

Arkansas Comprehensive Testing, Assessment, and Accountability Program

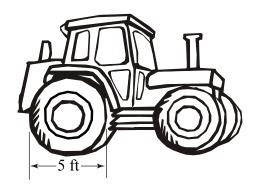
Released Item Booklet

Geometry End-of-Course Examination

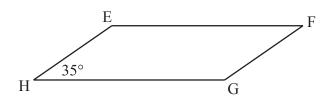
April 2007 Administration

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1. The diameter of a tractor tire is 5 feet. Rounded to the nearest hundredth, how far will the tractor move when the wheel rotates once? Use $\pi = 3.14$.

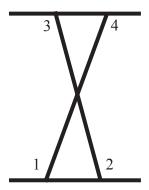


- A. 7.85 feet
- * B. 15.70 feet
 - C. 19.63 feet
 - D. 78.50 feet
- 2. What is the measure of $\angle E$ in the parallelogram below?



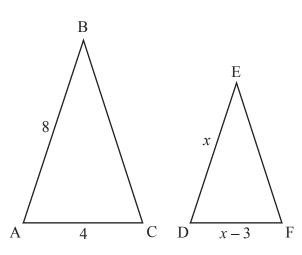
- A. 35°
- B. 55°
- * C. 145°
 - D. 155°

3. An engineer designed a steel beam, shown below. The horizontal parts that form the top and bottom are parallel. To build the cross pieces, the engineer needs to know the measure of the angles shown. The measure of $\angle 1 = 110$ degrees and m $\angle 2 = 105$ degrees. What are the measures of $\angle 3$ and $\angle 4$?



- A. $m \angle 3 = 70^{\circ}, m \angle 4 = 65^{\circ}$
- B. $m \angle 3 = 65^{\circ}, m \angle 4 = 70^{\circ}$
- C. $m \angle 3 = 110^{\circ}, m \angle 4 = 105^{\circ}$
- * D. $m \angle 3 = 105^{\circ}, m \angle 4 = 110^{\circ}$
- **4.** What is the midpoint of a segment with endpoints of (-3, 5) and (8, -17)?
 - A. (3, -6)
 - B. (5, -12)
 - * C. (2.5, -6)
 - D. (-5.5, -9.5)

5. The triangles below are similar. What is the value of x?

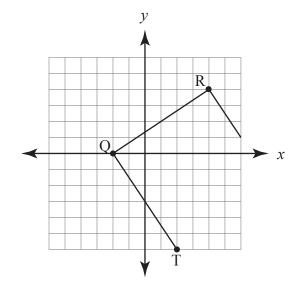


- A. -4
- B. 3
- C. 4
- * D. 6
- **6.** Lewis wrote the statements below about four constellations: Cygnus, Hercules, Leo, and Pegasus.
 - The constellation Cygnus appeared after the constellation Hercules.
 - The constellation Hercules appeared after the constellation Leo.
 - The constellation Leo appeared before the constellation Cygnus.
 - The constellation Pegasus appeared after the constellation Cygnus.

In what order did the constellations appear?

- A. Cygnus, Pegasus, Leo, Hercules
- B. Leo, Cygnus, Pegasus, Hercules
- C. Leo, Cygnus, Hercules, Pegasus
- * D. Leo, Hercules, Cygnus, Pegasus

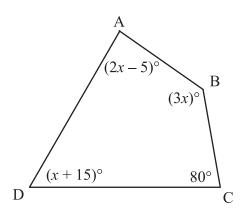
7. A portion of rectangle QRST has been graphed on a plane.



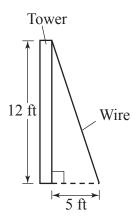
What is the slope of line RS?

- * A. $-\frac{3}{2}$
 - B. $-\frac{2}{3}$
 - C. $\frac{2}{3}$
 - D. $\frac{3}{2}$
- **8.** A meter stick is held perpendicular to the ground. It forms a shadow that is 1.8 m long. At the same time, a flagpole forms a shadow that is 7.2 m long. How tall is the flagpole?
 - A. 0.25 m
 - * B. 4 m
 - C. 9 m
 - D. 12.96 m

9. Figure ABCD below is a quadrilateral. What is the value of *x*?



- A. 15
- B. 40
- * C. 45
 - D. 65
- 10. A 12-foot tower is to be anchored by a wire running from the top of the tower to a point 5 feet from the bottom of the tower. What is the length of the wire?



