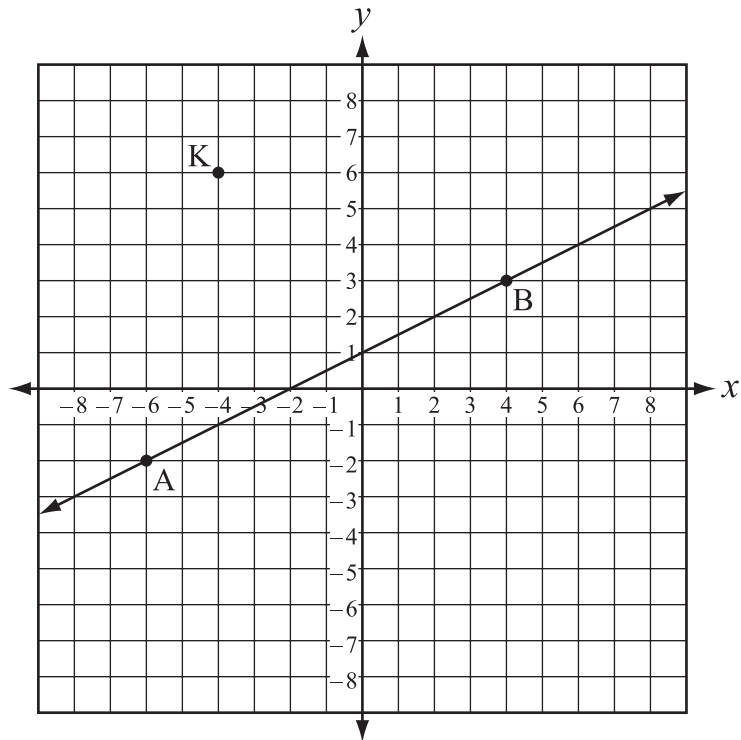
    C.   rhombus

    D.   parallelogram

11. A designer is building a plastic display case. Its side view is shown below.

What is LM? Round your answer to the nearest centimeter.

   A.   10 cm

   B.   25 cm

* C.   43 cm

   D.   55 cm

12. Look at the graph below.

What is the equation of the line that passes through point K and is parallel to $\overleftrightarrow{AB}$?

A. $y = \dfrac{1}{2}x + 1$

B. $y = -\dfrac{5}{4}x + 1$

* C. $y = \dfrac{1}{2}x + 8$

D. $y = -2x - 2$

13. A glassblower starts with a solid cylindrical glass rod 150 millimeters long with a diameter of 24 millimeters. After heating the rod, the glassblower works it until it is 225 millimeters long. The rod's diameter is unchanged. Which is the best estimate of the increase in the surface area of the rod?

