ACTAAP

Arkansas Comprehensive Testing, Assessment, and Accountability Program

Released Item Booklet

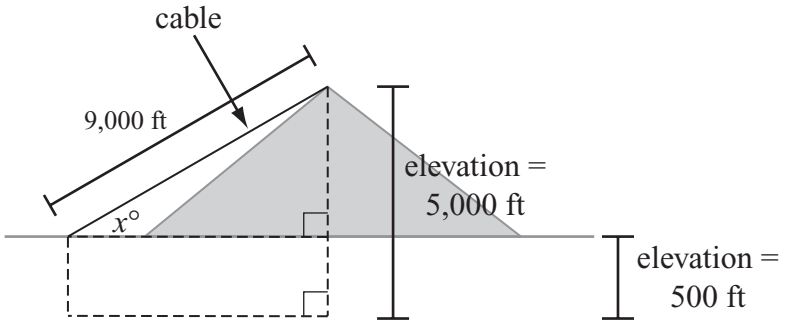
Geometry End-of-Course Examinations

2011–2012 Administrations

Arkansas Department of Education

PART II MID-YEAR RELEASED GEOMETRY ITEMS

1. A cable car starts at an elevation of 500 feet above sea level and rises to the top of a peak that is 5,000 feet above sea level. The cable is 9,000 feet long.



What is x, the measure of the angle of elevation of the cable?

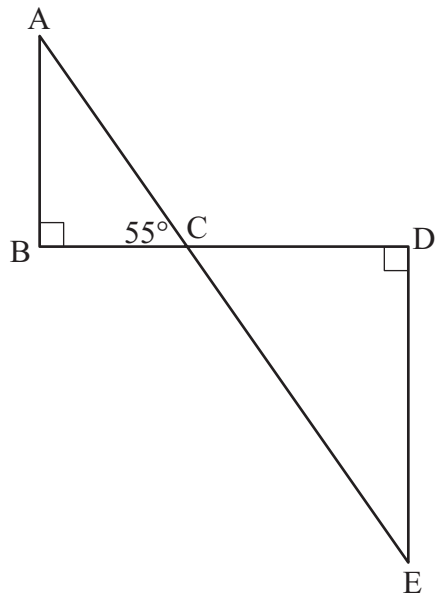
A. 3°

B. 6°

* C. 30°

D. 33°

2. $\overline{AE}$ is intersected by $\overline{BD}$ at the point C, forming two right triangles, ΔABC and ΔEDC.



What is the measure of $\angle E$?

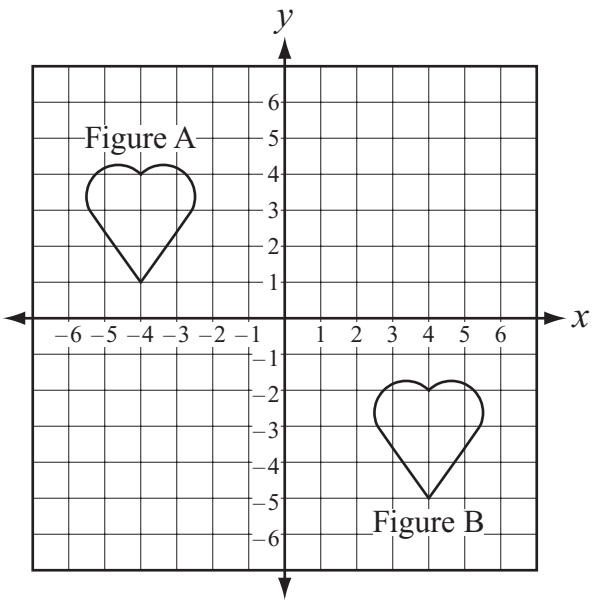
* A. 35°

B. 45°

C. 55°

D. 90°

3. Look at the graph below.



Which best describes the transformation from Figure A to Figure B?

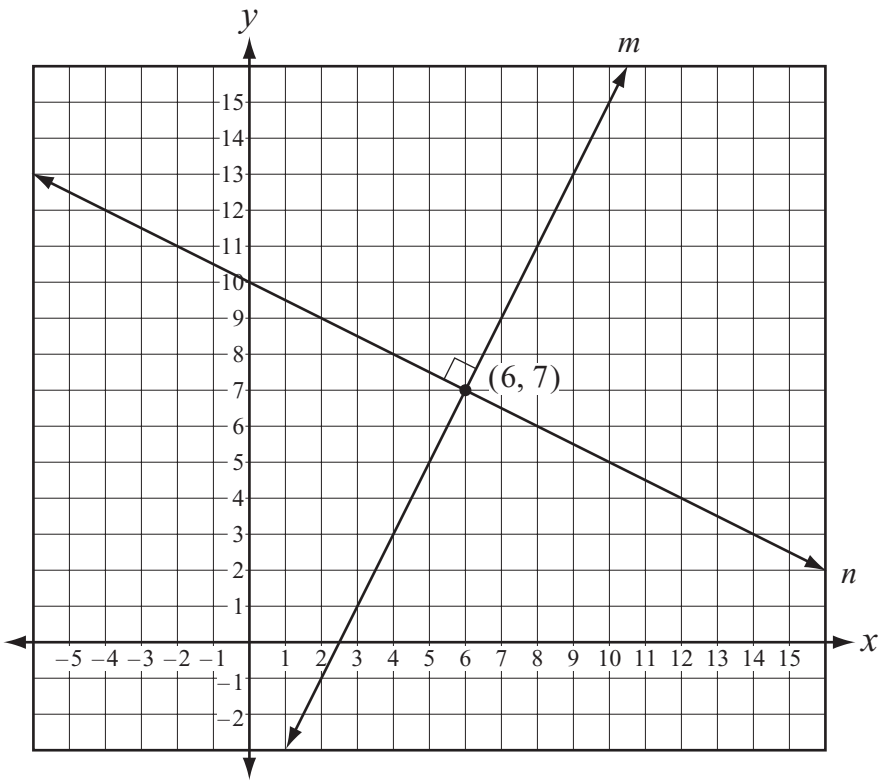
A. translation 1 unit right and 1 unit down

* B. translation 8 units right and 6 units down

C. translation 8 units right and 3 units down

D. translation 6 units right and 8 units down

4. The coordinate grid below shows that line *m* and line *n* are perpendicular to each other.



If the equation for line *n* is $y = -\frac{1}{2}x + 10$, then which is the equation for line *m*?

A. $y = 2x - 8$

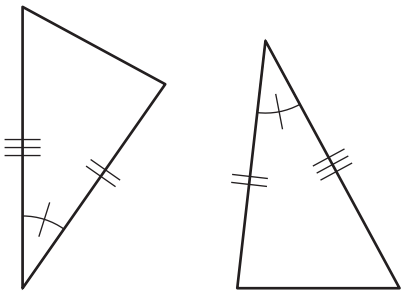
* B. $y = 2x - 5$

C. $y = -2x + 19$

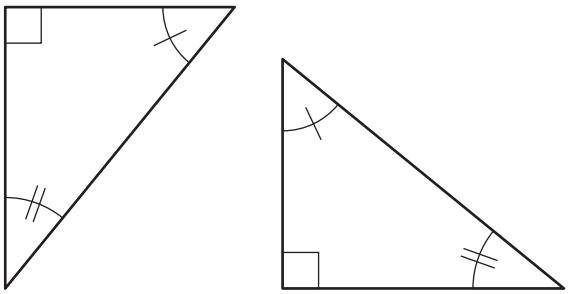
D. $y = -2x + 20$

5. Which two triangles are congruent, according to the side-angle-side (SAS) theorem?

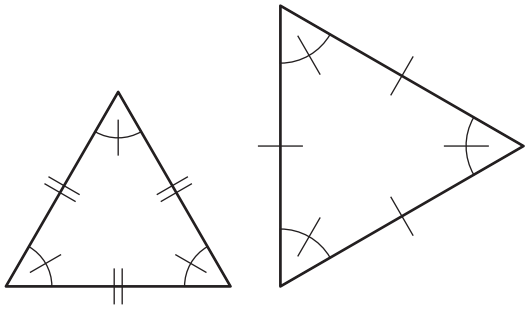
* A.



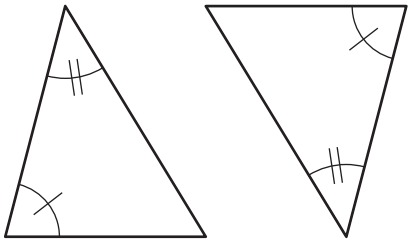
B.



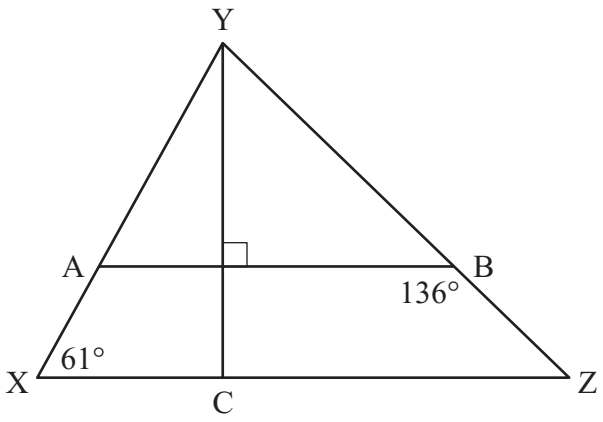
C.



