



Arkansas Comprehensive Testing, Assessment, and Accountability Program

**RELEASED ITEM**  
**BOOKLET**  
**Geometry**  
**End-of-Course Examinations**  
**2013–2014 Administrations**

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**Arkansas Department of Education**



# TABLE OF CONTENTS

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	PAGE
<b>PART I</b>	
Overview .....	4
Scoring Student Responses to Geometry Open-Response Items .....	5
<b>PART II</b>	
Mid-Year Released Geometry Items .....	6
Spring Released Geometry Items .....	28
End-of-Course Mathematics Reference Sheet .....	46
<b>PART III</b>	
Curriculum Framework .....	47
<b>PART IV</b>	
Item Correlation with Curriculum Framework .....	49
Mid-Year Released Geometry Items .....	49
Spring Released Geometry Items .....	50
Mid-Year Non-Released Geometry Items .....	51
Spring Non-Released Geometry Items .....	52

## PART I OVERVIEW

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The criterion-referenced tests implemented as part of the **Arkansas Comprehensive Testing, Assessment, and Accountability Program (ACTAAP)** are being developed in response to Arkansas Legislative Act 35, which requires the State Board of Education to develop a comprehensive testing program that includes assessment of the challenging academic content standards defined by the Arkansas Curriculum Frameworks.

As part of this program, students in Arkansas public schools in 2014 who had completed or were completing Geometry by the end of first semester participated in the *Mid-Year Geometry End-of-Course Examination*. Students in Arkansas public schools who had completed or were completing Geometry by the end of the spring semester participated in the *Spring Geometry End-of-Course Examination*.

This Released Item Booklet for the Geometry End-of-Course Examinations contains test questions or items that were asked of students during the 2013–2014 operational administrations. The test items included in Part II of this booklet are some of the items that contributed to the student performance results for these administrations.

Students were given approximately an hour and a half each day to complete assigned test sessions during the two days of Mid-Year testing. Students were given approximately two hours each day to complete assigned test sessions during the two days of Spring testing. Students were permitted to use a calculator for both multiple-choice and open-response items. Students were also supplied with a reference sheet to be used so that all students would have equal access to this information during testing. (See the reference sheet on page 46 of this booklet.) All of the multiple-choice items within this booklet have the correct response marked with an asterisk (\*).

The development of the Geometry End-of-Course Examinations was based on the *Arkansas Geometry Mathematics Curriculum Framework*. This framework has distinct levels: Strands to be taught in concert, Content Standards within each Strand, and Student Learning Expectations within each Content Standard. An abridged version of the *Arkansas Geometry Mathematics Curriculum Framework* can be found in Part III of this booklet. It is important to note that this abridged version lists only the predominant Strand, Content Standard, and Student Learning Expectation associated with each item. However, since many key concepts within the *Arkansas Geometry Mathematics Curriculum Framework* are interrelated, in many cases there are other item correlations or associations across Strands, Content Standards, and Student Learning Expectations.

Part IV of the Released Item Booklet contains a tabular listing of the Strand, Content Standard, and Student Learning Expectation that each question was designed to assess. The multiple-choice and open-response items found on the Geometry End-of-Course Examinations were developed in close association with the Arkansas education community. Arkansas teachers participated as members of the Geometry Content Advisory Committee, providing routine feedback and recommendations for all items. The number of items associated with specific Strands, Content Standards, and Student Learning Expectations was based on approximate proportions suggested by the Content Advisory Committee, and their recommendations were accommodated to the greatest extent possible given the overall test design. Part IV of the Released Item Booklet provides Arkansas educators with specific information on how Geometry End-of-Course Examination items align or correlate with the *Arkansas Geometry Mathematics Curriculum Framework* to provide models for classroom instruction.

## **PART I SCORING STUDENT RESPONSES TO GEOMETRY OPEN-RESPONSE ITEMS**

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While multiple-choice items are scored by machine to determine if the student chose the correct answer from four options, responses to open-response items must be scored by trained “readers” using a pre-established set of scoring criteria. Readers are trained to score in only one content area. Qualified readers for Arkansas scoring will be those with a four-year college degree in mathematics, education, or related fields.

The Arkansas Geometry Rangefinding Committee assisted in the development of the scoring criteria. The committee comprises active Arkansas educators with expertise in mathematics education.

### **Reader Training**

Before readers are allowed to begin assigning scores to any student responses, they go through intensive training. The first step in that training is for the readers to read the Geometry open-response items as they appear in the test booklet and to respond—just as the student test takers are required to do. This step gives the readers some insight into how the students might have responded. The next step is the readers’ introduction to the scoring rubric. All of the specific requirements of the rubric are explained by the Scoring Director who has been specifically trained to lead the scoring group. Then responses (anchor papers) that illustrate the score points of the rubric are presented to the readers and discussed. The goal of this discussion is for the readers to understand why a particular response (or type of response) receives a particular score. After discussion of the rubric and anchor papers, readers practice scoring sets of responses that have been prescored and selected for use as training papers. Detailed discussion of the responses and the scores they receive follows.

After three or four of these practice sets, readers are given “qualifying rounds.” These are additional sets of prescored papers, and, in order to qualify, each reader scoring Geometry responses must score in exact agreement on at least 80% of the responses. Readers who do not score within the required rate of agreement are not allowed to score the Geometry End-of-Course Examination responses.

Once scoring of the actual student responses begins, readers are monitored constantly throughout the project to ensure that they are scoring according to the criteria. Daily and cumulative statistics are posted and analyzed, and Scoring Directors or Team Leaders reread selected responses scored by the readers. These procedures promote reliable and consistent scoring. Any reader who does not maintain an acceptable level of agreement is dismissed from the project.

### **Scoring Procedures**

All student responses to the Geometry End-of-Course Examination open-response test items are scored independently by two readers. Those two scores are compared, and responses that receive scores that are non-adjacent (a “1” and a “3,” for example) are scored a third time by a Team Leader or the Scoring Director for resolution.

## PART II MID-YEAR RELEASED GEOMETRY ITEMS

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1. The number of squares in the figures below form a pattern.



Figure 1

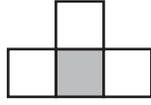


Figure 2

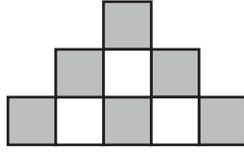


Figure 3

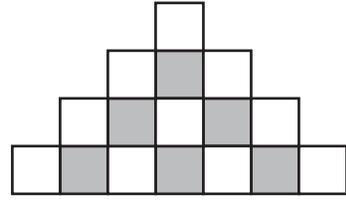
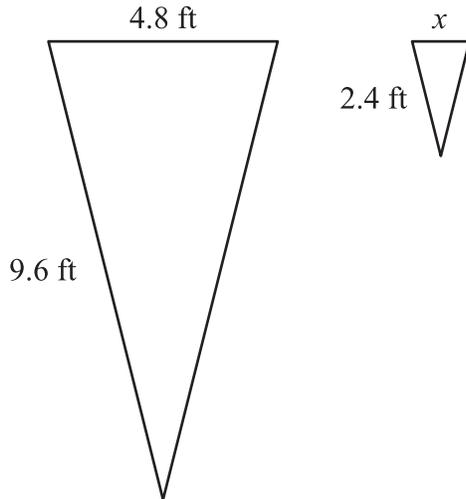


Figure 4

If Figure 5 is drawn, how many **white** squares will it have?

- \* A. 10
- B. 11
- C. 16
- D. 20

2. Aimee hangs banners from the ceiling of the gymnasium, alternating large banners with small banners. Each banner is in the shape of a triangle, and the triangles are similar triangles.



What is  $x$ ?

- A. 0.6 ft
- \* B. 1.2 ft
- C. 2.4 ft
- D. 4.8 ft

3. A cylinder has a radius of 5 cm and a height of 16 cm. Another cylinder is four times as tall but has the same radius. How does the volume of the second cylinder compare to that of the first?

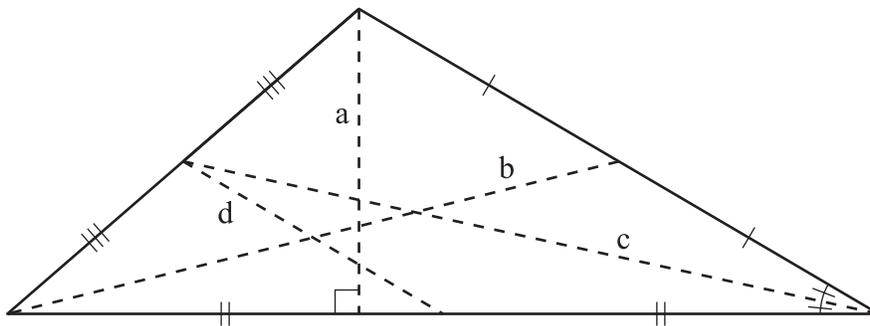
- \* A. It has four times the volume of the first cylinder.
- B. It has eight times the volume of the first cylinder.
- C. It has sixteen times the volume of the first cylinder.
- D. It has sixty-four times the volume of the first cylinder.