- * A. 13 ft
 - B. 17 ft
 - C. 34 ft
 - D. 169 ft

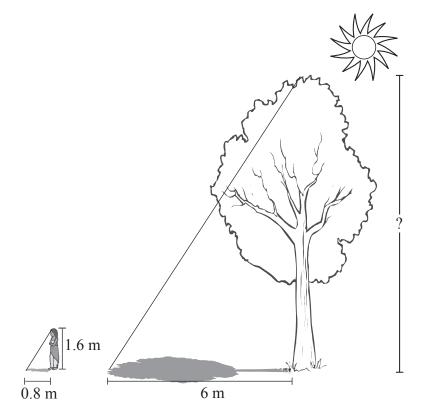
- 11. The coordinates of point A are (-2, 3). The coordinates of the midpoint of \overline{AB} are (6, 1). What are the coordinates of point B?
 - A. (2, 2)
 - B. (4, -1)
 - C. (-4, 2)
 - * D. (14, -1)
- 12. The figure below represents Pascal's Triangle. The sum of the numbers in Row 1 is 1, the sum of Row 2 is 2, and the sum of Row 3 is 4.

Row 1					1				
Row 2				1		1			
Row 3			1		2		1		
Row 4		1		3		3		1	
Row 5	1		4		6		4		1

If this pattern continues, what is the sum of the numbers in Row 7?

- A. 10
- B. 32
- * C. 64
 - D. 128
- 13. The circumference of a cylindrical fire hydrant is 33 inches. How many inches is the diameter of the fire hydrant, rounded to the nearest hundredth? Use $\pi = 3.14$.
 - A. 3.24 inches
 - B. 5.25 inches
 - C. 6.48 inches
 - * D. 10.51 inches

14. Cecelia wants to find the height of a tree by measuring shadows, as shown in the figure below. The length of the tree's shadow is 6 m long, and Cecelia's shadow is 0.8 m long. Cecelia is 1.6 m tall.



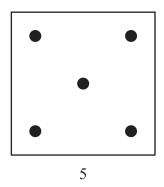
What is the height of the tree, to the nearest meter?

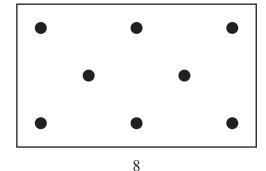
- A. 3 m
- B. 8 m
- C. 14 m
- * D. 12 m
- 15. A line is represented by the equation y = 12x + 33. Which equation represents a line that is parallel to this line?
 - A. y = 3x 8
 - * B. y = 12x 19
 - C. y = 12x + 33
 - D. $y = -\frac{1}{12}x + 7$

- **16.** Which statement is always true?
 - * A. All squares are rhombi.
 - B. All rectangles are squares.
 - C. All parallelograms are rectangles.
 - D. All quadrilaterals are parallelograms.

17. What is the 7th number in the pattern below?

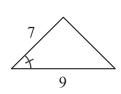






- A. 11
- * B. 20
 - C. 23
 - D. 30
- 18. Lucy measures the circumference of a circular pie pan. It is 30 inches. What is the diameter of the pie pan? Use $\pi = 3.14$.
 - A. 3.09 inches
 - B. 4.78 inches
 - C. 6.18 inches
 - * D. 9.55 inches
- **19.** Michelle is cutting pieces of wood to make shelves. Which must be true if Michelle's shelves are rectangular?
 - * A. The diagonals are congruent.
 - B. There are four congruent sides.
 - C. The diagonals are perpendicular.
 - D. The consecutive interior angles are not congruent.

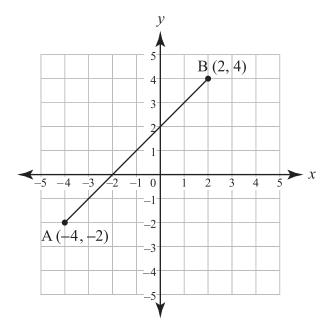
20. Which theorem can be used to show that the two triangles below are congruent?