D.



6. In the figure below, $\overline{AB}$ and $\overline{XZ}$ are parallel to each other.



What is the measure of $\angle XYC$?

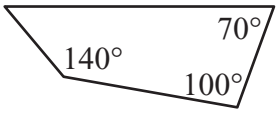
* A. 29°

B. 44°

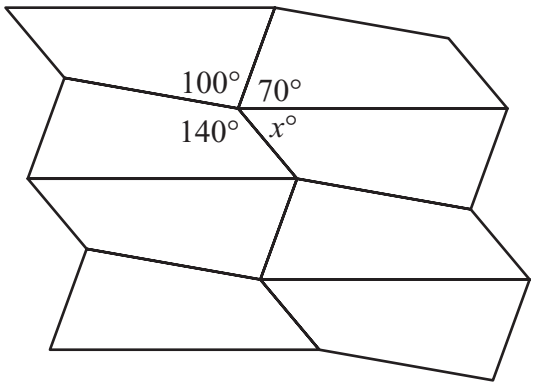
C. 46°

D. 75°

7. The figure below is a tessellation of a quadrilateral.



quadrilateral

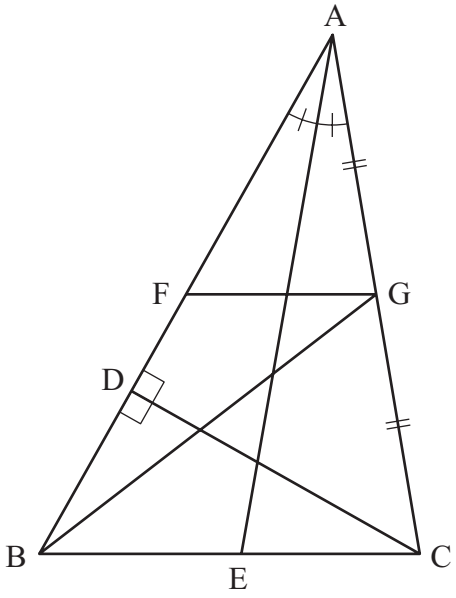


tessellation

What is the value of x?

A. 20
B. 40
* C. 50
D. 100

8. Triangle ABC is shown below.



Which segment is an angle bisector?

* A. $\overline{AE}$
B. $\overline{BG}$
C. $\overline{CD}$
D. $\overline{FG}$

9. On a globe, lines of longitude run north-south and lines of latitude run east-west. How many times do the Prime Meridian (0° longitude) and the Equator (0° latitude) intersect?

A. 1
* B. 2
C. 4
D. 8

10. Each figure shown below is a square measuring 1 unit wide by 1 unit long.

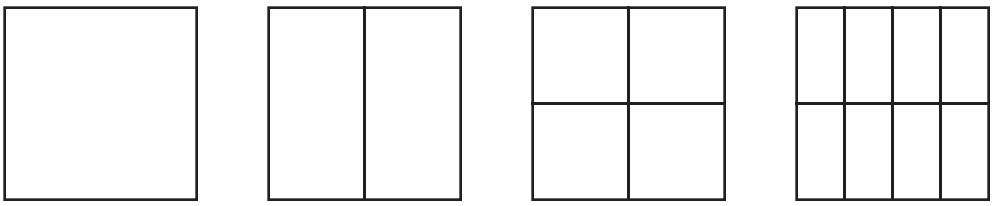
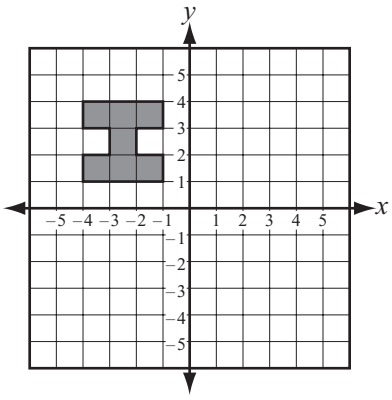


Figure 1 Figure 2 Figure 3 Figure 4

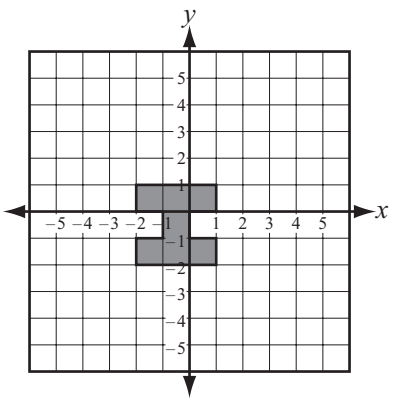
If the pattern continues, how many sections will make up Figure 8?

A. 16 sections
B. 32 sections
* C. 128 sections
D. 256 sections

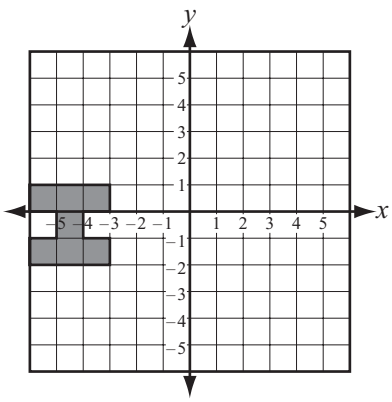
11. Which image will result from the figure below being translated three units down and two units to the right?



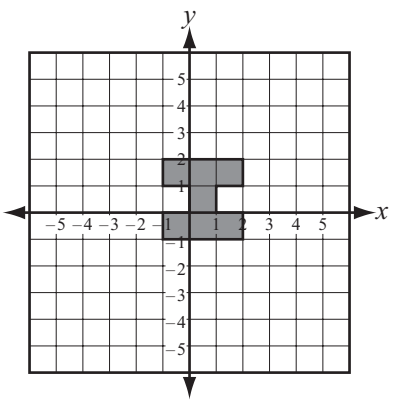
* A.



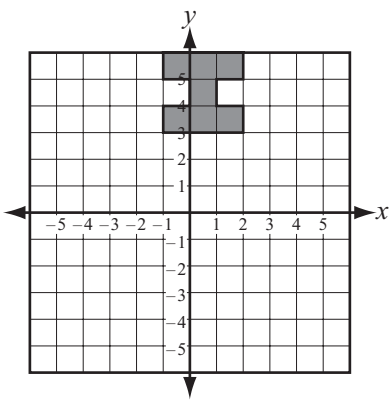
B.



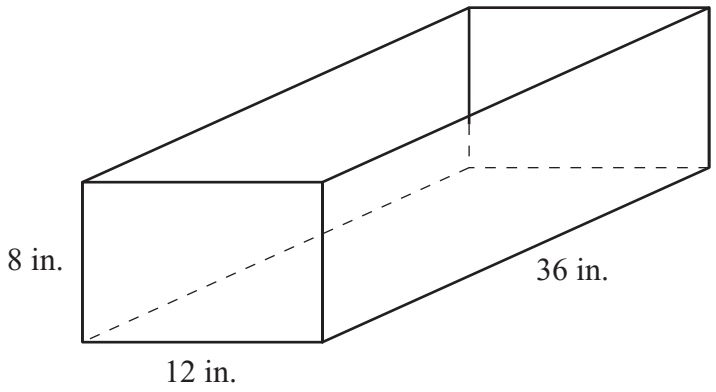
C.



D.



12. Maia makes flower boxes to sell at a farmer's market. One flower box is shown below.



Maia wants to make another flower box that has a length of 24 inches instead of 36 inches. What will be the difference in volumes of the two flower boxes?

A. 480 $in.^3$
* B. 1,152 $in.^3$
C. 2,304 $in.^3$
D. 3,456 $in.^3$

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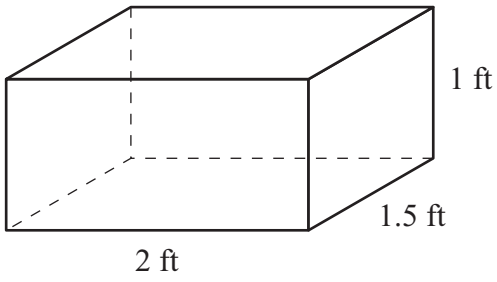
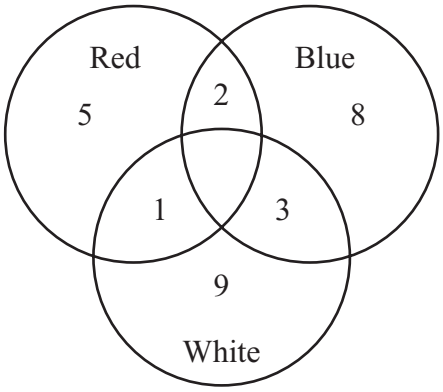
13. Max wants to wrap a box in the shape of a rectangular prism that is 2 ft long, 1 ft high, and 1.5 ft deep.



How much wrapping paper is needed to cover the exact surface area of the box?