    A.   75 mm^2

* B.   5,655 mm^2

    C.   11,310 mm^2

    D.   33,929 mm^2

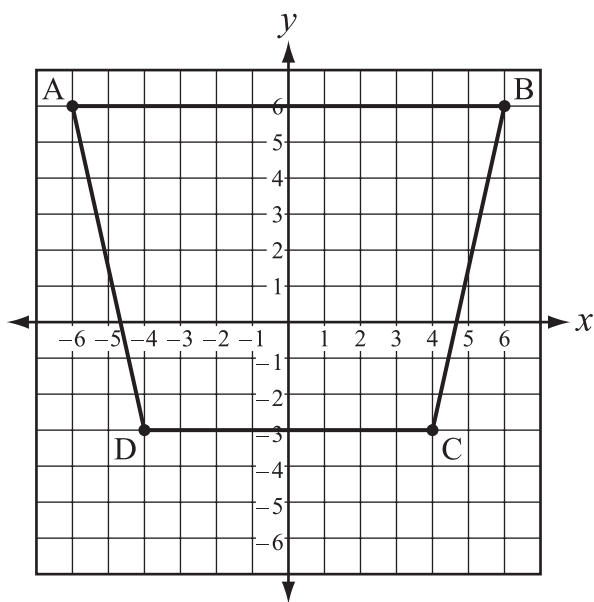14. Use the graphs below to answer this question.
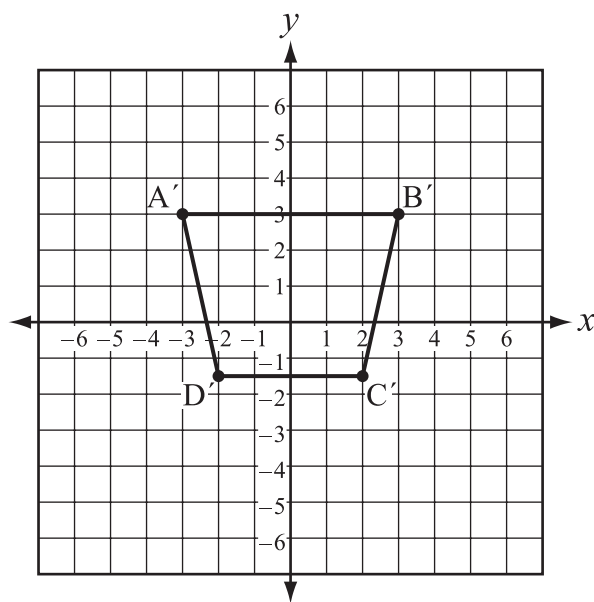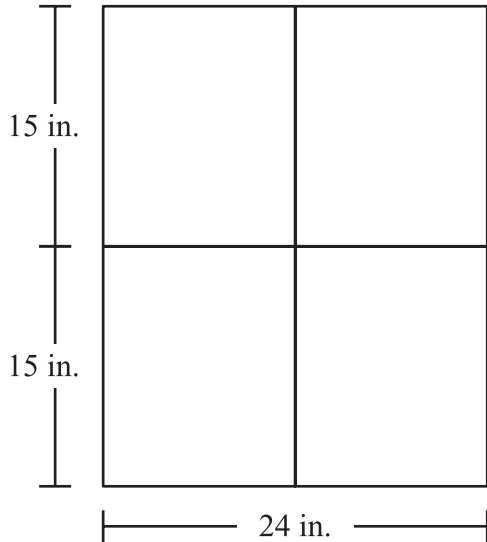

Figure 1

Figure 2

Which type of transformation is shown from Figure 1 to Figure 2?

* A.   dilation

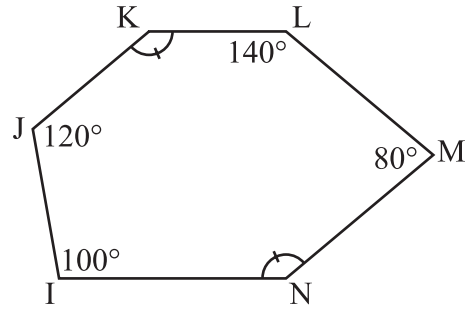   B.   rotation

   C.   reflection

   D.   translation

15. Mary Ann's rectangular window is 24 in. wide and 30 in. long. The window has 4 panes that are similar to the window.

15 in.

15 in.
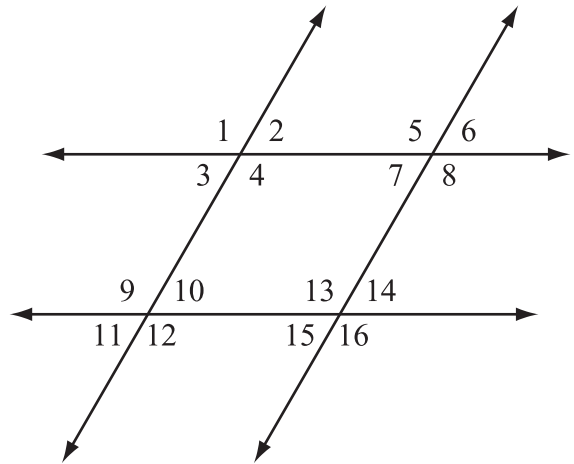
24 in.

If the length of each pane is 15 in., what is the width of each pane?

* A. 12 in.
  B. 15 in.
  C. 24 in.
  D. 30 in.

16. In the figure below, what is m∠N?

K
140°
L
J 120°
80° M
100°
I
N

A. 90°
B. 110°
C. 120°
* D. 140°

17. Two sets of parallel lines are shown below.

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

9 / 10   13 / 14
11 / 12   15 / 16

Which statement must be true?

* A. ∠1 ≅ ∠12
  B. ∠1 ≅ ∠14
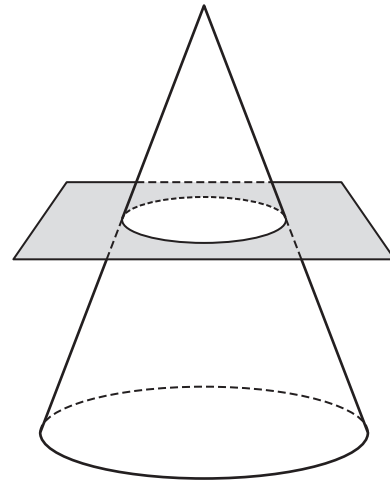 C. m∠5 + m∠9 = 180°
  D. m∠10 + m∠11 = 90°

18. The storage cabinet shown below is in the shape of a rectangular solid.

All six faces of the storage cabinet are to be painted. What is the surface area of the storage cabinet to the nearest hundredth of a square foot?