4. Which line is parallel to  $y = -\frac{3}{5}x + 4$ ?

- A.  $y = \frac{5}{3}x + 2$
- B.  $y = \frac{1}{5}x + 4$
- C.  $y = -\frac{1}{5}x - 4$
- \* D.  $y = -\frac{3}{5}x + 1$

## PART II MID-YEAR RELEASED GEOMETRY ITEMS

5. A triangle is shown below.

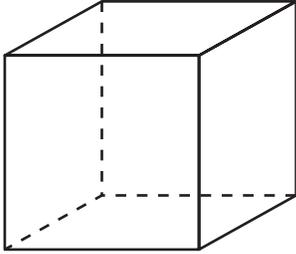


Which dashed segment best represents an angle bisector of the triangle?

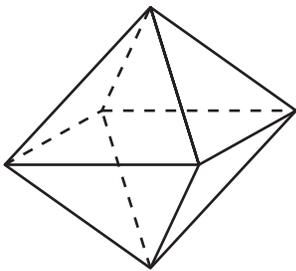
- A. a  
B. b  
\* C. c  
D. d
- 
6. What must be true about same-side interior angles when parallel lines are cut by a transversal?
- A. They are congruent.  
B. They form a linear pair.  
\* C. They are supplementary.  
D. They are complementary.
7. An object is translated from  $A(-6, -4)$  to  $A'(-18, -8)$ . What is the translation rule?
- \* A.  $(x - 12, y - 4)$   
B.  $(x + 3, y + 2)$   
C.  $(x - 3, y - 2)$   
D.  $(x - 12, y + 2)$

8. Which figure below is not a Platonic solid?

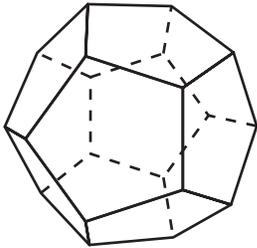
A.



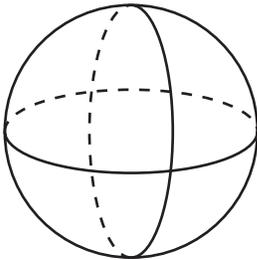
B.



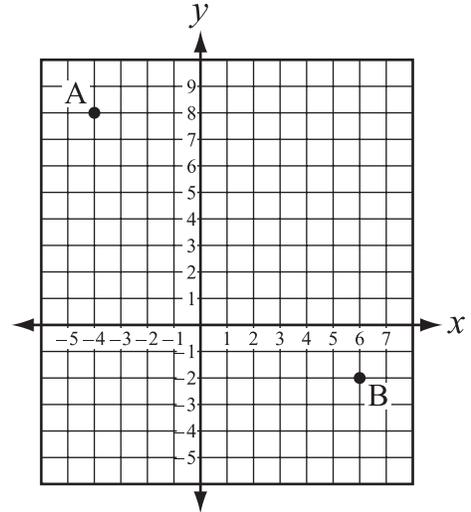
C.



\* D.



9. Points A and B are shown on the coordinate plane below.



What is the midpoint of a segment with endpoints at points A and B?

- A. (0, 3)
- \* B. (1, 3)
- C. (1, 4)
- D. (2, 4)

10. The sum of the interior angles of a certain polygon is  $540^\circ$ . What is the name of this polygon?

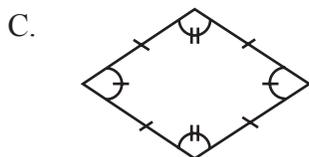
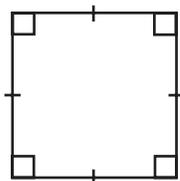
- A. triangle
- B. quadrilateral
- \* C. pentagon
- D. hexagon

## PART II MID-YEAR RELEASED GEOMETRY ITEMS

11. Which shape is a possible cross section of both a cube and a cylinder?



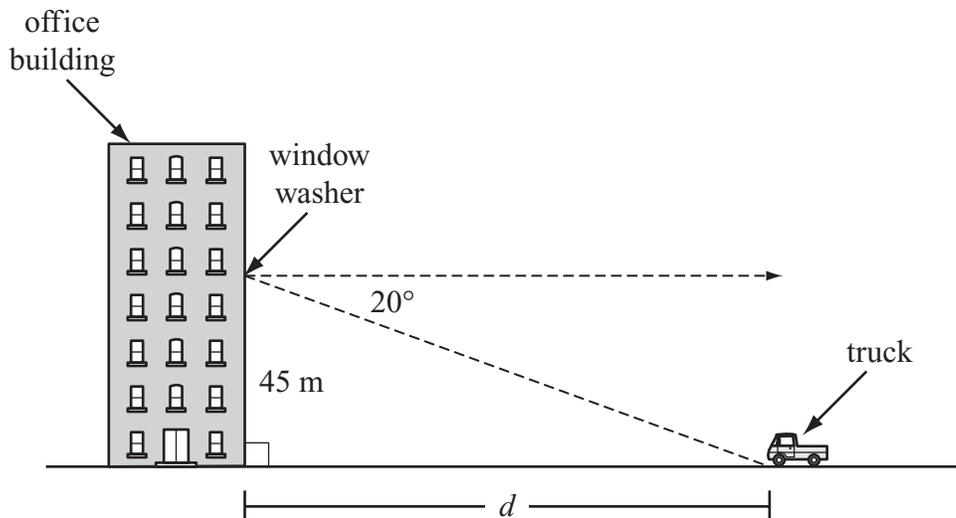
\* B.



D.



12. A window washer 45 meters up the side of an office building can look down at an angle of depression of  $20^\circ$  at his truck parked on street.



What is the horizontal distance  $d$  from the truck to the office building, rounded to the nearest tenth of a meter?

- A. 15.4 m  
B. 16.4 m  
C. 42.3 m  
\* D. 123.6 m

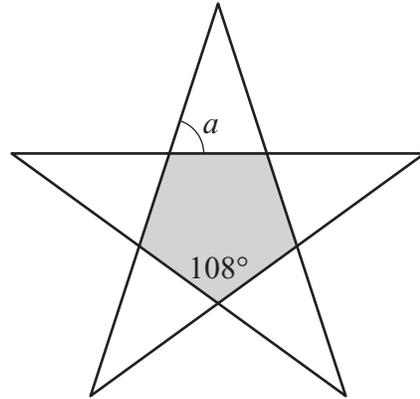
13. Four students, Kris, Lamar, Marcel, and Nick, each study a different world language at their high school.

- Their high school offers only four languages: Chinese, French, German, and Spanish.
- Marcel and Lamar do not study Chinese.
- Nick studies German or French but not both.
- Mrs. Rohrs teaches Lamar's German class.

What languages do Nick and Marcel study?

- \* A. Nick–French; Marcel–Spanish
- B. Nick–French; Marcel–Chinese
- C. Nick–German; Marcel–French
- D. Nick–German; Marcel–Spanish

14. In the figure below, each interior angle of the shaded central pentagon is  $108^\circ$ .



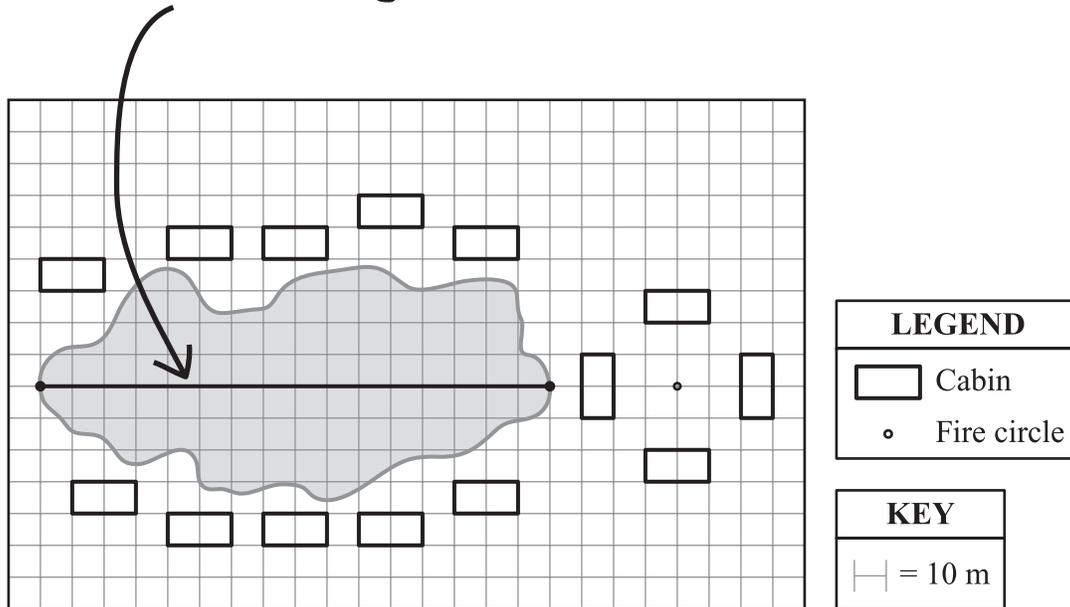
What is  $m\angle a$ ?

- A.  $18^\circ$
- \* B.  $72^\circ$
- C.  $198^\circ$
- D.  $288^\circ$

## PART II MID-YEAR RELEASED GEOMETRY ITEMS

15. Eli wrote a letter home from summer camp telling his parents that he swam the long way across the entire lake. He enclosed a map of the camp so they could see where he swam.