A. 3 ft^2
B. 4.5 ft^2
C. 6.5 ft^2
* D. 13 ft^2

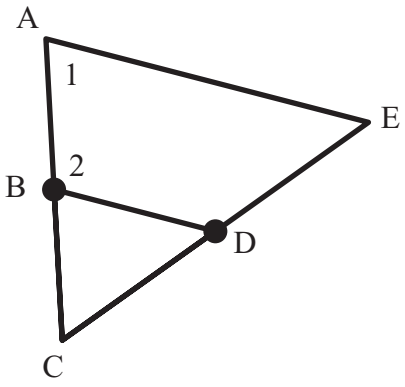
14. The Venn diagram below shows the colors of the cars in a school parking lot.



How many cars in the school parking lot are at least partly white?

A. 9
B. 10
C. 12
* D. 13

15. In the triangle shown below, point B is the midpoint of line $\overline{AC}$, and point D is the midpoint of line $\overline{CE}$.



Which conclusion is supported by the information above?

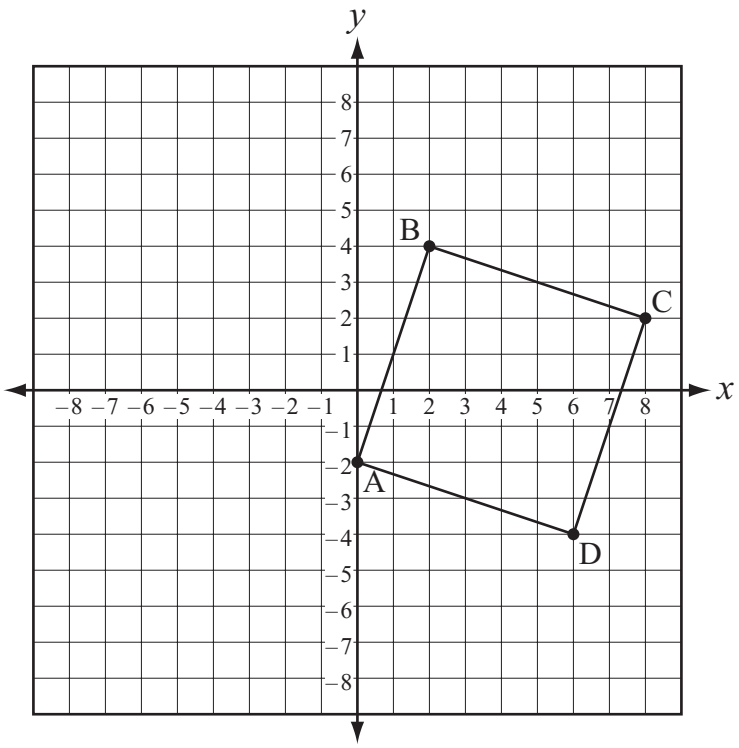
A. $\angle 1$ and $\angle 2$ are straight angles.

B. $\angle 1$ and $\angle 2$ are congruent angles.

* C. $\angle 1$ and $\angle 2$ are supplementary angles.

D. $\angle 1$ and $\angle 2$ are complementary angles.

16. The figure below shows a square with vertices A, B, C, and D.



Which statement **must** be true?

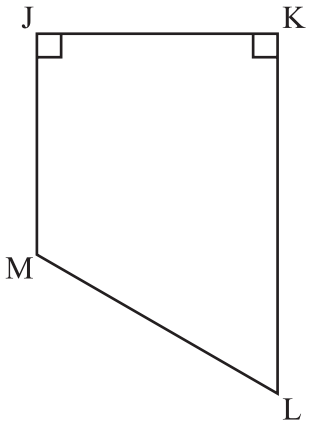
A. The slope of $\overleftrightarrow{AB}$ equals the slope of $\overleftrightarrow{BC}$.

* B. The slope of $\overleftrightarrow{BC}$ equals the slope of $\overleftrightarrow{AD}$.

C. The slope of $\overleftrightarrow{CD}$ is the opposite reciprocal of the slope of $\overleftrightarrow{AB}$.

D. The slope of $\overleftrightarrow{AD}$ is the opposite reciprocal of the slope of $\overleftrightarrow{BC}$.

17. For quadrilateral JKLM, shown below, m ∠KLM = $(2x)°$ and m ∠LMJ = $(4x)°$.



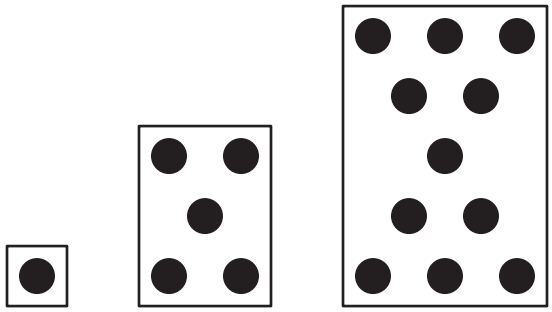
What is the value of x?

A. 15
* B. 30
C. 60
D. 75

18. Which of the following lengths could **not** be the side lengths of a triangle?

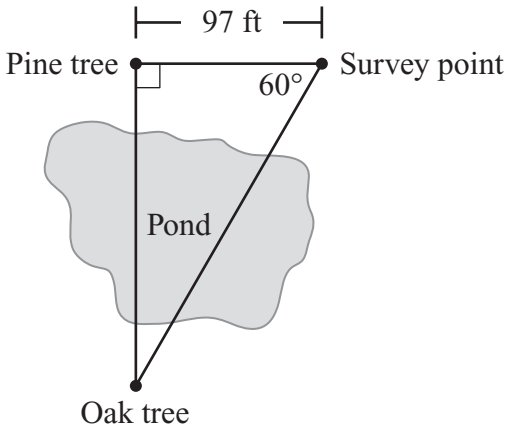
A. 0.2, 0.5, 0.6
B. 1.2, 40, 40
C. 5, 12, 13
* D. 9, 27, 81

19. If the pattern shown below continues, how many dots will appear in the 7th figure?



A. 31 dots
B. 35 dots
* C. 55 dots
D. 71 dots

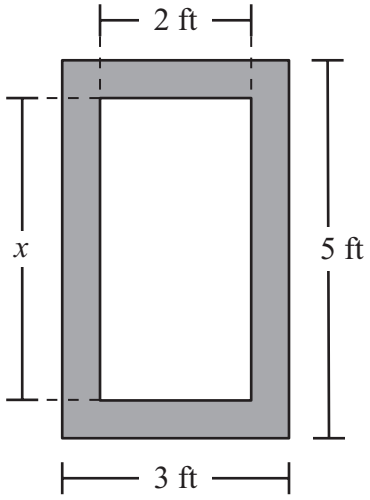
20. As an assignment, two students in a surveying class had to find the distance between two trees separated by a pond. Starting at the pine tree, they walked until they found a point at which the angle formed between the pine tree, the survey point, and the oak tree was 60°. Their sketch is shown below.



To the nearest foot, what is the distance between the pine tree and the oak tree?

* A. 168 ft
B. 194 ft
C. 291 ft
D. 336 ft

21. Toby has a rug made of a white rectangle surrounded by a dark border. The white rectangle is geometrically similar in shape to the entire rug.



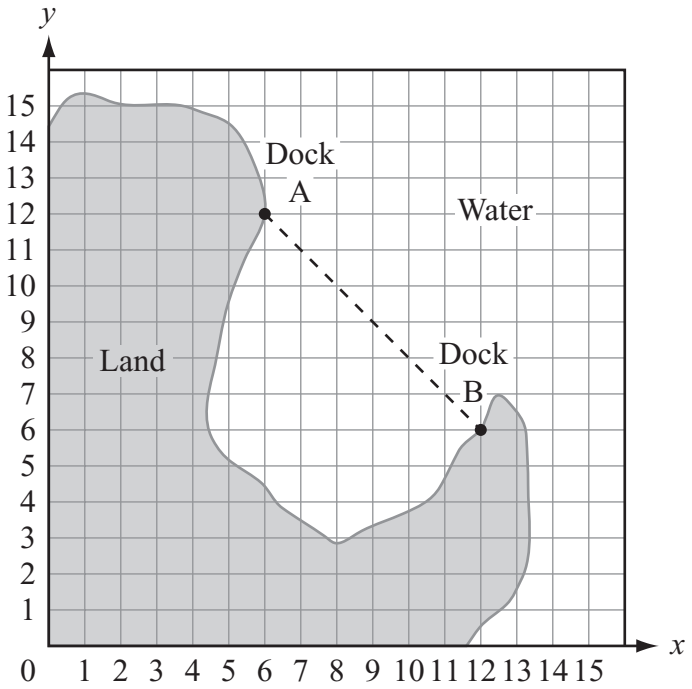
The entire rug is 3 feet wide and 5 feet long, and the white rectangle is 2 feet wide. What is x, the length of the white rectangle? Round to the nearest tenth of a foot.