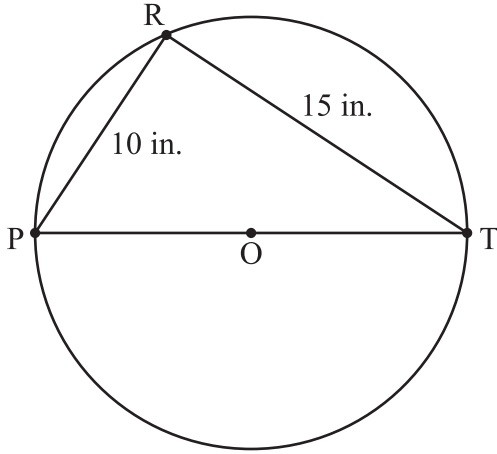   A.   31.50

   B.   32.25

   C.   63.00

* D.   64.50

19. Look at the figure below.

What shape is the cross-section of the cone?

   A.   point
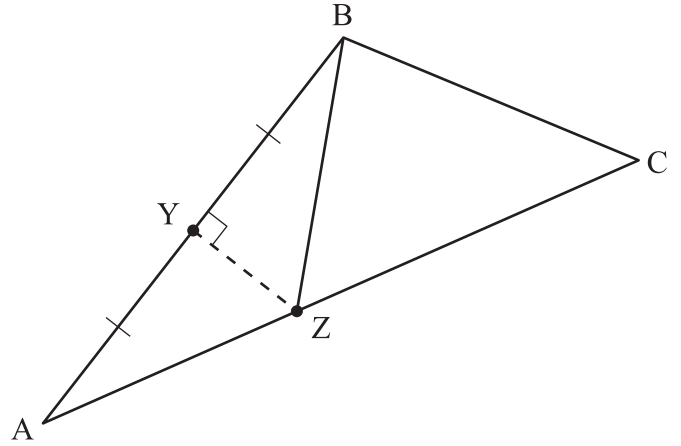
* B.   circle

   C.   triangle

   D.   rectangle

20. In the figure below, ΔPRT is inscribed in circle O.

What is the length of diameter $\overline{PT}$? Round your answer to the nearest tenth.

   A.   11.2 in.

   B.   12.5 in.

   C.   17.3 in.

 * D.   18.0 in.

21. The drawing below shows ΔABC. $\overline{YZ}$ is perpendicular to $\overline{AB}$, and $\overline{AY} \cong \overline{BY}$.
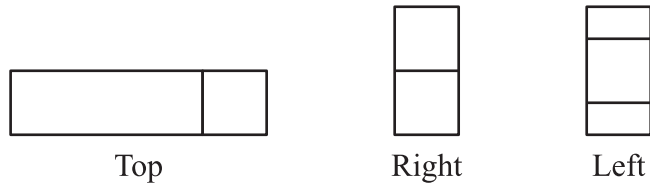

Which conclusion does this evidence support?

   A.   ΔABZ ~ ΔABC

 * B.   ΔAYZ ≅ ΔBYZ

   C. $\overline{BZ} \cong \overline{BC}$

   D.   ∠BZC ≅ ∠BCZ

22. Three views of a figure are shown below.

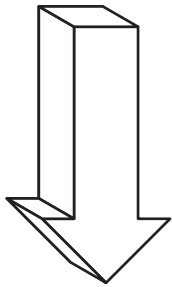Top   Right   Left

Which could be the figure shown in the three views?
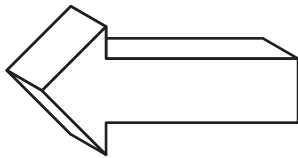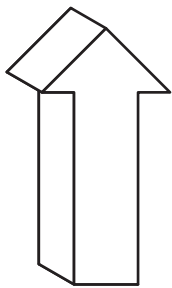
* A.

B.

C.

D.