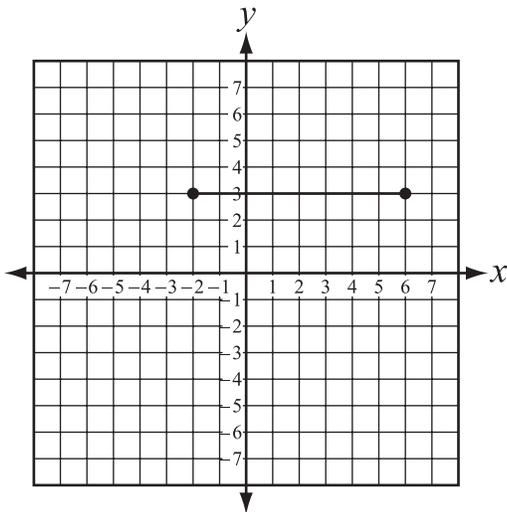
*I swam the whole way!*



How far did Eli swim in his big swim?

- A. 10 meters
- B. 16 meters
- C. 150 meters
- \* D. 160 meters

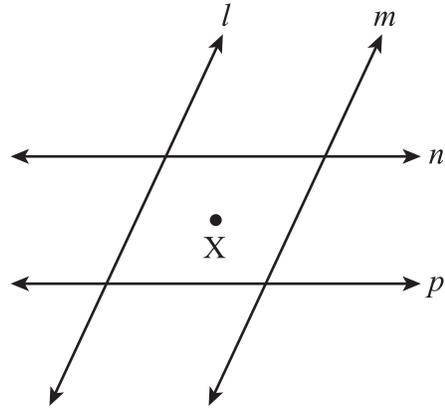
16. A line segment is shown on the graph below.



What is the equation of the perpendicular bisector of this line segment?

- A.  $x = -2$
- \* B.  $x = 2$
- C.  $x = 4$
- D.  $x = 6$

17. In the diagram shown below,  $l \parallel m$  and  $n \parallel p$ .



How many lines can be drawn through point X that are parallel to line  $l$ , but not parallel to line  $m$ ?

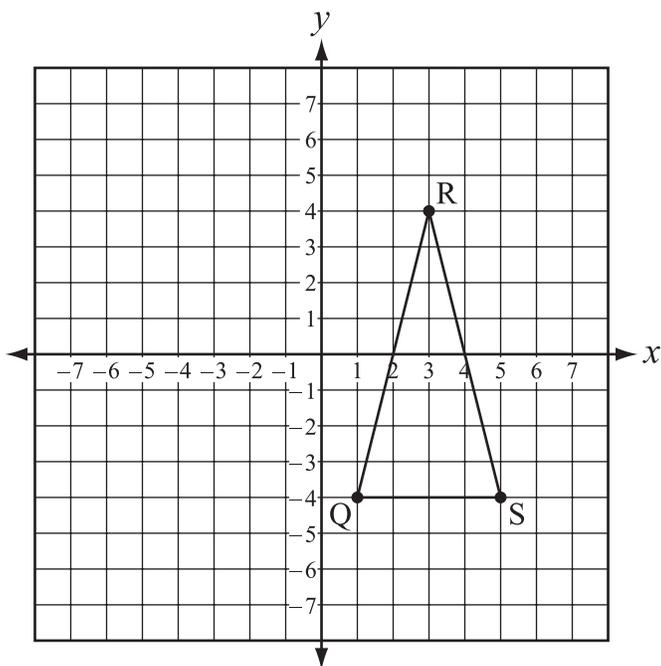
- \* A. 0
  - B. 1
  - C. 2
  - D. 4
18. A rectangular prism is 8 yards long, 5 yards wide, and 4 yards high. If the width is decreased by 2 yards and the height is increased by 2 yards, what happens to the volume?
- A. It stays the same.
  - B. It increases by  $8 \text{ yd}^3$ .
  - \* C. It decreases by  $16 \text{ yd}^3$ .
  - D. It decreases by  $40 \text{ yd}^3$ .

## PART II MID-YEAR RELEASED GEOMETRY ITEMS

19. Ben knows the length and height of a rectangular window. Which of the following will help him find the measure of the diagonal?

- \* A. Pythagorean Theorem
- B. Midsegment Theorem
- C. Diagonal Theorem
- D. SSS Theorem

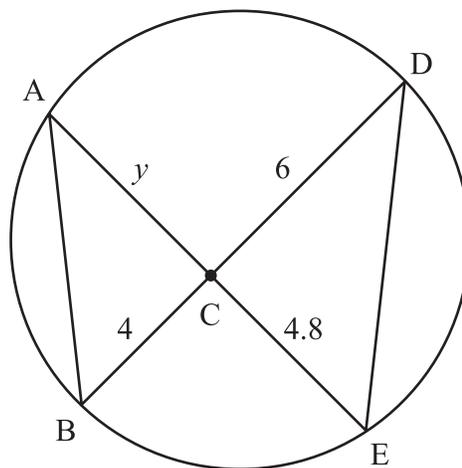
20. Look at the graph below.



What type of triangle is  $\triangle QRS$ ?

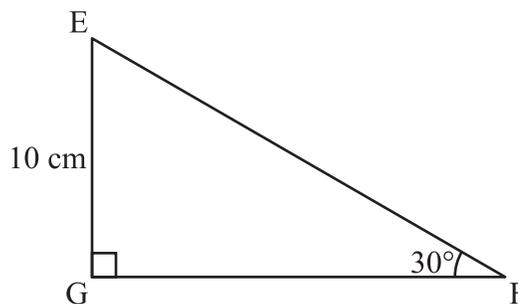
- A. right triangle
- B. scalene triangle
- \* C. isosceles triangle
- D. equilateral triangle

21. Look at the circle below.



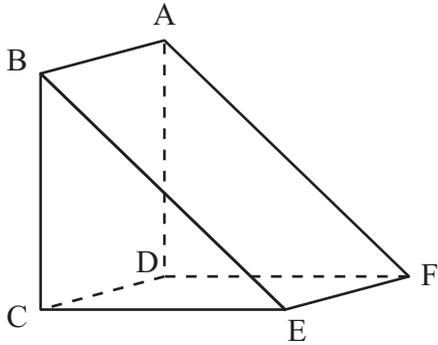
What is the value of y?

- \* A. 5.0
  - B. 6.2
  - C. 7.2
  - D. 12.0
22. In the diagram below, what is EF? Round your answer to the nearest tenth of a centimeter.



- A. 5.0 cm
- B. 8.7 cm
- C. 17.3 cm
- \* D. 20.0 cm

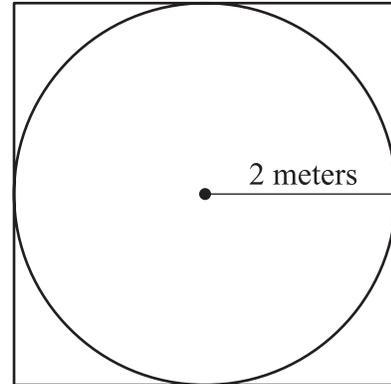
23. Use the diagram of the triangular prism below to answer the following question.



Which set of points are coplanar?

- A. AFDE
  - B. BCEF
  - C. BCDE
  - \* D. ABEF
24. Larry filled the inside of a wall with insulating foam. The space he filled is in the shape of a rectangular prism with dimensions of 0.25 feet by 20 feet by 7.5 feet. How many cubic feet of foam did Larry use?
- A. 27.75
  - \* B. 37.50
  - C. 300.00
  - D. 313.75

25. A square railing is to be installed around a circular flower bed with a radius of 2 meters.

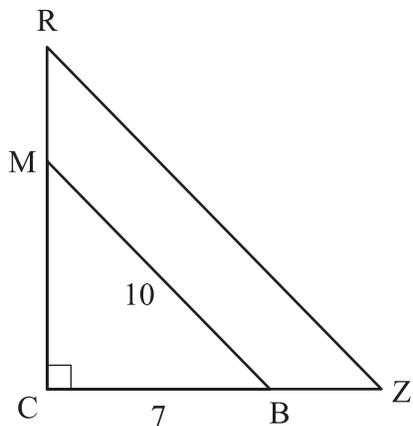


What is the total length of railing needed to create the square?

- A. 4 meters
  - B. 8 meters
  - C. 12 meters
  - \* D. 16 meters
26. What is the radius of the circle described by the equation  $(x - 2)^2 + (y + 3)^2 = 25$ ?
- A. 4
  - \* B. 5
  - C. 25
  - D. 625

**PART II MID-YEAR RELEASED GEOMETRY ITEMS**

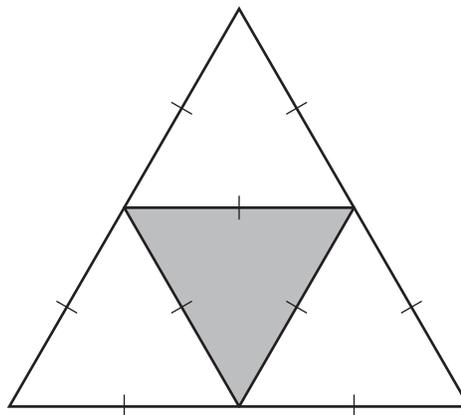
27. In the diagram,  $\triangle CMB \sim \triangle CRZ$ ,  $CB = 7$ , and  $BM = 10$ .



Which equation could be used to find the  $m\angle Z$ ?