A. 1.2 feet
* B. 3.3 feet
C. 6.0 feet
D. 7.5 feet

22. Johan draws a triangle that has an angle measuring 91°. What type of triangle could Johan have drawn?

A. right
B. acute
* C. isosceles
D. equilateral

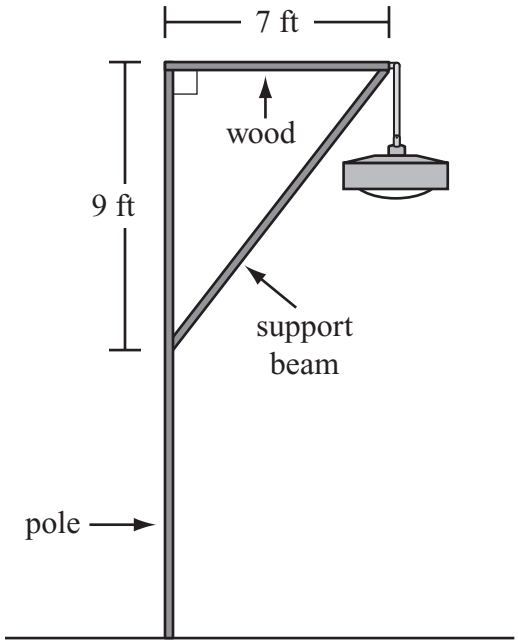
23. A crab trap is placed at the midpoint of docks A and B.



What are the coordinates of the crab trap?

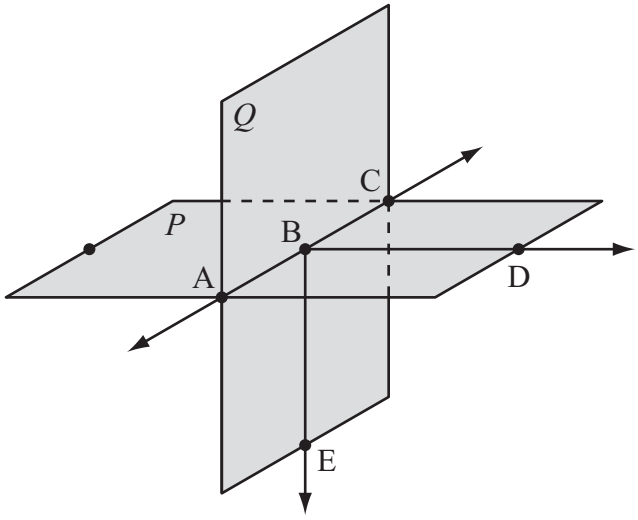
A. (3, 3)
B. (8, 10)
* C. (9, 9)
D. (10, 8)

24. A street lamp hangs from the end of a 7-foot length of wood connected to a pole. A support beam connects the end of the horizontal length of wood to the pole at a point 9 feet from the top of the pole. To the nearest tenth of a foot, how long is the support beam?



A. 5.7 ft
B. 8.0 ft
* C. 11.4 ft
D. 16.0 ft

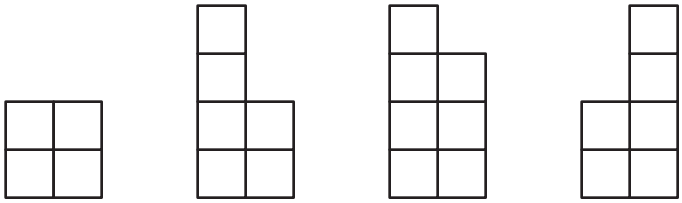
25. Planes *P* and *Q* are perpendicular to each other.



What is the intersection of planes *P* and *Q*?

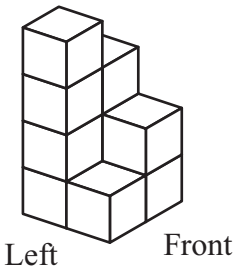
A. $\overrightarrow{BE}$
* B. $\overleftrightarrow{AC}$
C. point B
D. $\angle DBE$

Use the following views of a solid figure to answer question 26.

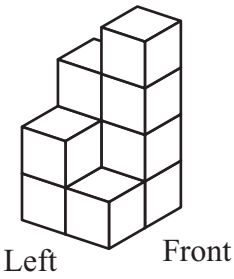


26. Which of the following shows a solid figure with these views?

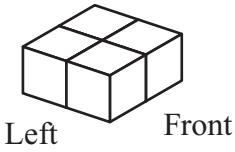
* A.



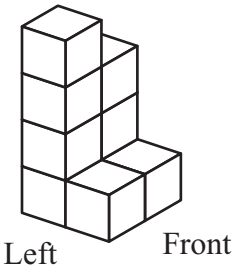
B.



C.



D.



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27. The radius of sphere *A* is 3 times the radius of sphere *B*. Which best describes the relationship between the surface area of sphere *A* and the surface area of sphere *B*?

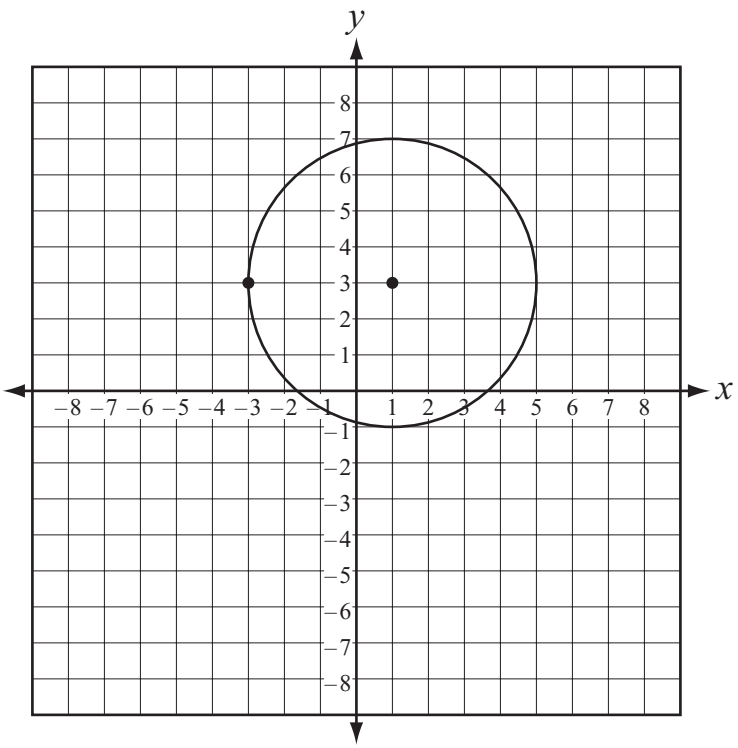
A. The surface area of *A* is $\frac{1}{9}^{th}$ of the surface area of *B*.

B. The surface area of *A* is $\frac{1}{27}^{th}$ of the surface area of *B*.

* C. The surface area of *A* is 9 times greater than the surface area of *B*.

D. The surface area of *A* is 27 times greater than the surface area of *B*.

28. A factory uses the pattern shown below to cut circles out of sheet metal to make the bottoms of buckets.



If the center of the circle is (1, 3), what is the equation of the edge of the circular pattern?

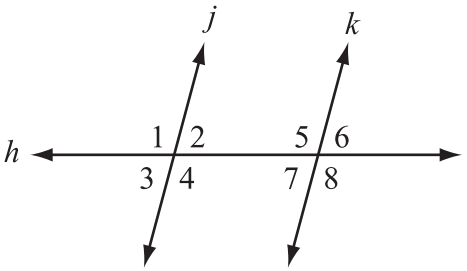
* A. $(x-1)^2+(y-3)^2=16$

B. $(x-1)^2+(y-3)^2=25$

C. $(x-3)^2+(y-1)^2=16$

D. $(x-3)^2+(y-1)^2=25$

Use the diagram below to answer question 29.



29. Which statement would make lines j and k parallel?

A. $\angle 1 \cong \angle 4$

* B. $\angle 1 \cong \angle 5$

C. $\angle 3 \cong \angle 2$

D. $\angle 3 \cong \angle 8$

30. Line m intersects line n to form a 90° angle. The equation of line m is $y = 7x - 4$. If line n passes through $(-7, -2)$, what is the equation of line n?

A. $y = 7x + 7$

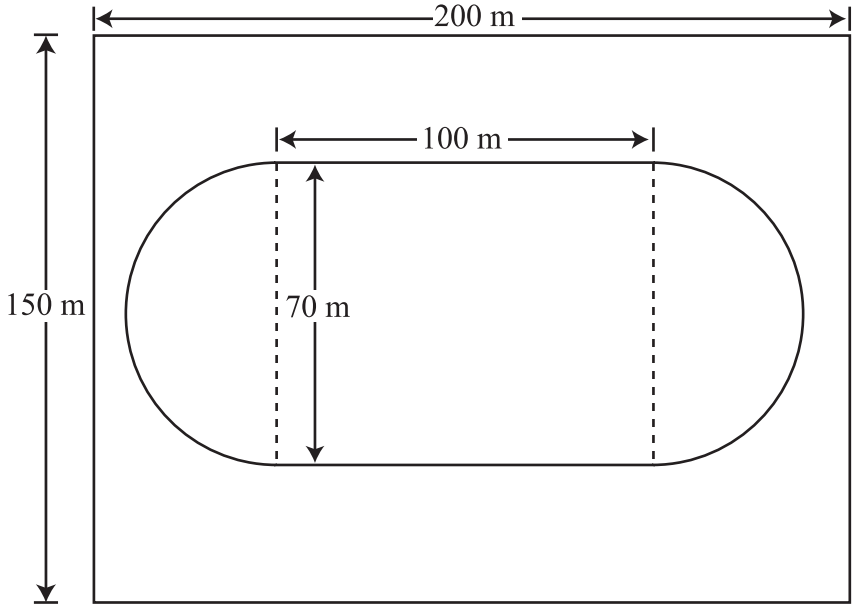
B. $y = 7x + 47$

* C. $y = -\frac{1}{7}x - 3$

D. $y = -\frac{1}{7}x - \frac{51}{7}$

PART II Mid-Year Released Geometry Items

A. A rectangular field measuring 150 meters by 200 meters contains a running track. The area enclosed by the running track is in the shape of a rectangle with semicircles on each end, as illustrated below.