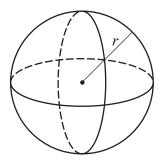
- A. AAA
- B. ASA
- * C. SAS
 - D. SSS

21. Which are the coordinates of the midpoint of AB shown below?



- A. (-2, 2)
- * B. (-1, 1)
 - C. (1,-1)
 - D. (0, 2)
- **22.** Ray AB is an angle bisector of ∠FAC. Which statement must be true?
 - A. Angle FAB and \angle BAC each measure 45° .
 - B. Angle FAB and ∠BAC are complementary angles.
 - C. Angle FAB and ∠BAC are a linear pair.
 - * D. Angle FAB and ∠BAC are congruent.

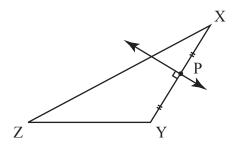
23. The surface area of the sphere below is $4\pi r^2$. If the radius were to be divided by 2, how would the surface area be affected?



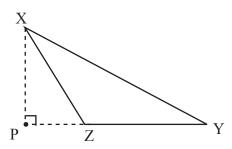
- A. The surface area would be 16 times smaller.
- B. The surface area would be 8 times smaller.
- * C. The surface area would be 4 times smaller.
 - D. The surface area would be 2 times smaller
- **24.** Which **best** describes an orthographic drawing of the top view of a cone?
 - A. a point
 - B. a sphere
 - C. a triangular shape
 - * D. a circle with a point in the center

25. In which figure is point P on a perpendicular bisector of the triangle?

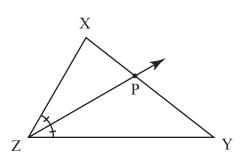
*A.



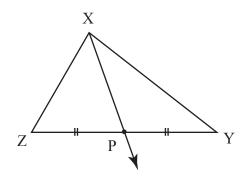
B.



C.

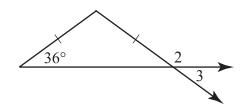


D.



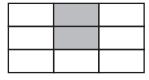
- **26.** What is the measure of each interior angle of a regular decagon?
 - A. 126°
 - * B. 144°
 - C. 162°
 - D. 180°
- 27. The equation of a circle in standard form is $(x-3)^2 + (y+6)^2 = 25$. What is the center point of the circle?
 - * A. (3, -6)
 - B. (-3, 6)
 - C. (6, -3)
 - D. (-6, 3)

28. What is the ratio of $m \angle 2$ to $m \angle 3$?

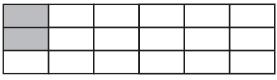


- A. $\frac{36}{36}$
- B. $\frac{144}{108}$
- C. $\frac{108}{36}$
- * D. $\frac{144}{36}$

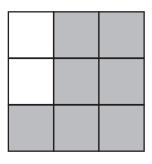
29. Below are four targets that will be used for the beanbag toss at the school carnival. Assuming the beanbag hits the target, which target has a $\frac{2}{9}$ probability of the beanbag landing on a shaded section?



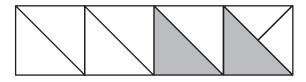
Target 1



Target 2

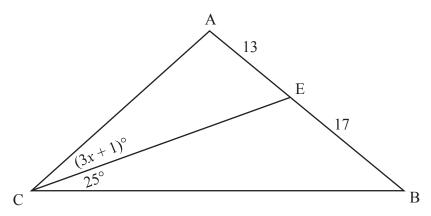


Target 3



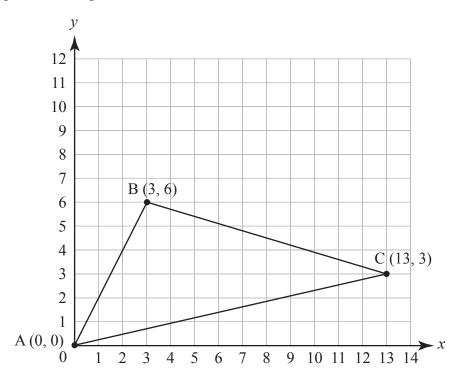
Target 4

- * A. Target 1
 - B. Target 2
 - C. Target 3
 - D. Target 4
- **30.** In the figure below, \overline{CE} is an angle bisector. What is the value of x?

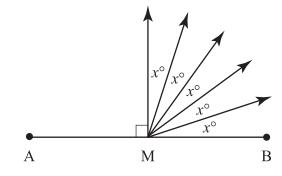


- A. 4
- * B. 8
 - C. 13
 - D. 25

31. What is the length of the longest side of $\triangle ABC$?

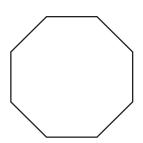


- A. $\sqrt{45}$
- B. $\sqrt{109}$
- * C. $\sqrt{178}$
 - D. $\sqrt{256}$
- **32.** Point M is located on \overline{AB} . What is the value of x?