- A.  $\sin Z = \frac{7}{10}$
- B.  $\tan Z = \frac{7}{10}$
- \* C.  $\cos Z = \frac{7}{10}$
- D.  $\sin Z = \frac{10}{7}$

28. A game consists of shooting pellets at the target shown below. The board is surrounded by a guide so that every pellet will hit somewhere on the target.



What is the probability of hitting the target in the shaded section?

- A. 20%
- \* B. 25%
- C. 33%
- D. 75%

29. Jason is tiling his kitchen counter. Which shape will not tessellate the space?

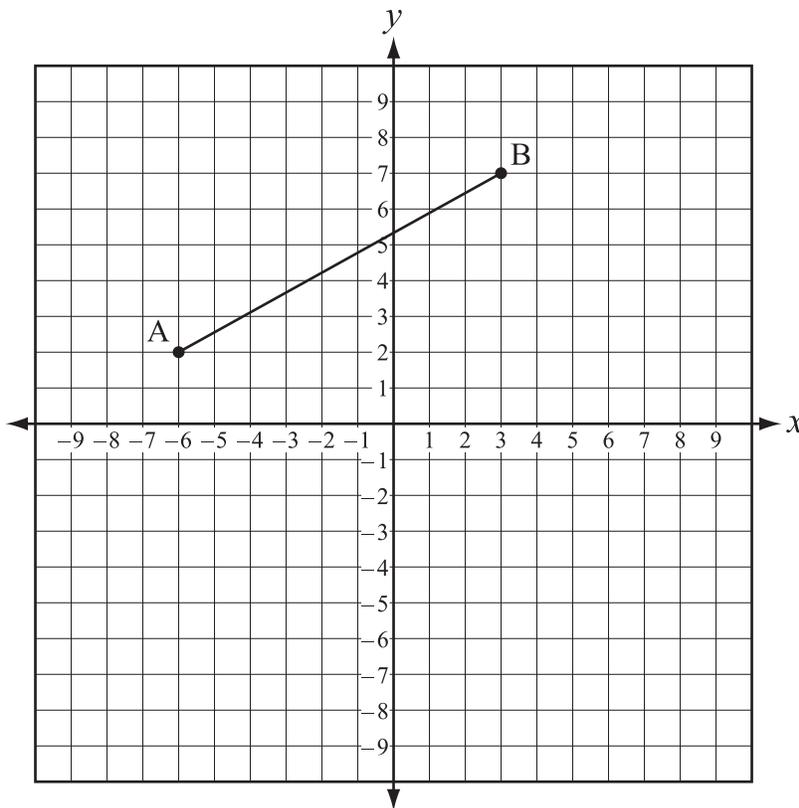
- \* A. circle
- B. triangle
- C. trapezoid
- D. parallelogram

30.  $\angle 1$  and  $\angle 2$  are supplementary angles. If  $\angle 1$  measures  $36^\circ$ , what is the measure of  $\angle 2$ ?

- A.  $54^\circ$
- B.  $90^\circ$
- \* C.  $144^\circ$
- D.  $180^\circ$

## PART II MID-YEAR RELEASED GEOMETRY ITEMS

- A. A city planning committee is looking at the number of streets that intersect a portion of a road within the city. In the coordinate grid below, line segment  $\overline{AB}$  below represents a road between two locations.



- Point A is at  $(-6, 2)$
- Point B is at  $(3, 7)$

1. Each unit on the coordinate grid represents 10 miles. What is the unit length in miles of the road represented by  $\overline{AB}$ ? Round your answer to the nearest mile. Show your work.
2. An existing road is perpendicular to the road represented by  $\overline{AB}$ . If this road were represented by line segment  $\overline{CD}$  on the coordinate grid, what would be the slope of  $\overline{CD}$ ? Show your work.
3. Using the slope obtained in Part 2, find the equation of the line containing  $\overline{CD}$  if  $\overline{CD}$  contains the point  $(5, -2)$ . Show your work.

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

**Item A Scoring Rubric—2014 Geometry**

<b>Score</b>	<b>Description</b>
<b>4</b>	The student earns 4 points. The response contains no incorrect work.
<b>3</b>	The student earns 3 – 3½ points.
<b>2</b>	The student earns 2 – 2½ points.
<b>1</b>	The student earns ½ – 1½ points, or some minimal understanding is shown.
<b>0</b>	The student earns 0 points. No understanding is shown.
<b>B</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 MID-YEAR RELEASED GEOMETRY ITEMS

### SOLUTION AND SCORING

Do not deduct for early rounding or truncating in internal work that results in the correct answer. Students may write these values for brevity, using the exact calculator value to find their answer.

4 points possible:

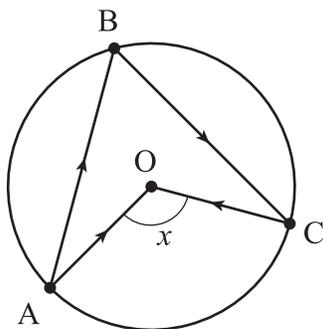
Part	Points
<b>1</b>	<p><b>1 point possible:</b></p> <p>1 point: Correct length: <b>103</b> (<i>miles not required</i>)            Correct procedure is shown and/or explained            Give credit for the following or equivalent:            Ex. <math>d = 10 \cdot \sqrt{(3 - -6)^2 + (7 - 2)^2} = 10 \cdot \sqrt{9^2 + 5^2} = 10 \cdot \sqrt{81 + 25} = 10 \cdot \sqrt{106}</math>  <math>= 10 \cdot 10.29563\dots = 102.95630\dots \approx 103</math>            Ex. "From Point A (-6,2), I counted right 9 and up 5 to Point B (3,7).            Using the Pythagorean Theorem:  <math>d = 10 \cdot \sqrt{9^2 + 5^2} = 10 \cdot \sqrt{81 + 25} = 10 \cdot \sqrt{106} = 10 \cdot 10.29563\dots = 102.95630\dots \approx 103</math>."</p> <p><b>OR</b></p> <p>½ point</p> <ul style="list-style-type: none"> <li>• Correct length not rounded to the nearest mile                Correct procedure shown and/or explained</li> <li>• Correct length                Procedure is missing or incomplete</li> <li>• Student finds length from A to B, but does not multiply by <b>10</b>.                Correct incomplete procedure is shown and/or explained                May or may not be rounded or truncated to the nearest mile.</li> <li>• Incorrect or missing length                Work may have a calculation, copy, or rounding error, early rounding, or truncation.                Correct procedure is shown and/or explained                May or may not be rounded or truncated to the nearest mile.</li> </ul>

**PART II MID-YEAR RELEASED GEOMETRY ITEMS**

Part	Points
2	<p><b>1 point possible:</b></p> <p>1 point: Correct slope: <math>-\frac{9}{5}</math>            Correct procedure is shown and/or explained            Give credit for the following or equivalent:</p> <ul style="list-style-type: none"> <li>• <math>m = \frac{7-2}{3-6} = \frac{5}{-9}</math>  <math>m = \text{negative reciprocal} = -\frac{9}{5}</math></li> <li>• <math>\frac{\text{rise}}{\text{run}} = \frac{5}{-9}</math></li> <li>• Shows counting <b>up 5</b> and <b>right 9</b>.</li> </ul> <p><b>OR</b></p> <p>½ point</p> <ul style="list-style-type: none"> <li>• Correct slope            Procedure is missing or incomplete</li> <li>• Incorrect or missing slope            Correct procedure is shown and/or explained            Work may have a calculation or copy error.</li> </ul>
3	<p><b>2 points possible:</b></p> <p>2 points: Correct equation: <math>y = -\frac{9}{5}x + 7</math>  <i>(or correct equation for an incorrect slope in Part 2)</i>            Correct procedure is shown and/or explained            Give credit for the following or equivalent:</p> <ul style="list-style-type: none"> <li>• <math>y = mx + b \Rightarrow -2 = -\frac{9}{5}(5) + b = -9 + b \Rightarrow -2 + 9 = 7 = b</math>  <math>y = -\frac{9}{5}x + 7</math></li> <li>• <math>(y - y_1) = m(x - x_1) \Rightarrow y - 2 = -\frac{9}{5}(x - 5) \Rightarrow y + 2 = -\frac{9}{5}x + 9 \Rightarrow y = -\frac{9}{5}x + 7</math>            All three forms are acceptable.</li> <li>• Shows counting <b>up 9</b> and <b>left 5</b> to find the <b>y</b>-intercept.</li> </ul> <p><b>OR</b></p> <p>1 point</p> <ul style="list-style-type: none"> <li>• Correct equation            Procedure is missing or incomplete</li> <li>• Incorrect or missing equation            Work may have a calculation or copy error.            Correct procedure is shown and/or explained</li> </ul>

## PART II MID-YEAR RELEASED GEOMETRY ITEMS

- B. A trophy and award company uses a laser to etch figures on award medals. A computer program directs the laser in the path shown in the diagram below. Point O is the center of the circle, and points A, B, and C all lie on the circle.



1. The laser etches a  $60^\circ$  angle at B. What is  $m\angle x$ ? Show your work and/or explain your answer.
2. If  $OC = 3$  cm, what is the length of  $\widehat{AC}$  to the nearest hundredth? Show your work and/or explain your answer.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

### Item B Scoring Rubric—2014 Geometry

Score	Description
4	The student earns 4 points. The response contains no incorrect work. <b>Degree</b> needed in Part 1 and <b>cm</b> needed in Part 2.
3	The student earns 3 – $3\frac{1}{2}$ points.
2	The student earns 2 – $2\frac{1}{2}$ points.
1	The student earns 1 – $1\frac{1}{2}$ 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.)