1. Determine the area enclosed by the running track. Round your answer to the nearest square meter. Show your work or explain how you found your answer.

2. A bag of supplies is dropped from a helicopter and lands on the field. Assuming the bag is equally likely to land anywhere in the field, what is the probability that the bag lands **outside** the area enclosed by the running track? Round your answer to the nearest whole percent. Show your work or explain how you found your answer.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

Item A Scoring Rubric—2012 Geometry

Score	Description
4	The student earns 4 points. The response contains no incorrect work. Note: Label of "sq. m" is not required in Part 1 Label of "%" is not required in Part 2
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. In $\triangle ABC$, A is at $(-4, 1)$, B is at $(2, 4)$, and C is at $(-1, 1)$.

1. In your answer document, graph ΔABC. Make sure you label the vertices.

2. Translate ΔABC from Part 1 six units right and 1 unit up and label the vertices DEF, respectively.

3. Reflect ΔDEF in Part 2 over the *x*-axis and label the vertices RST, respectively.

4. Rotate ΔRST in Part 3 clockwise 90 degrees about the origin and label the vertices MJK, respectively.

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

Item B Scoring Rubric—2012 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: Unconnected correct points and labels for two to four triangles
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.)

Notes:

In all parts, the expected *x*- and *y*-coordinates are not required but are as follows:

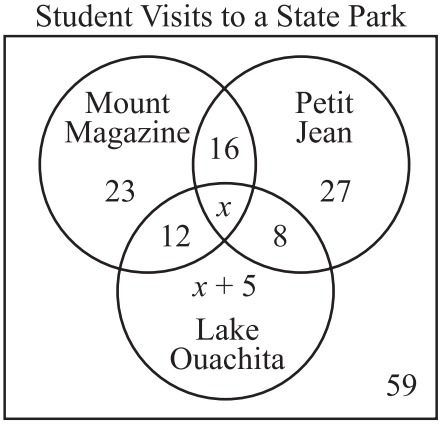
Part 1: **ΔABC :** A (–4, 1) B (2, 4) C (–1, 1)

Part 2: **ΔDEF :** D (2, 2) E (8, 5) F (5, 2)

Part 3: **ΔRST :** R (2, –2) S (8, –5) T (5, –2)

Part 4: **ΔMJK :** M (–2, –2) J (–5, –8) K (–2, –5)

C. The school newspaper conducted a survey of whether students had visited Mount Magazine State Park, Petit Jean State Park, or Lake Ouachita State Park in the past year. The results of the survey are in the Venn diagram below.



1. A total of 115 students in the survey had **not** visited Petit Jean State Park. Determine the value of x. Show your work or explain how you found your answer.

2. Determine how many students in the survey visited each of the three parks. Show your work or explain how you found your answer.

3. Determine the number of students who were surveyed. Show your work or explain how you found your answer.

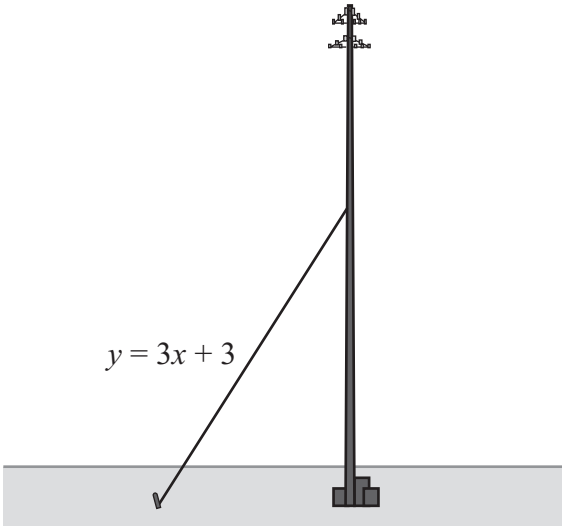
BE SURE TO LABEL YOUR RESPONSES 1, 2, AND 3.

Item C Scoring Rubric—2012 Geometry

Score	Description
4	The student earns 6 points. The response contains no incorrect work.
3	The student earns 4 – 5 points.
2	The student earns 2 – 3 points.
1	The student earns 1 point, 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.)

PART II Spring Released Geometry Items

1. The line in the diagram below represents a cable used to support a cell-phone transmission tower.



A second, longer cable will be attached to the tower above the first one. The two cables will be parallel to each other. Which could be the equation of the second cable?

A. $y = -\frac{1}{3}x + 6$

B. $y = -\frac{1}{3}x + 3$

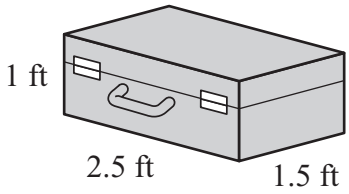
* C. $y = 3x + 6$

D. $y = 3x + 3$

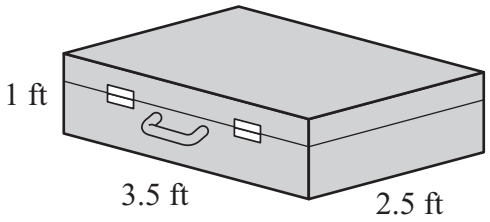
PART II Spring Released Geometry Items

2. Hannah's old suitcase has a length of 2.5 feet, a width of 1.5 feet, and a height of 1 foot. Her new suitcase has a length of 3.5 feet, a width of 2.5 feet, and a height of 1 foot.

Old Suitcase



New Suitcase

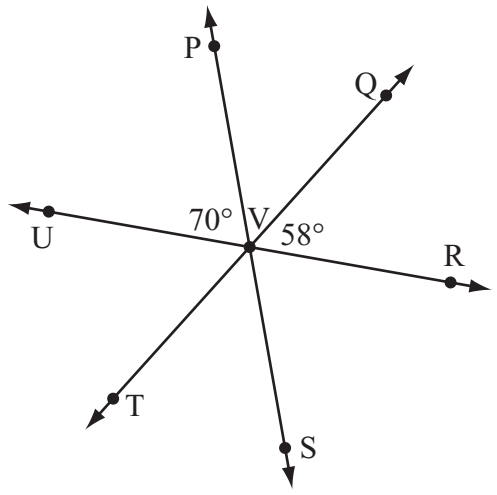


How many more cubic feet of volume does Hannah's new suitcase have than her old suitcase has?

A. $2\ ft^3$
* B. $5\ ft^3$
C. $8.75\ ft^3$
D. $14\ ft^3$

---

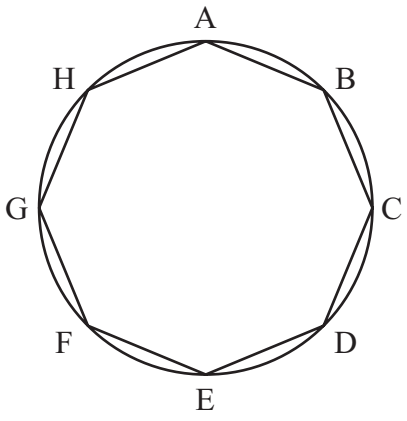
3. $\overleftrightarrow{PS}$, $\overleftrightarrow{QT}$, and $\overleftrightarrow{UR}$ intersect at point V.



What is m∠UVS?

A. 20°
B. 58°
* C. 110°
D. 128°

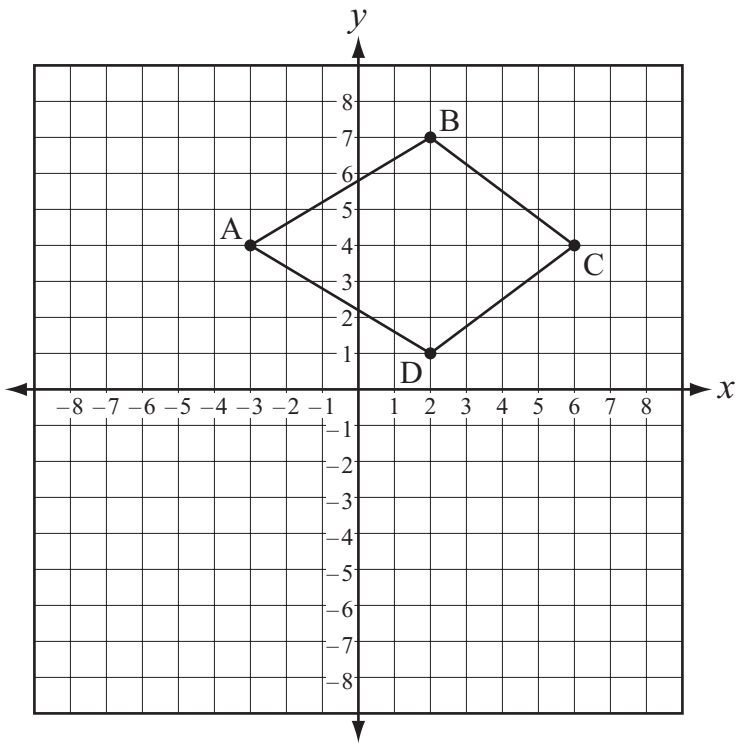
4. The figure below shows an octagon inscribed within a circle.