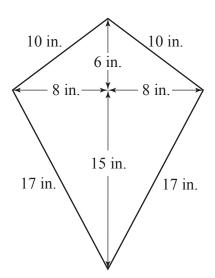
- * A. 18
 - B. 36
 - C. 90
 - D. 180

33. The polygon below is a regular octagon. What is the measure of each exterior angle?

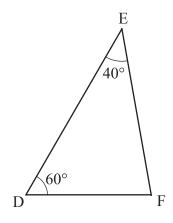


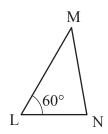
- A. 40°
- * B. 45°
 - C. 60°
 - D. 360°

34. Isaac's kite is shown below. What is the total area of Isaac's kite?



- A. 91 in.²
- * B. 168 in.²
 - C. 216 in.²
 - D. 336 in.²
- **35.** What is the measure of $\angle N$, given that $\triangle DEF \sim \triangle LMN$ as shown below?





- A. 40°
- B. 60°
- * C. 80°
 - D. 100°

36. Which equation represents a line parallel to the line y = 2x + 7?

A.
$$y = -\frac{1}{2}x - 3$$

$$B. \quad y = \frac{1}{2}x + 7$$

C.
$$y = -2x + 7$$

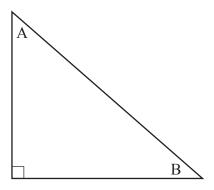
* D.
$$y = 2x - 3$$

37. Shavon and Joe designed the target below for the water balloon toss at the school carnival. Assuming the water balloon hits the target, what is the probability that it will hit a "0"?

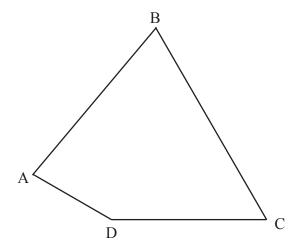
	1	1	1	1	1
	1	2	2	2	1
	1	2	3	2	1
0	1	2	2	2	1
	1	1	1	1	1
	0	0	0	0	0

- A. $\frac{2}{9}$
- B. $\frac{4}{9}$
- C. $\frac{6}{36}$
- * D. $\frac{11}{36}$

38. In the triangle below, angles A and B may be classified as what type of angles?

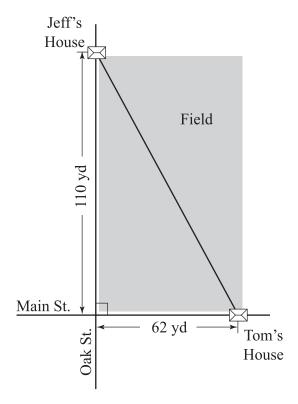


- * A. complementary
 - B. supplementary
 - C. linear
 - D. right
- 39. In the figure below, $m\angle A = 80$ degrees, $m\angle B = 70$ degrees, and $m\angle D = 150$ degrees. What is the measure of $\angle C$?



- A. 50°
- * B. 60°
 - C. 70°
 - D. 80°

40. Jeff lives on Oak Street, and Tom lives on Main Street.

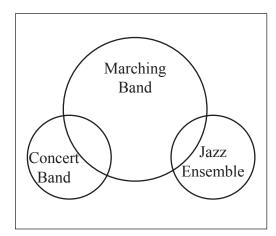


How much farther, to the nearest yard, is it for Tom to walk down Main Street and turn on Oak Street to get to Jeff's house than if he travels the shortest distance between the houses through an empty field?

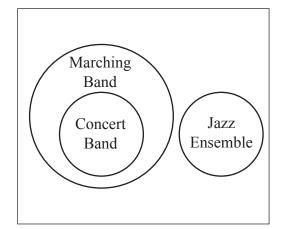
- * A. 46 yd
 - B. 48 yd
 - C. 126 yd
 - D. 172 yd

41. At a certain university, all members of the concert band are in the marching band. Some members of the jazz ensemble are also in the marching band, but none of them are in the concert band. Which Venn diagram represents the relationship described?