23. Using only one shape, which regular polygon will tessellate?
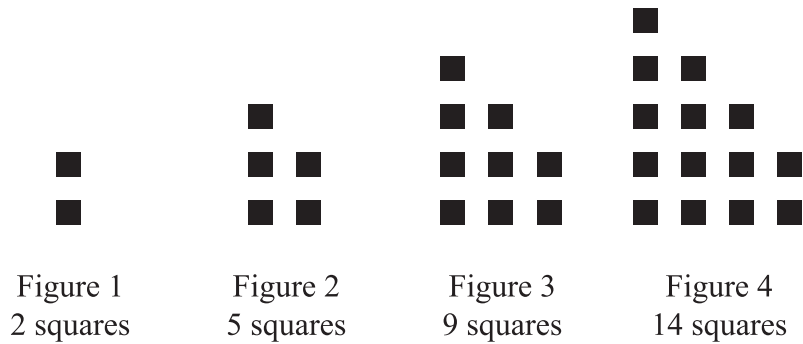
    A.   pentagon

* B.   hexagon

    C.   octagon

    D.   decagon

24. Which of the following theorems is the name of a triangle similarity theorem?

    A.   Side-Side (SS)

    B.   Angle-Side (AS)

    C.   Side-Vertex-Side (SVS)

* D.   Side-Angle-Side (SAS)

PART II   Spring Released Geometry Items

25. If the pattern below continues, how many squares will there be in Figure 7?

Figure 1	Figure 2	Figure 3	Figure 4
2 squares	5 squares	9 squares	14 squares

   A.   27

* B.   35

   C.   44

   D.   54

---

26. Look at the triangle below.

Which of the following is the value of x?
Round your answer to the nearest whole
number.

* A.   15

   B.   29

   C.   62

   D.   70

27. Look at the figure below.

What is the value of x?

   A.   1.0

   B.   1.6

* C.   2.0

   D.   5.0

28. Alex and three of his friends are all different ages.

- Lauren is older than Alex.
- Breanna is the oldest of the friends.
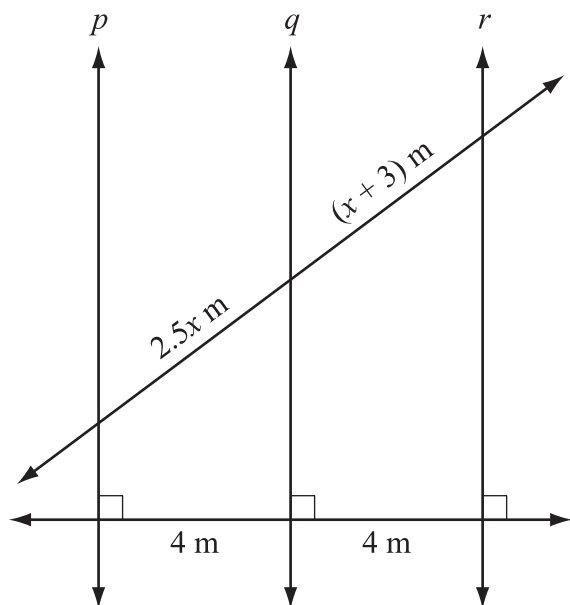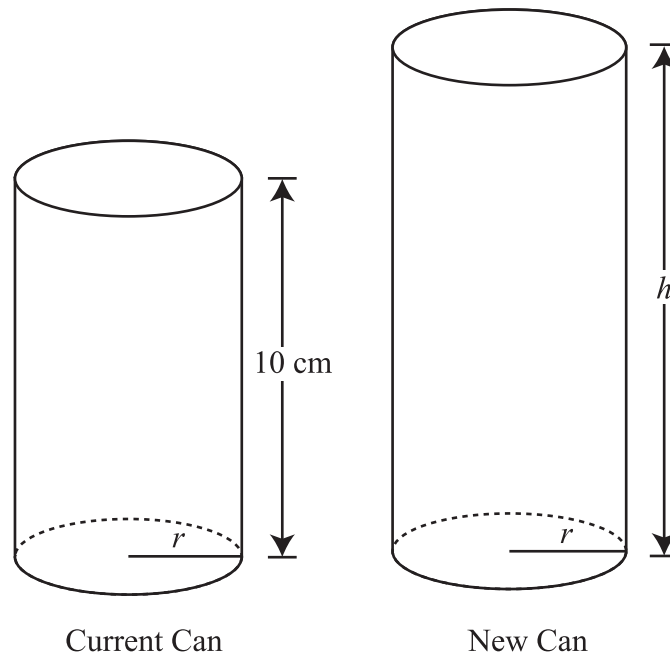- Meghan is younger than Breanna but older than Lauren.