What is the $m\overset{\frown}{AD}$?

A. 45°
B. 90°
C. 105°
* D. 135°

5. The vertices of quadrilateral ABCD are plotted on the coordinate plane below.



What is the **most** specific name of quadrilateral ABCD?

* A. kite

B. square

C. rhombus

D. parallelogram

PART II Spring Released Geometry Items

6. If the pattern below continues, how many squares would appear in the 9th figure?

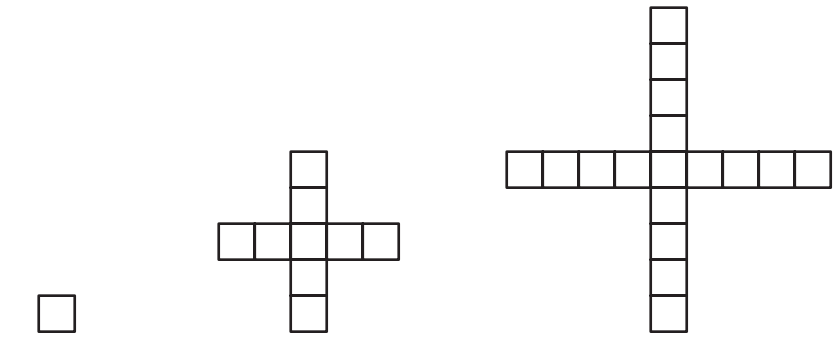


Figure 1 Figure 2 Figure 3

A. 64 squares
* B. 65 squares
C. 72 squares
D. 73 squares

---

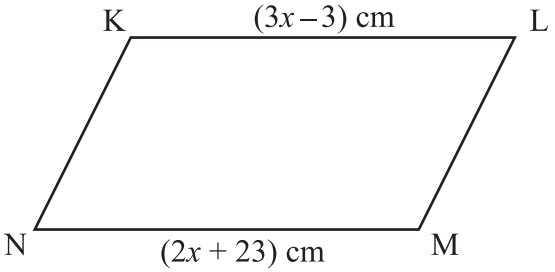
7. What is the midpoint of the line segment from (−10, −4) to (12, 2)?

* A. (1, −1)
B. (2, −2)
C. (–4, 4)
D. (–7, 7)

8. Which of the following segment lengths can be used to form a triangle?

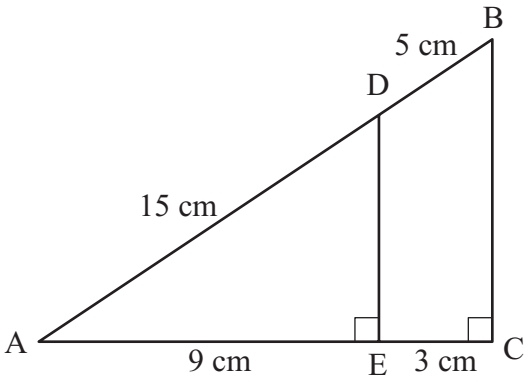
A. 2 cm, 3 cm, 5 cm
B. 2 cm, 3 cm, 13 cm
C. 2 cm, 4 cm, 7 cm
* D. 2 cm, 5 cm, 6 cm

9. In parallelogram KLMN, what is the value of x?



A. 14
B. 20
* C. 26
D. 32

10. Look at the figure below.



What is cos A?

A. $\frac{1}{3}$

B. $\frac{2}{5}$

* C. $\frac{3}{5}$

D. $\frac{3}{4}$

11. Which could be the measures of the angles of ΔJKL?

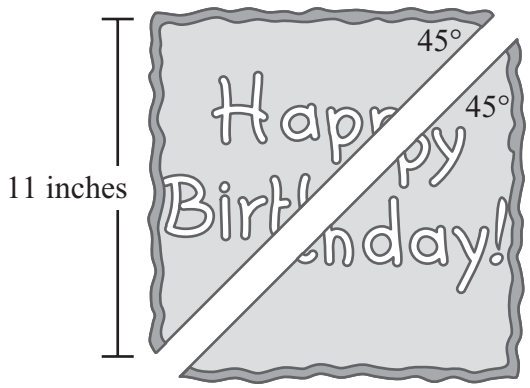
A. $m\angle J = 33°, m\angle K = 56°, m\angle L = 65°$

* B. $m\angle J = 35°, m\angle K = 45°, m\angle L = 100°$

C. $m\angle J = 130°, m\angle K = 144°, m\angle L = 194°$

D. $m\angle J = 180°, m\angle K = 180°, m\angle L = 180°$

12. Sonalee cut her square birthday cake diagonally, making two triangular sections with 45 degree angles.



If the side of the cake is 11 inches, how long is the diagonal of the cake?

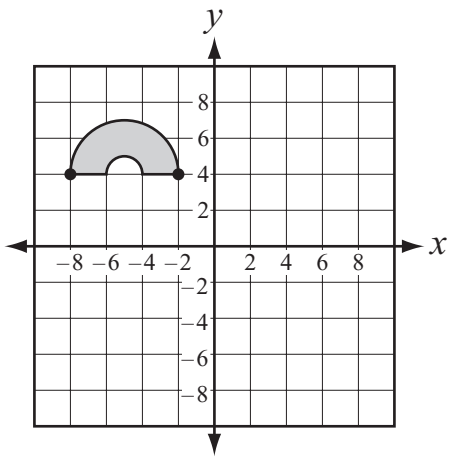
A. 5.5

B. $\frac{11}{\sqrt{2}}$

C. 11

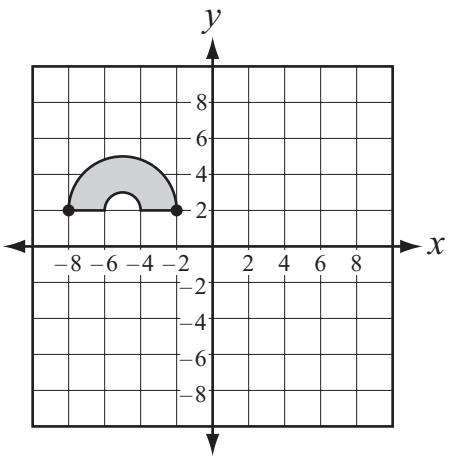
* D. $11\sqrt{2}$

13. Look at the graph below.

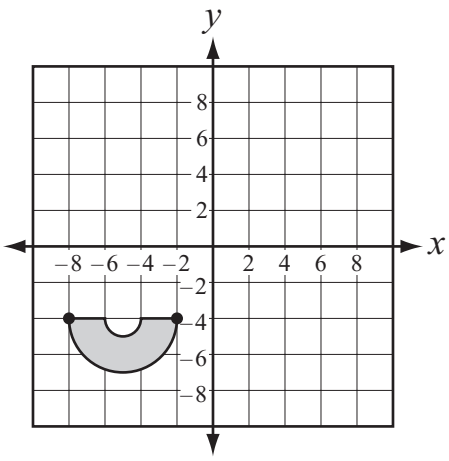


Which shows the figure below after being translated 2 units down and reflected over the *x*-axis?

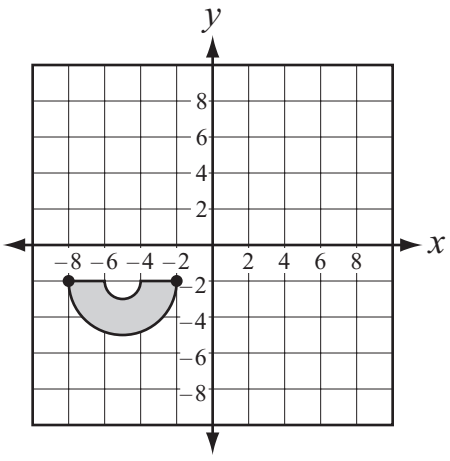
A.



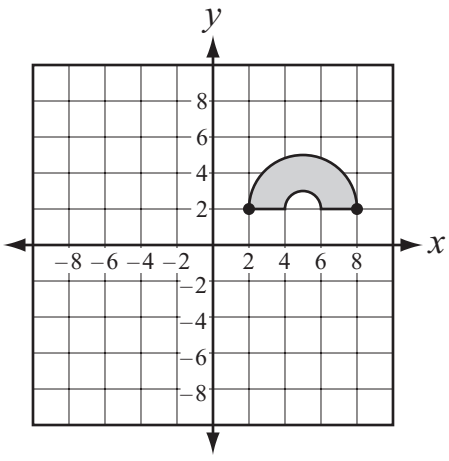
B.



* C.



D.



14. What is the equation of a circle with center at (10, 8) and a radius of 12?

A. $(x-10)^2-(y-8)^2=144$

* B. $(x-10)^2+(y-8)^2=144$

C. $(x+10)^2-(y+8)^2=144$

D. $(x+10)^2+(y+8)^2=144$

15. Brian, Paul, and Luke are brothers. Brian is 2 inches shorter than Paul. Paul is 5 inches taller than Luke. What can you conclude using deductive reasoning?