**SOLUTION AND SCORING**

**Do not deduct for early rounding or truncating in internal work that results in the correct answer. Students may write these values for brevity, using the exact calculator value to find their answer.**

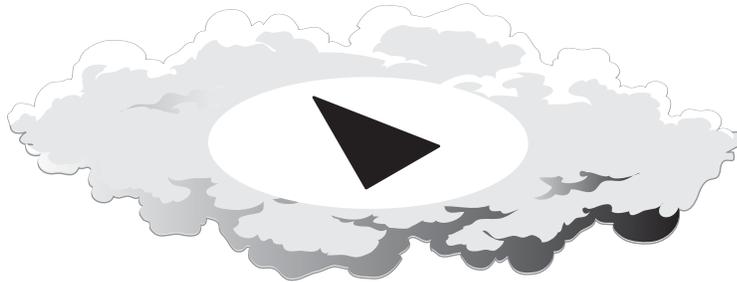
**4 points possible:**

Part	Points
<b>1</b>	<p><b>2 points possible:</b></p> <p>2 points: Correct angle measure: <math>m\angle x = 120^\circ</math> (<i>degrees is required for a 4</i>)                      Correct procedure is shown and/or explained                      Give credit for the following or equivalent:</p> <p>Ex. The measure of an inscribed angle equals one-half the measure of the intercepted arc. The measure of a central angle equals the measure of the intercepted arc. Therefore, the measure of an inscribed angle is one-half the measure of a central angle that intercepts the same or congruent arcs or</p> $60 = \frac{1}{2} \cdot m\angle x \text{ which means } m\angle x = 60 \cdot 2 = 120^\circ .$ <p>Ex. <math>m\angle B = \frac{1}{2} \cdot m\widehat{AC}</math> and <math>m\angle x = m\widehat{AC}</math></p> $m\angle B = \frac{1}{2} \cdot m\angle x \text{ by substitution}$ $60 = \frac{1}{2} \cdot m\angle x$ $m\angle x = 120^\circ$ <p>Ex. <math>60 = \frac{1}{2} \cdot m\angle x \Rightarrow m\angle x = 60 \cdot 2 = 120^\circ</math></p> <p><b>OR</b></p> <p>1 point</p> <ul style="list-style-type: none"> <li>• Correct angle measure: <math>120^\circ</math> Correct procedure is missing or incomplete</li> <li>• Angle measure is missing or incorrect Correct procedure is shown and/or explained</li> </ul>

## PART II MID-YEAR RELEASED GEOMETRY ITEMS

Part	Points
2	<p><b>2 points possible:</b></p> <p>2 points: Correct arc length: <b>6.28 cm</b> (<i>centimeters is required for a 4</i>)  <i>(or correct arc length based on an incorrect angle measure from Part 1)</i>            Correct procedure is shown and/or explained            Give credit for the following or equivalent:</p> <p>Ex. Arc Length = <math>\frac{n}{360}(2\pi r) = \frac{120}{360}(2)(\pi)(3) = 2\pi = 6.28318\dots \approx 6.28</math></p> <p>Ex. Arc Length = <math>\frac{n}{360}(2\pi r) = \frac{120}{360}(2)(3.14)(3) = \frac{1}{3}(6.28)(3) = 6.28</math></p> <p>Ex. A circle has 360 degrees and since <math>m\angle x = 120</math>,            arc AC must be <math>\frac{120}{360}</math> or <math>\frac{1}{3}</math> of the entire circle.            The radius of the circle is 3 cm, so its circumference is equal to <math>6\pi</math>.            The length of <math>\widehat{AC}</math> is <math>\frac{1}{3}</math> of <math>6\pi</math> or <math>2\pi</math> (approximately 6.28 cm).</p> <p>Ex. <math>\pi</math> radians = <math>180^\circ \Rightarrow 120^\circ \cdot (\pi / 180) = \frac{2}{3}\pi</math> radians</p> $s = r\theta = 3 \cdot \frac{2}{3}\pi = 2\pi = 2 \cdot 3.14159\dots = 6.28318\dots \approx 6.28$ <p><b>OR</b></p> <p>1½ points: Correct arc length but is rounded to a place other than the nearest 100<sup>th</sup> or truncated,            or is incorrect due to early rounding  <i>(or correct arc length based on an incorrect angle measure from Part 1)</i>            Correct procedure is shown and/or explained</p> <p><b>OR</b></p> <p>1 point</p> <ul style="list-style-type: none"> <li>• Correct arc length: <b>6.28</b>            Correct procedure is missing or incomplete</li> <li>• Arc length is missing            Correct procedure is shown and/or explained</li> <li>• Arc length is incorrect due to calculation, copy, or rounding error  <i>(may or may not be rounded to the nearest 100<sup>th</sup>)</i>            Correct procedure is shown and/or explained</li> </ul>

- C. A spotlight projects a triangular shape onto a cloud.



1. The side lengths of a triangle projected on a cloud are 16 feet, 16 feet, and 20 feet. The longest side of the triangle on the spotlight is 0.5 feet long. What is the perimeter of the triangle on the spotlight? Show your work and/or explain your answer.
  
2. The spotlight operator has a second triangular template that he can use on the spotlight. The perimeter of the new triangle is 2 feet. What is the perimeter of the triangle the second template would project onto the same cloud? Show your work and/or explain your answer.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

<b>Item C Scoring Rubric—2014 Geometry</b>
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Score	Description
<b>4</b>	The student earns 4 points. The response contains no incorrect work. <b>Feet</b> label required in Parts 1 and 2.
<b>3</b>	The student earns 3 – 3½ points.
<b>2</b>	The student earns 2 – 2½ points.
<b>1</b>	The student earns ½ – 1½ points, or some minimal understanding is shown.
<b>0</b>	The student earns 0 points. No understanding is shown.
<b>B</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 MID-YEAR RELEASED GEOMETRY ITEMS

### SOLUTION AND SCORING

For this item, it is acceptable for students to write a scale factor. Ex:  $0.5'=20'$

4 points possible:

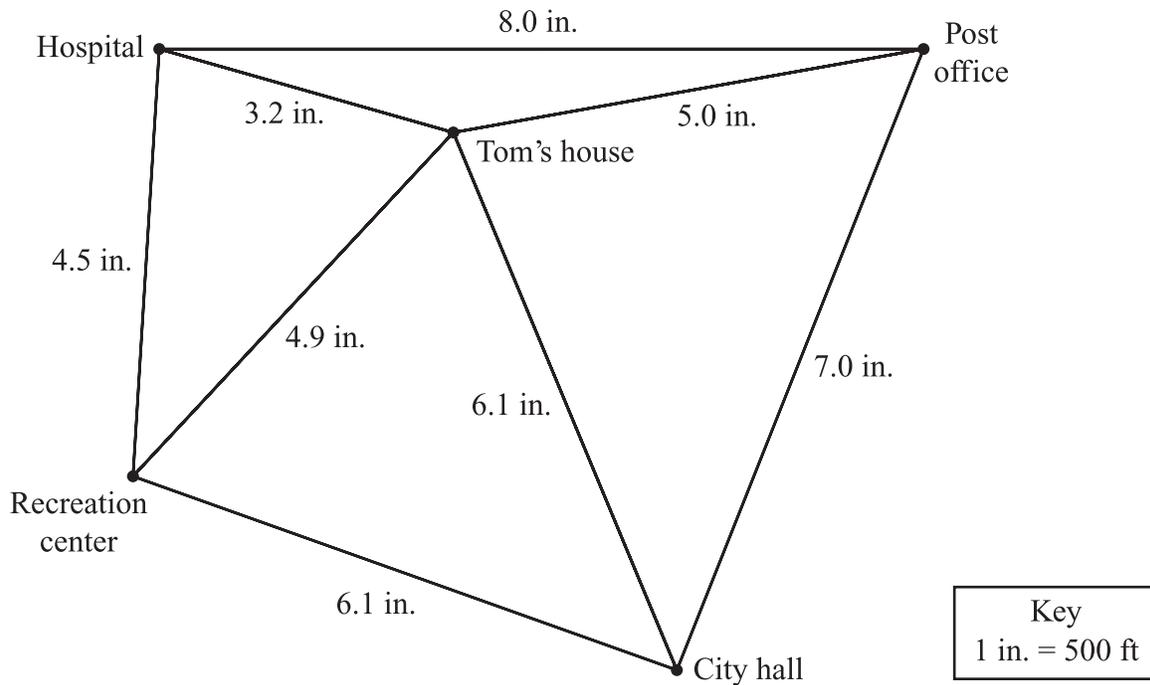
Part	Points
1	<p><b>2 points possible:</b></p> <p>2 points: Correct perimeter: <b>1.3 feet</b> (<i>feet required for a 4</i>)            Correct procedure is shown and/or explained            Give credit for the following or equivalent:</p> <ul style="list-style-type: none"> <li>Find the missing sides first               <math display="block">\frac{0.5}{20} = \frac{x}{16}</math> <math display="block">20x = 8</math> <math display="block">x = 0.4 \text{ feet}</math> <math display="block">P = 0.4 + 0.4 + 0.5 = 1.3 \text{ feet}</math> </li> <li>Ratio of sides = ratio of perimeter               <math display="block">\frac{0.5}{20} = \frac{x}{16 + 16 + 20}</math> <math display="block">\frac{0.5}{20} = \frac{x}{52}</math> <math display="block">20x = 26</math> <math display="block">x = 1.3 \text{ feet}</math> </li> </ul> <p><b>OR</b></p> <p>1 point</p> <ul style="list-style-type: none"> <li>Correct Perimeter: 1.3                Procedure is missing or incomplete</li> <li>Incorrect perimeter due to a calculation, copy, rounding, or truncation error                Correct procedure is shown and/or explained</li> <li>Missing Perimeter                Correct procedure is shown and/or explained</li> <li>Finds <math>x = 0.4</math> feet                Correct procedure is shown and/or explained</li> </ul> <p><b>OR</b></p> <p>½ point</p> <ul style="list-style-type: none"> <li>Finds <math>x = 0.4</math> feet                Procedure is missing or incomplete</li> <li>Sets up correct proportion                Answer and procedure may be missing, incomplete, or incorrect.                Give credit for the following or equivalent:  <math display="block">\frac{0.5}{20} = \frac{x}{16} \text{ or } \frac{0.5}{20} = \frac{x}{52} \text{ or } \frac{x}{0.5} = \frac{16}{20}</math> </li> </ul>