Which shows the correct order of the friends from oldest to youngest?

* A.   Breanna, Meghan, Lauren, and Alex

   B.   Breanna, Lauren, Meghan, and Alex

   C.   Breanna, Meghan, Alex, and Lauren

   D.   Breanna, Lauren, Alex, and Meghan

29. A potato chip manufacturer sells its potato chips in cylindrical cans. The current can has a volume of 300 cm³. They want to increase the size of the can to a volume of 400 cm³ while keeping the radius the same.

Current Can   New Can

What will be the height, *h,* of the new can? Round your answer to the nearest hundredth of a centimeter.

    A.   7.50 cm

    B.   10.75 cm

    C.   11.33 cm

 * D.   13.33 cm
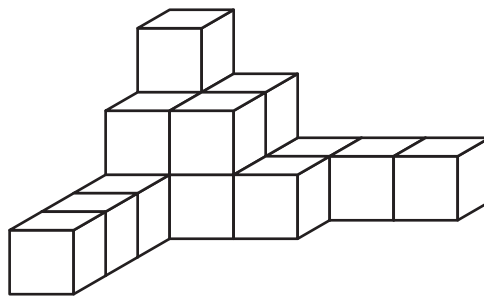
30. E is the midpoint of $\overline{DF}$.

What are the coordinates of E?

A. $\left(\dfrac{1}{2}, -\dfrac{1}{2}\right)$

* B. $\left(-\dfrac{1}{2}, \dfrac{1}{2}\right)$

C. $\left(\dfrac{7}{2}, -\dfrac{3}{2}\right)$

D. $\left(-\dfrac{3}{2}, \dfrac{7}{2}\right)$

PART II   SPRING RELEASED GEOMETRY ITEMS

A.   An arrangement of blocks sitting on a surface is shown below.

Front

1.   Draw the view of the blocks from the right side.

2.   Draw the view of the blocks from the top.

3.   How many blocks in all are in the arrangement?

4.   The length of each side of the cube-shaped blocks is 3 cm. What is the volume of the arrangement of blocks? Show your work.
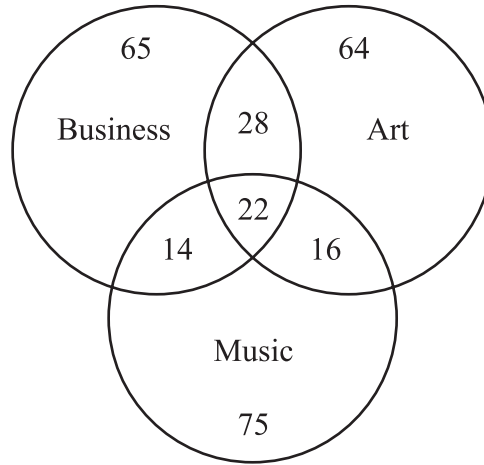
BE SURE TO LABEL YOUR RESPONSES 1, 2, 3, AND 4.

	Item A Scoring Rubric—2013 Geometry

Score	Description
4	The student earns 4 points. The response contains no incorrect work. Correct label of "cubic centimeters" in Part 4.
3	The student earns 3 – 3½ points.
2	The student earns 2 – 2½ points.
1	The student earns ½ – 1½ points, or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank — No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" is assigned for the item.)

B.   A school requires all students to take an elective in Business, Art, and/or Music. The diagram below shows the distribution of students in the electives.

Student Enrollment in Electives

Four claims listed below are made about the distribution of students in the electives. For each claim, determine whether it is true or false. Justify your decision with mathematical reasoning.

1.   More students signed up for Music electives than for Business electives.

2.   More students are enrolled in two or more electives than are enrolled in only one elective.

3.   More students are not enrolled in Music electives than are not enrolled in Art electives.

4.   More students are in Art electives but not Business than are in Music but not Business.

BE SURE TO LABEL YOUR RESPONSES 1, 2, 3, AND 4.

Item B Scoring Rubric—2013 Geometry	

Score	Description
4	The student earns 4 points. The response contains no incorrect work.
3	The student earns 3 – 3½ points.
2	The student earns 2 – 2½ points.
1	The student earns ½ – 1½ points, or some minimal understanding is shown. Ex. Finds the correct number of students in one of the categories in one of the four prompts, with work.
0	The student earns 0 points. No understanding is shown.
B	Blank — No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" is assigned for the item.)