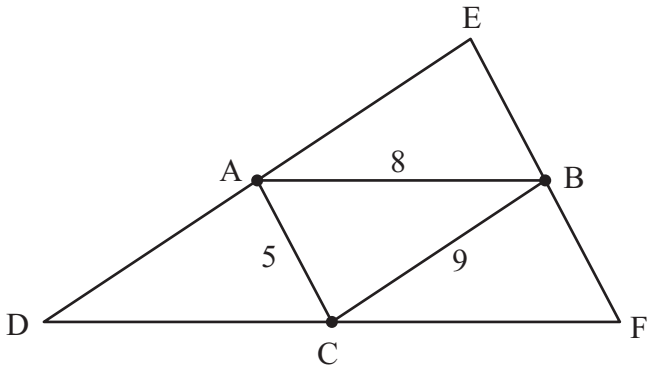
* A. Brian is 3 inches taller than Luke.

B. Luke is 7 inches shorter than Brian.

C. Brian is 1 inch taller than Luke.

D. Paul is 3 inches taller than Brian.

16. In the figure below, point A is the midpoint of $\overline{DE}$, point B is the midpoint of $\overline{EF}$, and point C is the midpoint of $\overline{DF}$.



What is the perimeter of ΔDEF?

A. 11 units

B. 22 units

* C. 44 units

D. 66 units

17. Which would be the equation of a line that passes through the point $(3, 10)$ and is perpendicular to the line with equation $y=\frac{3}{4}x+7$?

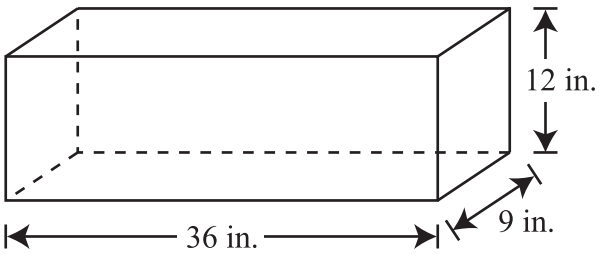
A. $y=-\frac{4}{3}x+\frac{49}{3}$

* B. $y=-\frac{4}{3}x+14$

C. $y=\frac{3}{4}x+\frac{31}{4}$

D. $y=\frac{4}{3}x+6$

18. An aquarium in the shape of a rectangular prism, as shown below, is to be filled with water up to 2 inches from the top.



How many cubic inches of water will the aquarium contain?

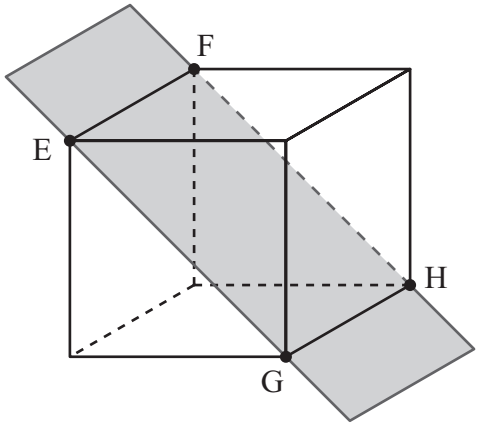
A. 648 $in.^3$

B. 1,548 $in.^3$

C. 2,380 $in.^3$

* D. 3,240 $in.^3$

19. A cube is cut by a plane that intersects corners E, F, G, and H as shown below.



What shape represents the cross-section of this intersection?

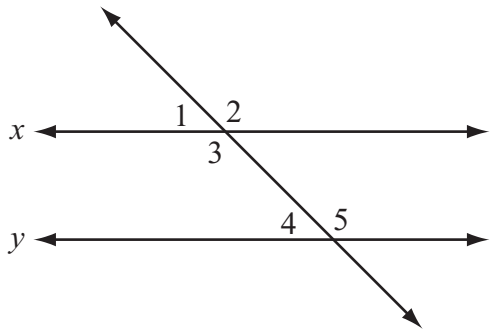
* A. rectangle

B. rhombus

C. trapezoid

D. square

20. Look at the figure below.



Which would prove that line x is parallel to line y?

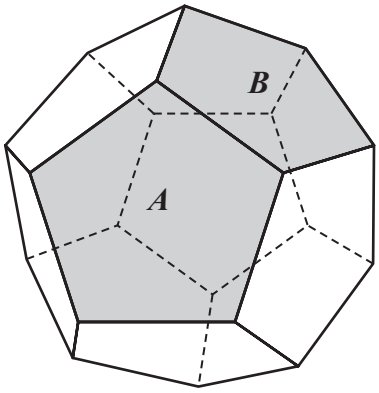
A. $m\angle 1 + m\angle 2 = 180°$

B. $m\angle 2 + m\angle 3 = 180°$

* C. $m\angle 3 + m\angle 4 = 180°$

D. $m\angle 4 + m\angle 5 = 180°$

21. The figure below is a dodecahedron, one of the Platonic Solids. The area of face A is 6 cm^2.



What is the area of face B?

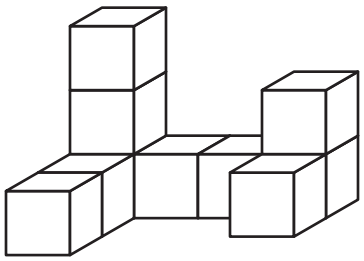
A. 3 cm^2

* B. 6 cm^2

C. 36 cm^2

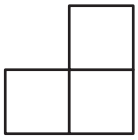
D. 72 cm^2

22. Parker built the figure below with cubes.

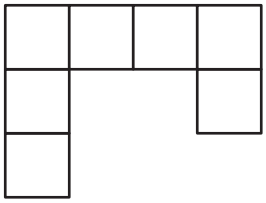


Which of the following is the right view?

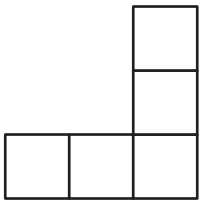
A.



B.



* C.

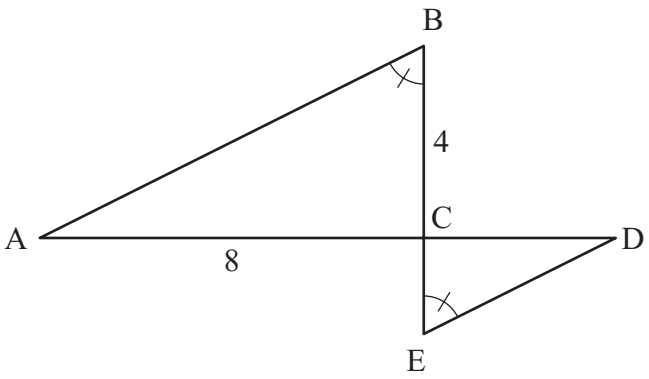


D.

23. An ocean aquarium is making an exhibit for its jellyfish. It will have two tanks in the shape of cylinders. Both cylinders will have the same radius, but one tank will be three times as tall as the other tank. What is the ratio of the volume of the short tank to the volume of the tall tank?

* A. 1:3
B. 1:6
C. 1:9
D. 1:18

24. Look at the figure below.

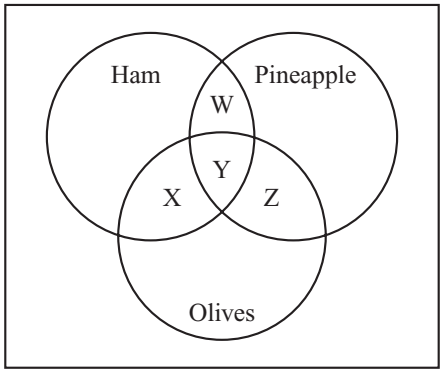


If $\overline{AD}$ is 12 inches, how many inches is $\overline{CE}$?

A. 1
* B. 2
C. 6
D. 8

25. Darius likes his pizza to have pineapple and olives but not ham.

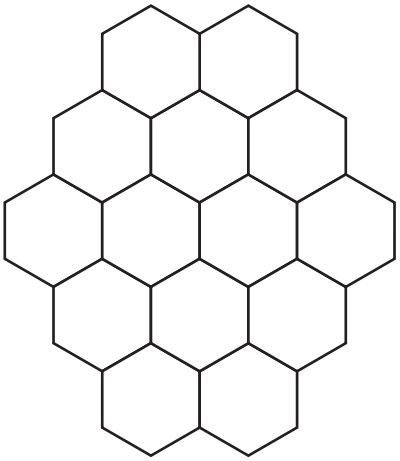
Pizza Toppings



In the Venn diagram above, which section represents what Darius likes on his pizza?

A. W
B. X
C. Y
* D. Z

26. Lori makes a tessellation using only exact copies of a single shape. The tessellation is shown below.



Why is this figure considered a tessellation?