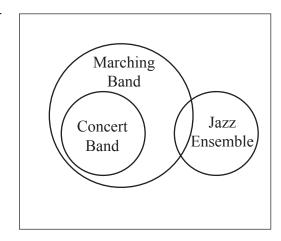
A.



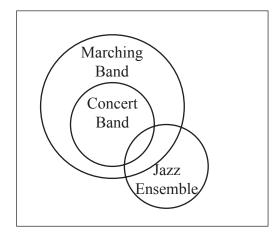
В.



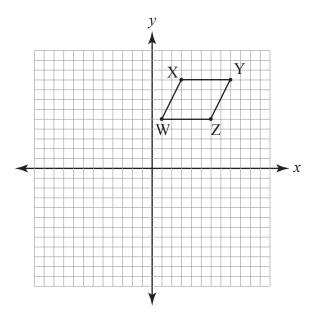
* C.



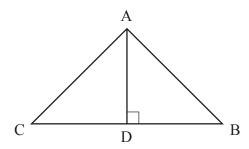
D.



42. If the parallelogram below were translated 3 units left and 6 units down, what would be the coordinates of the new image W'X'Y'Z'?

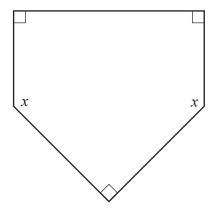


- * A. W'(-2,-1), X'(0,3), Y'(5,3), Z'(3,-1)
 - B. W'(-1, -2), X'(3, 0), Y'(3, 5), Z'(-1, 3)
 - C. W'(4,-1), X'(6,3), Y'(11,3), Z'(9,-1)
 - D. W'(7, 8), X'(9, 12), Y'(14, 12), Z'(12, 8)
- 43. Segment AD is the perpendicular bisector of \overline{BC} . Which statement must be true?



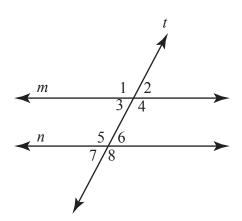
- A. The triangle must be an equilateral triangle.
- B. Segment AD must be half as long as \overline{BC} .
- * C. Segment CD must be congruent to \overline{BD} .
 - D. Segment AD must be congruent to \overline{BD} .

44. The home plate used in a baseball game is a pentagon with three right angles. The other two angles are congruent.



What is the value of x?

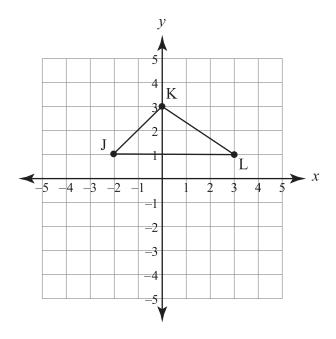
- A. 108°
- * B. 135°
 - C. 225°
- D. 270°
- **45.** Two parallel lines, m and n, are cut by transversal t, as shown in the figure below.



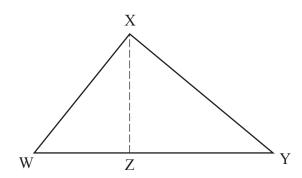
If $m\angle 4 = 2x - 5$ and $m\angle 6 = 3x + 20$, what is the value of x?

- A. –25
- B. 15
- * C. 33
 - D. 165

46. Triangle JKL is translated 4 units left and 5 units up. What are the coordinates of the image of point J?

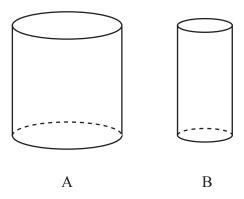


- A. (2, 6)
- B. (3, -3)
- * C. (-6, 6)
 - D. (-2, 6)
- 47. In the figure below, m $\angle XZY$ is 90 degrees. What term accurately describes \overline{XZ} ?



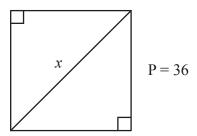
- * A. altitude
 - B. median
 - C. diagonal
 - D. perpendicular bisector

48. Cylinders A and B have the same height. The radius of cylinder A is twice the radius of cylinder B.



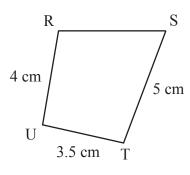
How does the volume of cylinder A compare to the volume of cylinder B?