**PART II MID-YEAR RELEASED GEOMETRY ITEMS**

Part	Points
2	<p><b>2 points possible:</b></p> <p>2 points: Correct perimeter: <b>80 feet</b> (<i>feet required for a 4</i>)  <i>(or correct perimeter based on an incorrect perimeter in Part 1)</i>                      Correct procedure is shown and/or explained                      Give credit for the following or equivalent:</p> <ul style="list-style-type: none"> <li>• <math>\frac{0.5}{20} = \frac{2}{x}</math>  <math>0.5x = 40</math>  <math>x = 80</math> feet</li> <li>• <math>\frac{1.3}{16+16+20} = \frac{2}{x}</math>  <math>1.3x = 52(2)</math>  <math>x = 80</math> feet</li> <li>• <math>\frac{20}{.5} = \frac{x}{2}</math>  <math>\frac{20}{.5} = 40 \Rightarrow x = 2 \cdot 40 = 80</math></li> </ul> <p><b>OR</b></p> <p>1 point</p> <ul style="list-style-type: none"> <li>• Correct perimeter: 80 feet                      Procedure is missing or incomplete</li> <li>• Incorrect perimeter due to a calculation, copy, rounding error, or early rounding  <i>(or incorrect perimeter based on an incorrect perimeter in Part 1)</i>                      Correct procedure is shown and/or explained</li> <li>• Missing perimeter                      Correct procedure is shown and/or explained</li> </ul> <p><b>OR</b></p> <p>½ point</p> <ul style="list-style-type: none"> <li>• Sets up correct proportion                      Answer and procedure may be missing, incomplete, or incorrect.                      Give credit for the following or equivalent:  <math>\frac{0.5}{20} = \frac{2}{x}</math> <b>or</b> <math>\frac{1.3}{52} = \frac{2}{x}</math> <b>or</b> <math>\frac{20}{0.5} = \frac{x}{2}</math></li> </ul>

## PART II SPRING RELEASED GEOMETRY ITEMS

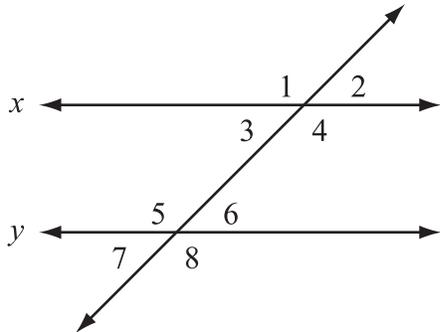
1. Tom drew a map of his town where 1 in. equals 500 ft in real life.



How much farther is it to walk directly from the post office to the hospital than to walk directly from the hospital to Tom's house?

- A. 1,600 ft
- \* B. 2,400 ft
- C. 4,000 ft
- D. 5,600 ft

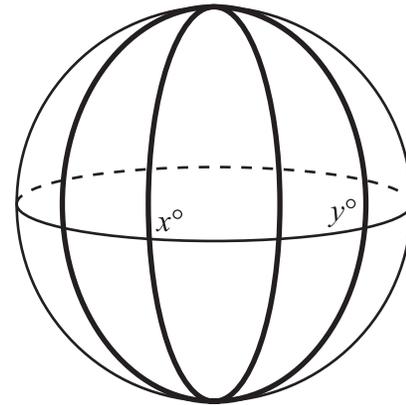
2. In the figure below, parallel lines  $x$  and  $y$  are cut by a transversal.



What is the relationship between  $\angle 1$  and  $\angle 8$ ?

- \* A. They are alternate exterior angles.
  - B. They are alternate interior angles.
  - C. They are corresponding angles.
  - D. They are vertical angles.
3. Which of the following sets of three straight pieces of lumber could be used to form a triangular frame?
- A. 1 ft, 2 ft, 3 ft
  - B. 3 ft, 5 ft, 10 ft
  - \* C. 7 ft, 11 ft, 13 ft
  - D. 10 ft, 10 ft, 20 ft

4. Boris looked at a globe. He noticed that the equator was a great circle and that the lines of longitude were also great circles that all intersected at the poles.



If  $x = 90$ , what is the sum of  $x$  and  $y$ ?

- A. 120
- \* B. 180
- C. 210
- D. 360

## PART II SPRING RELEASED GEOMETRY ITEMS

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5. Each block in the figures below is 2 cm wide. Figure 1 has a horizontal width of 2 cm. Figure 2 has a horizontal width of 6 cm. Figure 3 has a horizontal width of 10 cm.



Figure 1

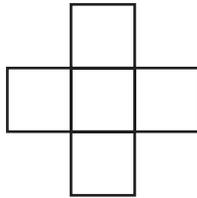


Figure 2

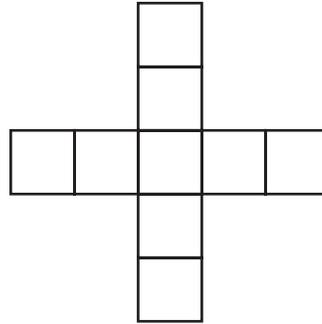
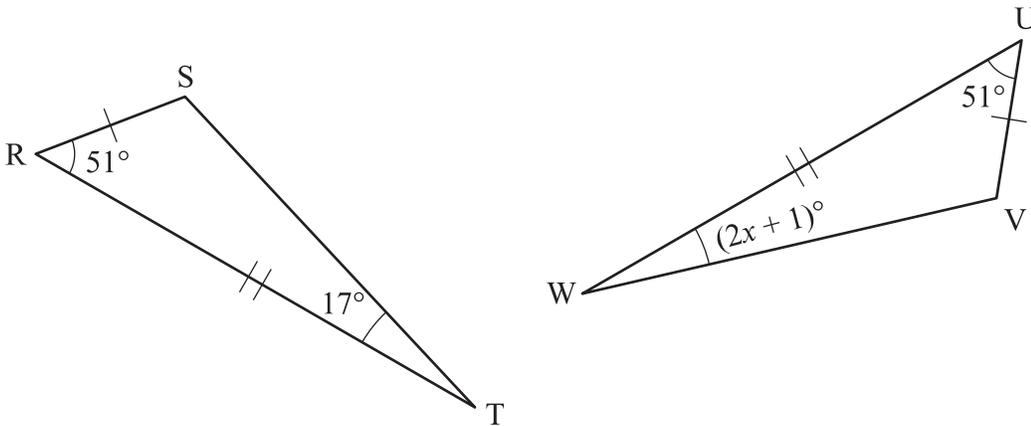


Figure 3

If the pattern continues, what will be the horizontal width of Figure 5?

- A. 14 cm
- B. 16 cm
- \* C. 18 cm
- D. 20 cm

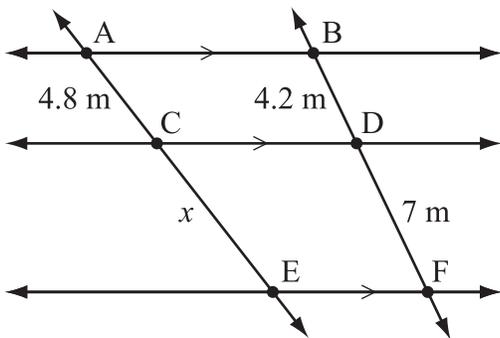
6.  $\triangle RST$  and  $\triangle UVW$  are shown below.



What is the value of  $x$ ?

- \* A. 8
- B. 9
- C. 25
- D. 35

7. In the diagram below,  $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD} \parallel \overleftrightarrow{EF}$ .

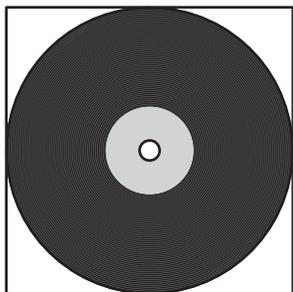


To the nearest meter, what is the value of  $x$ ?