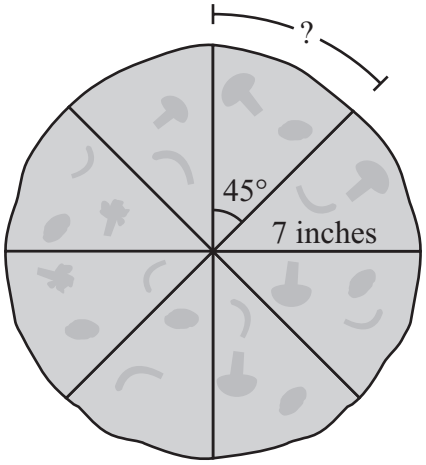
* A. because the figure has no gaps or overlaps

B. because only a hexagon can make a tessellation

C. because all polygons can be used to make tessellations

D. because tessellations can only be made of a single, repeated shape

27. Tong ordered a pizza with a radius of 7 inches. Each slice of pizza has an angle of 45°, as shown below.



What is the arc length of one slice of pizza? Use $\pi = 3.14$ and round to the nearest hundredth.

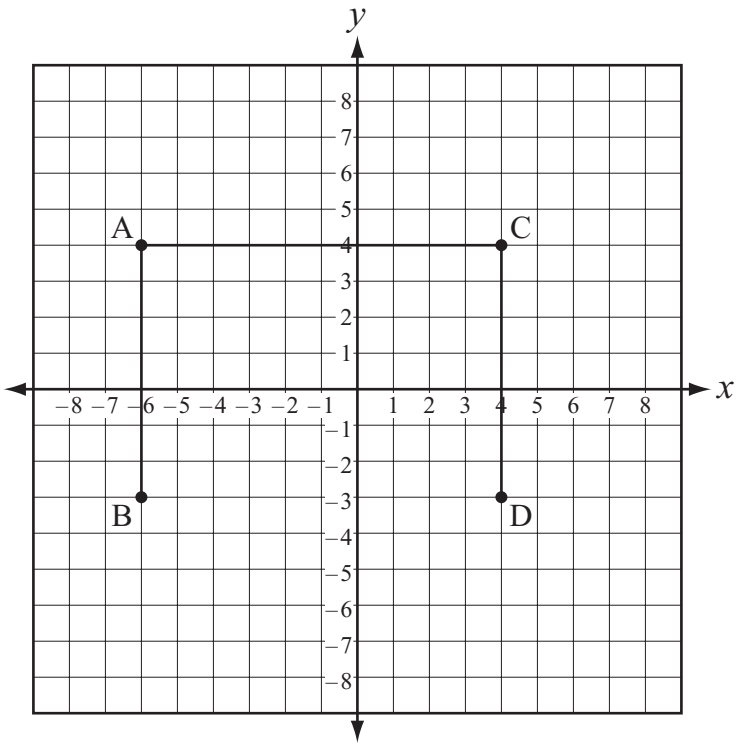
A. 2.75 inches

B. 3.86 inches

* C. 5.50 inches

D. 19.23 inches

28. Platform $\overline{AC}$ is supported by beams $\overline{AB}$ and $\overline{CD}$. Jay wants to add a third beam to help support the platform. This beam will meet $\overline{AC}$ at its midpoint, forming a right angle.



Which of the following is the equation of the line that contains the third beam?

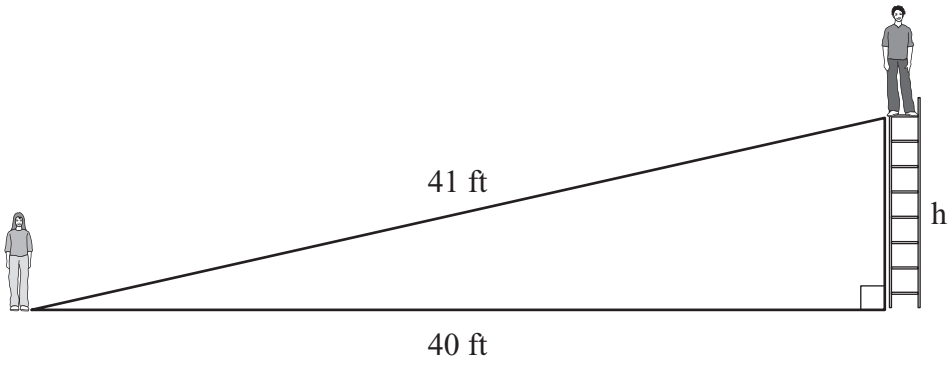
A. $x = -6$

* B. $x = -1$

C. $x = 0$

D. $x = 4$

29. Rodrigo climbs a ladder to hang a banner over a doorway. Gabriela stands on the ground 41 feet from him, giving him directions. She is standing 40 feet from the foot of the ladder.



What is the height of the ladder?

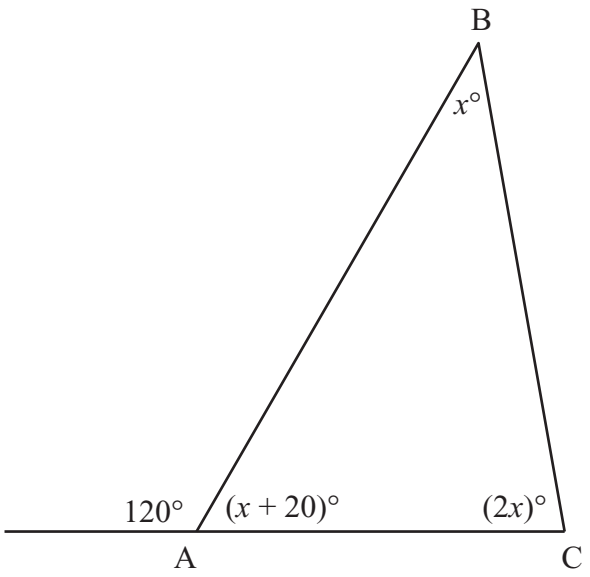
* A. 9 ft

B. 40.5 ft

C. 57 ft

D. 81 ft

30. In ΔABC below, the $m\angle A = (x + 20)°$, the $m\angle B = x°$, and the $m\angle C = (2x)°$. The exterior angle at A measures 120°.

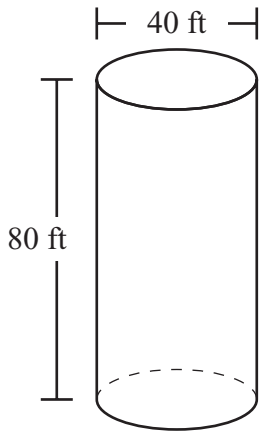


What is the value of x?

A. 20
* B. 40
C. 60
D. 80

PART II Spring Released Geometry Items

A. A manufacturing company uses cylindrical storage tanks with a diameter of 40 ft and a height of 80 ft, as shown below.



1. What is the volume of each of the storage tanks? Round your answer to the nearest cubic foot. Show or explain all work.

2. If the manufacturing company changes the diameter of the storage tanks to be 80 ft and keeps the height the same, what is the new volume of each tank? Round your answer to the nearest cubic foot. Show or explain all work.

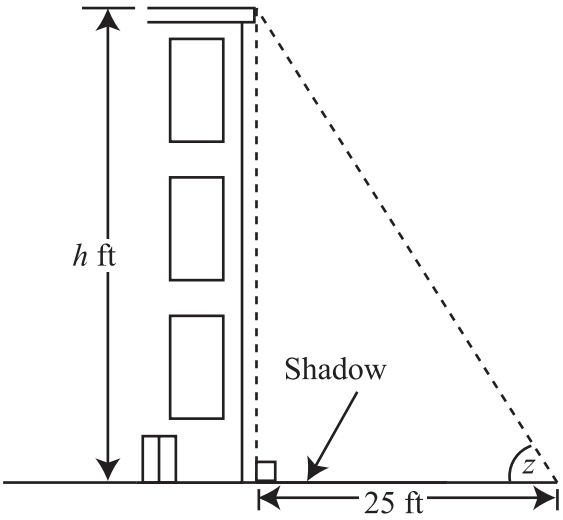
3. What should the diameter of the storage tank be if the manufacturing company wants the volume of the storage tank to be 16 times as great as the original volume and the height remains the same? Show or explain all work.

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

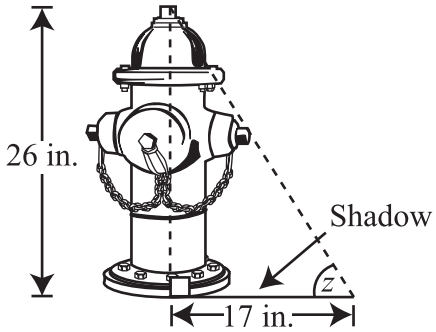
Item A Scoring Rubric—2012 Geometry

Score	Description
4	The student earns 4 points. The response contains no incorrect work. Correct label of "feet" in Part 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.)

B. Jeffrey is determining the height of a building. He takes advantage of a nearby fire hydrant and the shadows that are cast on the ground.



Building



Fire Hydrant

The fire hydrant is 26 inches tall, and the shadow cast by it is 17 inches long. The shadow cast by the building is 25 feet long, as shown above.

1. Determine the height of the building, h. Round your answer to the nearest foot. Show your work or explain how you found your answer.

2. What is the value of z, the measure of the angle of elevation to the Sun? Round your answer to the nearest degree. Show your work or explain your answer.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

Item B Scoring Rubric—2012 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.
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.)