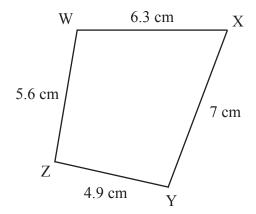
- A. Cylinder A has $\frac{1}{2}$ the volume of cylinder B.
- B. Cylinder A has twice the volume of cylinder B.
- * C. Cylinder A has 4 times the volume of cylinder B.
 - D. Cylinder A has 8 times the volume of cylinder B.
- **49.** The perimeter of the square below is 36. What is the length of the diagonal, *x*?



- A. 6
- B. 9
- C. $6\sqrt{2}$
- * D. $9\sqrt{2}$

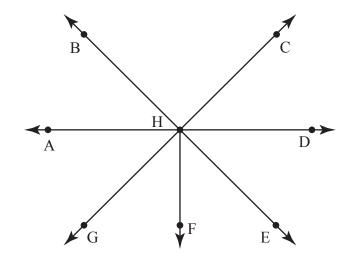
50. In the figure below, RSTU ~ WXYZ.





What is the length of \overline{RS} ?

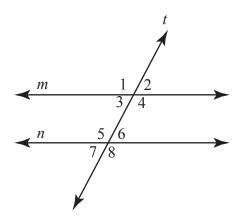
- A. 4.3 cm
- * B. 4.5 cm
 - C. 4.7 cm
 - D. 4.9 cm
- **51.** In the figure below, lines BE, CG, and AD, as well as ray HF, intersect at point H.



Which pair of angles must be congruent?

- * A. ∠CHD and ∠AHG
 - B. ∠CHD and ∠EHD
 - C. ∠BHC and ∠GHF
 - D. ∠FHE and ∠EHG

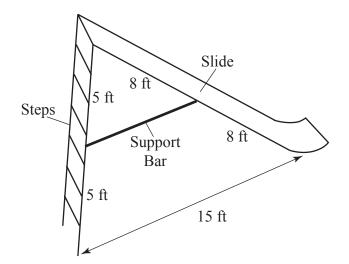
52. Two parallel lines, m and n, are cut by a transversal, t, as shown in the figure below.



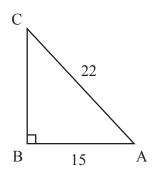
If $m\angle 2 = 2x + 7$ and $m\angle 7 = 3x - 13$, what is the measure of $\angle 7$?

- A. 20
- B. 37
- * C. 47
 - D. 133

53. A playground slide has a support bar attached at the midpoint of the steps and the midpoint of the slide, as shown in the figure below. What is the length of the support bar?

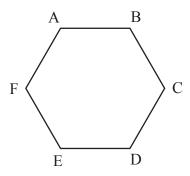


- A. $6\frac{1}{2}$ ft
- * B. $7\frac{1}{2}$ ft
 - C. 13 ft
 - D. 14 ft
- **54.** What is the **approximate** measure of $\angle A$ in the figure below?



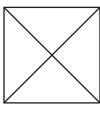
- A. 30°
- B. 34°
- C. 43°
- * D. 47°

55. ABCDEF is a regular hexagon.

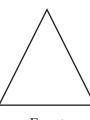


What is the measure of each interior angle in ABCDEF?

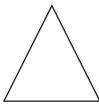
- A. 60°
- * B. 120°
 - C. 180°
 - D. 720°
- **56.** The top, front, and right views of a three-dimensional figure are shown below.



Top



Front

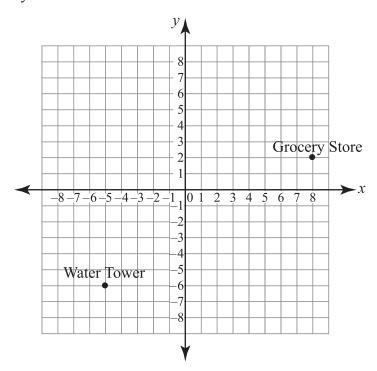


Right

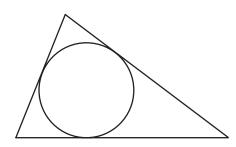
What is the **correct** name for this figure?

- A. tetrahedron
- B. square prism
- * C. square pyramid
 - D. triangular pyramid

57. The city of Jefferson's system of street blocks is shown below.



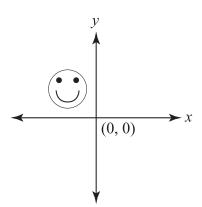
- Rounded to the nearest tenth, what is the distance from the water tower to the grocery store?
- A. 10.2
- * B. 15.3
- C. 21.0
- D. 25.0
- **58.** What is the relationship between the triangle and the circle in the figure below?