- A. 3 m
- B. 6 m
- C. 7 m
- \* D. 8 m

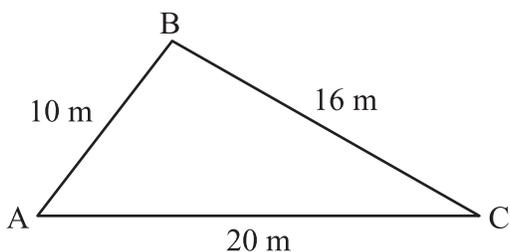
## PART II SPRING RELEASED GEOMETRY ITEMS

8. A disc is placed on top of its paper sleeve, as shown below. The area of the paper sleeve is 144 square inches.



What is the area of four corners of the paper sleeve that are not covered by the disc?

- \* A. 30.96 in.<sup>2</sup>
  - B. 108.00 in.<sup>2</sup>
  - C. 113.04 in.<sup>2</sup>
  - D. 106.32 in.<sup>2</sup>
9. The measures of three sides of a playground are shown below.



If the area of  $\triangle ABC$  is 80 square meters, what is the altitude from  $\angle B$ ?

- A. 4 m
- \* B. 8 m
- C. 10 m
- D. 16 m

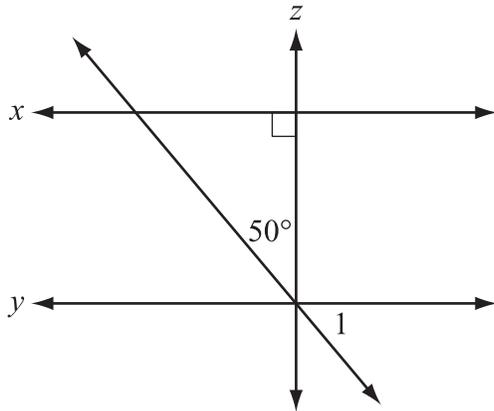
10. Three interior angles of a quadrilateral are  $43^\circ$ ,  $51^\circ$ , and  $104^\circ$ . What is the measure of the remaining angle?

- A.  $72^\circ$
- B.  $142^\circ$
- C.  $152^\circ$
- \* D.  $162^\circ$

11. At a carnival, the probability of Kim hitting the shaded area on a target is 20%. What fraction of the target is shaded?

- A.  $\frac{1}{10}$
- B.  $\frac{1}{8}$
- \* C.  $\frac{1}{5}$
- D.  $\frac{4}{5}$

12. The figure below shows parallel lines  $x$  and  $y$  that are cut by two transversals, one of which is perpendicular to both lines.



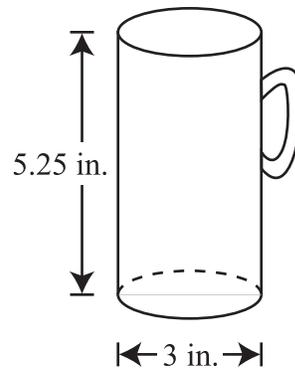
What is  $m\angle 1$ ?

- \* A.  $40^\circ$
  - B.  $50^\circ$
  - C.  $90^\circ$
  - D.  $130^\circ$
13. What are the coordinates of the point  $(-5, 1)$  after it is reflected across the  $y$ -axis?
- A.  $(-5, -1)$
  - B.  $(-1, -5)$
  - C.  $(1, 5)$
  - \* D.  $(5, 1)$

14. A courtyard is in the shape of a polygon. The sum of the measures of the interior angles of the polygon is  $540^\circ$ . How many sides does the courtyard have?

- A. 3
- B. 4
- \* C. 5
- D. 6

15. What is the volume of the cylindrical part of the plastic cup shown below? Round your answer to the nearest cubic inch.



- A. 25 cubic inches
- \* B. 37 cubic inches
- C. 47 cubic inches
- D. 49 cubic inches

## PART II SPRING RELEASED GEOMETRY ITEMS

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16. Which of the following equations represents a line that is perpendicular to the graph of  $y = 2x - 3$  and passes through the point  $(0, 2)$ ?

- A.  $y = 2x - 5$
- B.  $y = -3x + 2$
- C.  $y = -2x - 3$
- \* D.  $y = -\frac{1}{2}x + 2$
- 

17. Maria is arranging triangles in the pattern shown below.



Group 1



Group 2

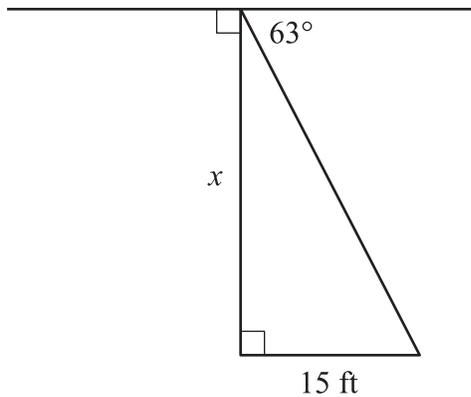


Group 3

If the pattern continues, how many triangles will be in the 23rd group?

- A. 22
- B. 23
- \* C. 24
- D. 25

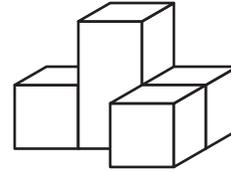
18. Pru looks out her apartment window down to the street to see if her friend is waiting for her.



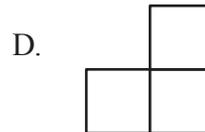
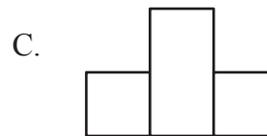
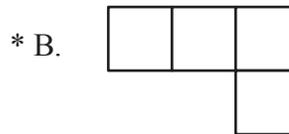
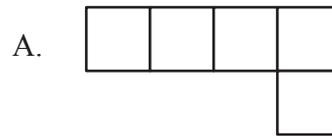
If Pru's friend is standing 15 ft away from the building and the angle of depression is  $63^\circ$ , approximately how high up is Pru's window?

- A. 7 ft
  - B. 8 ft
  - C. 13 ft
  - \* D. 29 ft
19. If the height of a cylinder is divided by 3, how will its volume change?
- \* A. It will be divided by 3.
  - B. It will be divided by 6.
  - C. It will be divided by 9.
  - D. It will be divided by 27.

Use the diagram below to answer question 20.



20. Which of the following is the top view for the object above?

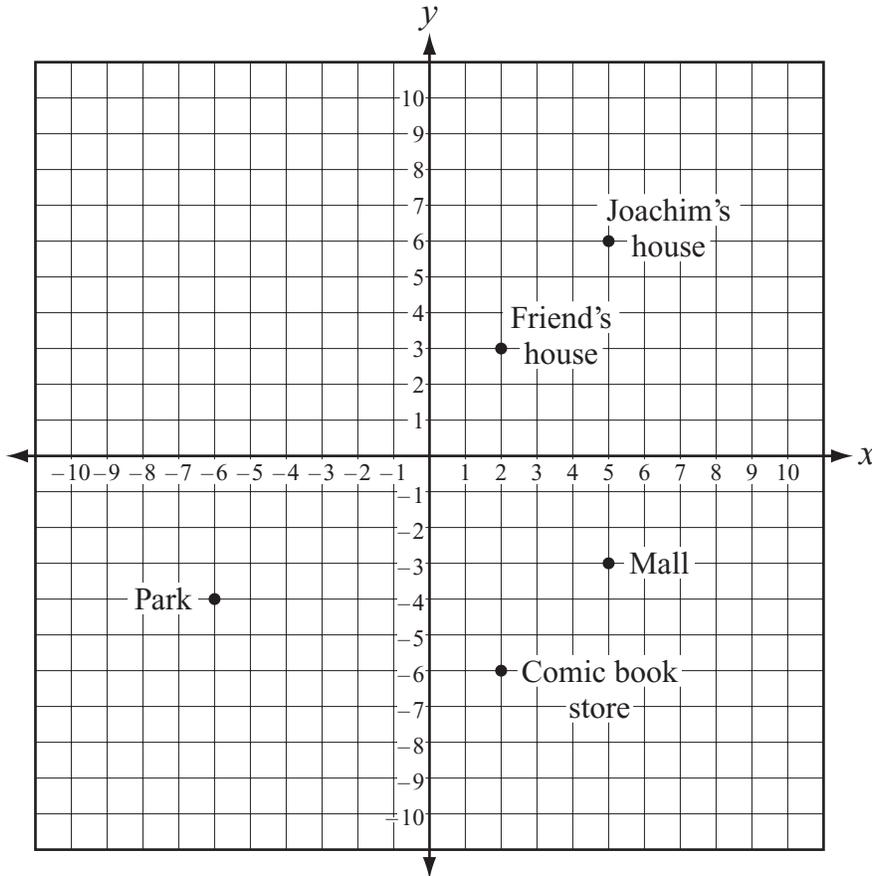


## PART II SPRING RELEASED GEOMETRY ITEMS

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21. A polygon graphed on a coordinate plane has the coordinates  $(2, 2)$ ,  $(4, 8)$ ,  $(8, 8)$ , and  $(11, 2)$ . What type of polygon is graphed?
- A. isosceles triangle
  - B. parallelogram
  - \* C. trapezoid
  - D. square
22. Two lines are cut by a transversal. Alyssa finds that a pair of alternate exterior angles measures  $45^\circ$ . Which statement is true?
- A. The two lines are parallel, and each of the other exterior angles measures  $45^\circ$ .
  - \* B. The two lines are parallel, and each of the other exterior angles measures  $135^\circ$ .
  - C. The two lines are not necessarily parallel, but each of the other exterior angles measures  $45^\circ$ .
  - D. The two lines are not necessarily parallel, but each of the other exterior angles measures  $135^\circ$ .