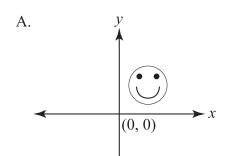


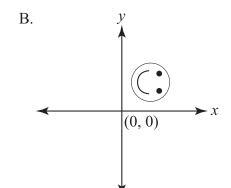
- * A. The circle is inscribed in the triangle.
 - B. The triangle is inscribed in the circle.
 - C. The circle is concentric with the triangle.
 - D. The circle is circumscribed about the triangle.

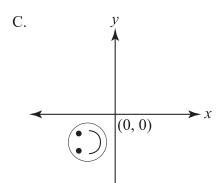
- **59.** Jane is designing a rectangular garden with an area of 36 ft². What dimensions should the garden have in order to use the **least** amount of fencing?
 - * A. $6 \text{ ft} \times 6 \text{ ft}$
 - B. $9 \text{ ft} \times 4 \text{ ft}$
 - C. $12 \text{ ft} \times 3 \text{ ft}$
 - D. $18 \text{ ft} \times 2 \text{ ft}$

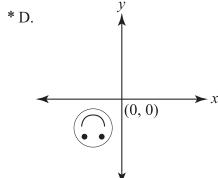
60. What would the figure below look like if it were reflected over the *x*-axis?











GEOMETRY OPEN-RESPONSE ITEM A

A. The coordinates for the vertices of quadrilateral GHIJ are given in the table below.

Vertex	Coordinates
G	(-4, 0)
Н	(0, 3)
I	(4, 1)
J	(4, -4)

- 1. On the grid provided in your answer document, plot the vertices of quadrilateral GHIJ. Connect the vertices to form a quadrilateral.
- 2. Find the slopes of \overline{GJ} and \overline{HI} and use the slopes to make a conclusion about the relationship between the segments. Show all of your work and/or explain your answer.
- 3. Find the lengths of \overline{GH} and \overline{IJ} and use the lengths of the segments to make a conclusion about the relationship between the segments. Show all of your work and/or explain your answer.
- 4. What type of quadrilateral is GHIJ? Be as specific as possible and use your answers from Parts 2 and 3 to support your answer.

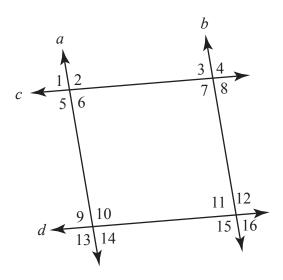
BE SURE TO LABEL YOUR RESPONSES 1, 2, 3, AND 4.

RUBRIC FOR GEOMETRY OPEN-RESPONSE ITEM A

SCORE	DESCRIPTION
4	The student earns 5 points. The response contains no incorrect work.
3	The student earns 3 ½–4 ½ points.
2	The student earns 2–3 points.
1	The student earns ½-1½ points, or some minimal understanding is shown. Ex: One correct slope in Part 2 with no work shown.
0	The student earns 0 points. No understanding is shown. Ex: $IJ = 5$, if points I and J are plotted correctly with work missing.
В	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

GEOMETRY OPEN-RESPONSE ITEM B

B. Lines a, b, c, and d are shown in a plane below.



- 1. Name one angle that must be congruent to $\angle 1$ in order to prove that $a \parallel b$. Explain your reasoning.
- 2. Name one angle that must be congruent to $\angle 1$ in order to prove that $c \parallel d$. Explain your reasoning.
- 3. If $a \parallel b$ and $c \parallel d$, what is the relationship between $\angle 9$ and $\angle 4$? Explain your reasoning.
- 4. The measure of $\angle 13$ equals (6x + 40) degrees and the measure of $\angle 16$ equals (120 4x) degrees. If $a \parallel b$, what is the value of x? Show your work and/or explain your answer.

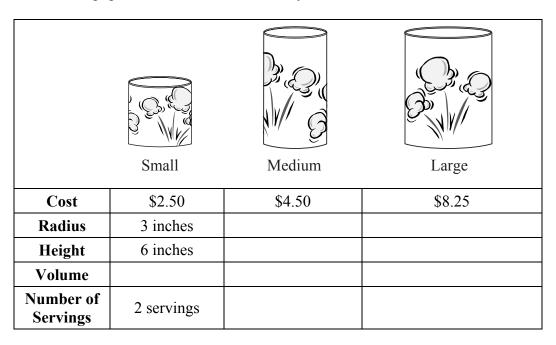
BE SURE TO LABEL YOUR RESPONSES 1, 2, 3, AND 4.

RUBRIC FOR GEOMETRY OPEN-RESPONSE ITEM B

SCORE	DESCRIPTION
4	The student earns 5 points. The response contains no incorrect work.
3	The student earns 3 ½–4 ½ points.
2	The student earns 2–3 points.
1	The student earns ½-1 ½ points, or some minimal understanding is shown. Ex: Correct angle is given in Parts 1 and 2 with incorrect explanation. Ex: Correct relationship is given in Part 3 with incorrect explanation.
0	The student earns 0 points. No understanding is shown.
В	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

GEOMETRY OPEN-RESPONSE ITEM C

C. A movie theater sells popcorn in 3 different sizes of cylindrical tubs.



- 1. In your answer document, copy and complete the table above using the following information. Show all of your work and/or explain your answer.
 - The medium tub has the same radius as the small tub, but it holds 1.5 times as much popcorn as the small tub.
 - The radius of the large tub of popcorn is 1.5 times the radius of the small tub. The height of the large tub is 1.5 times the height of the small tub.
- 2. A family of 6 people goes to the movies. What is the **least** expensive way to purchase a serving of popcorn for each person? Show all of your work and/or explain your answer.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

RUBRIC FOR GEOMETRY OPEN-RESPONSE ITEM C

SCORE	DESCRIPTION
4	The student earns 5 points. The response contains no incorrect work. Units are not required, but must be correct if included in student work.
3	The student earns 3 ½–4 ½ points.
2	The student earns 2–3 points.
1	The student earns ½–1 ½ points, or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
В	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

GEOMETRY OPEN-RESPONSE ITEM D

D. Jason, Patrick, and Bryce are learning to weld metal in their Industrial Technology class. Their project is to weld together metal rods of **different** lengths in order to form triangles. Their teacher gives each boy 4 rods of varying lengths, as shown in the table below.

Name	Lengths of Rods (in inches)			
Jason	5	3	12	4
Patrick	16	15	4	9
Bryce	7	2	10	19

Each boy can choose 3 of his rods to weld together, but they must form a triangle.

- 1. Explain the theorem that the boys can use in order to determine which 3 of their 4 rods should be welded together to make the triangle.
- 2. For each boy, determine one possible combination of his 3 metal rods that can be welded together to form the triangle. Show that this combination obeys the theorem from Part 1. If there are no combinations for any one of the boys, provide work to support your conclusion.

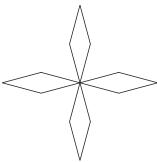
BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

RUBRIC FOR GEOMETRY OPEN-RESPONSE ITEM D

SCORE	DESCRIPTION
4	The student earns 4 points. The response contains no incorrect work. Units are not required, but must be correct if included in student work.
3	The student earns 3–3 ½ points.
2	The student earns 2–2 ½ points.
1	The student earns ½–1 ½ points, or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
В	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

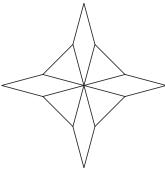
GEOMETRY OPEN-RESPONSE ITEM E

E. Jessica is making a window ornament from pieces of stained glass in the shapes of rhombi and triangles. Jessica begins the ornament with four rhombus-shaped pieces arranged at equal rotations around a center point, as shown below.



1. The smallest angles of each rhombus piece measure 30 degrees. In your answer document, draw one of the rhombi pieces and label all of its angle measures. Show all of your work and/or explain your answer.

Next, Jessica places triangular pieces between the rhombi pieces, connecting the vertices formed by the largest angles of each rhombus, as shown below.



2. In your answer document, draw one of the triangular pieces. Label all of its angle measures. Show all of your work and/or explain your answer.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

RUBRIC FOR GEOMETRY OPEN-RESPONSE ITEM E

SCORE	DESCRIPTION
4	The student earns 5 points. The response contains no incorrect work. The label of "degrees" or "o" is included somewhere in the response. An explanation of why the measures of the center angles of one triangle + one rhombus = 90° is included in Part 2.
3	The student earns 4 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.
В	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)