23. Joachim used a coordinate grid, shown below, to show the locations of the places he likes to go in his home town. Each block represents 1 square kilometer.

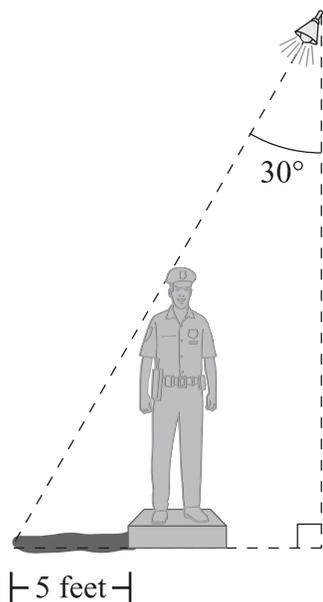


If Joachim travels in a straight line from the mall to the park, how many kilometers does he travel? Round your answer to the nearest tenth of a kilometer.

- \* A. 11.0
- B. 11.4
- C. 12.0
- D. 12.5

## PART II SPRING RELEASED GEOMETRY ITEMS

24. In an art gallery, a light shines on a statue, creating a shadow on the floor, as shown in the diagram below.



If the shadow is 5 feet long, how tall is the statue?

- A.  $\frac{5}{\sqrt{3}}$  feet  
B. 5 feet  
C.  $5\sqrt{2}$  feet  
\* D.  $5\sqrt{3}$  feet

25. What is the **exact** amount of wrapping paper necessary to cover the surface of a box in the shape of a rectangular solid that is 4.5 inches by 5.5 inches by 7 inches?

- A. 175.0 square inches  
B. 182.5 square inches  
\* C. 189.5 square inches  
D. 214.0 square inches

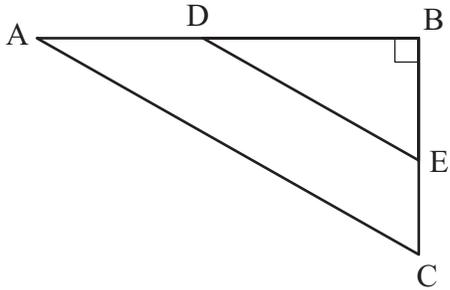
26. Paul needs to read a book and fill out each side of a cube with a different fact about the book. How many facts does Paul need to find?

- A. 4  
\* B. 6  
C. 8  
D. 12

27. What are the center and the radius of a circle with equation  $(x - 3)^2 + (y + 2)^2 = 25$ ?

- A. Center:  $(-3, 2)$  and Radius: 5  
B. Center:  $(-3, 2)$  and Radius: 25  
\* C. Center:  $(3, -2)$  and Radius: 5  
D. Center:  $(3, -2)$  and Radius: 25

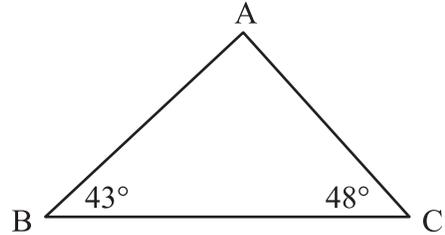
28. In the diagram below,  $\triangle ABC$  is similar to  $\triangle DBE$ .



What is  $\tan \angle DEB$ ?

- \* A.  $\frac{DB}{BE}$
- B.  $\frac{BE}{DB}$
- C.  $\frac{DB}{DE}$
- D.  $\frac{BC}{AB}$

29. The figure below shows  $\triangle ABC$  where  $m\angle B = 43^\circ$  and  $m\angle C = 48^\circ$ .

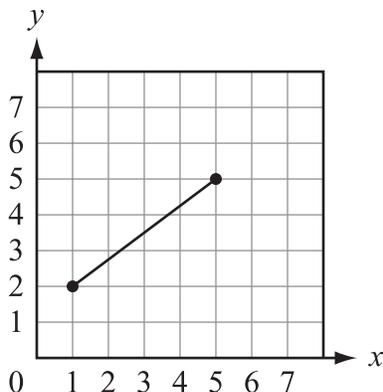


Which fact can be used to find  $m\angle A$ ?

- A.  $m\angle A = m\angle B + m\angle C$
  - B.  $\triangle ABC$  is a right triangle.
  - C.  $\triangle ABC$  is an isosceles triangle.
  - \* D. The sum of the measures of the interior angles of a triangle is  $180^\circ$ .
30. What is the equation of the line that is parallel to  $y = 3x + 5$  and passes through the point  $(0, -2)$ ?
- A.  $y = 3x$
  - \* B.  $y = 3x - 2$
  - C.  $y = 3x + 2$
  - D.  $y = 3x + 3$

## PART II SPRING RELEASED GEOMETRY ITEMS

- A. A carpenter wants to cut a board, represented by the segment shown on the graph below, into two equal pieces.



1. What point on the graph represents where the carpenter should cut the board? Show your work.
2. The carpenter needs to make the cut perpendicular to the board. What is the equation of the line representing the perpendicular bisector of the board on the graph? Show your work.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

### Item A Scoring Rubric—2014 Geometry

Score	Description
4	The student earns 4 points. The response contains no incorrect work.
3	The student earns 3 points.
2	The student earns 2 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.)

**SOLUTION AND SCORING**

**Board-Segment Endpoints:**            **(1,2)    (5,5)**

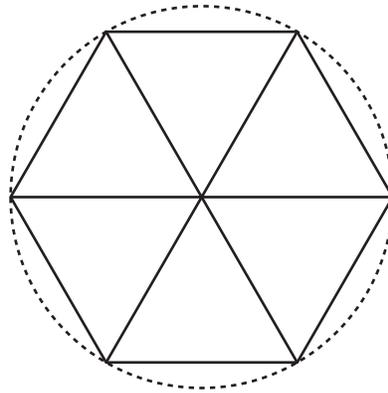
**4 points possible:**

Part	Points
<b>1</b>	<p><b>2 points possible:</b></p> <p>2 points:    Correct coordinates: <math>\left(3, \frac{7}{2}\right)</math> or <math>(3, 3.5)</math> or <math>\left(3, 3\frac{1}{2}\right)</math></p> <p>Correct procedure is shown and/or explained Give credit for the following or equivalent:</p> <p>Ex. The carpenter should cut the board at the midpoint of the line segment representing the board.</p> $\left(\frac{1+5}{2}, \frac{2+5}{2}\right) = \left(3, \frac{7}{2}\right)$ <p>Therefore, the carpenter should cut the board at <math>\left(3, \frac{7}{2}\right)</math></p> <p>Ex. <math>\left(\frac{1+5}{2}, \frac{2+5}{2}\right) = (3, 3.5)</math></p> <p>Ex. "From (1,2) I counted right 2 units and up 1.5 units to (3, 3.5). From (3, 3.5) I counted right 2 units and up 1.5 units to (5, 5)."</p> <p><b>OR</b></p> <p>1 point</p> <ul style="list-style-type: none"> <li>• Correct Coordinates: <math>\left(3, \frac{7}{2}\right)</math> Procedure is missing or incomplete</li> <li>• Missing coordinates Correct procedure is shown and/or explained</li> <li>• Incorrect coordinates due to a calculation or copy error Correct procedure is shown and/or explained</li> <li>• One correct coordinate with the correct procedure shown. Other coordinate is missing or incorrect</li> <li>• Correct coordinates. Missing parenthesis Correct procedure is shown and/or explained</li> </ul>

## PART II SPRING RELEASED GEOMETRY ITEMS

Part	Points
2	<p><b>2 points possible:</b></p> <p>2 points: Correct equation or equivalent equation: <math>y = -\frac{4}{3}x + \frac{15}{2}</math>  <i>(or correct equation based on an incorrect coordinate in Part 1)</i>            Correct procedure is shown and/or explained            Give credit for the following or equivalent:</p> <p>Ex. The slope of the board is <math>m = \frac{5-2}{5-1} = \frac{3}{4}</math></p> <p>The slope of the perpendicular bisector is <math>-\frac{4}{3}</math></p> <p>The line will pass through the midpoint of the segment found in Part 1.</p> $y - 3\frac{1}{2} = -\frac{4}{3}(x - 3)$ $y - 3\frac{1}{2} = -\frac{4}{3}x + 4$ $y = -\frac{4}{3}x + \frac{15}{2}$ <p>So, the carpenter should cut the board along the line <math>y = -\frac{4}{3}x + \frac{15}{2}</math></p> <p>Ex. <math>m_{\text{Board}} = \frac{5-2}{5-1} = \frac{3}{4} \Rightarrow m_{\perp\text{Bisector}} = -\frac{4}{3}</math></p> $\frac{7}{2} = -\frac{4}{3}(3) + b = -4 + b \Rightarrow \frac{7+8}{2} = \frac{15}{2} = b$ $\Rightarrow y = -\frac{4}{3}x + \frac{15}{2}$ <p><b>OR</b></p> <p>1 point</p> <ul style="list-style-type: none"> <li>• Correct equation: <math>y = -\frac{4}{3}x + \frac{15}{2}</math>  <i>(or correct equation based on an incorrect coordinate in Part 1)</i>            Procedure is missing or incomplete</li> <li>• Incorrect equation due to a calculation or copy error            Correct procedure is shown and/or explained</li> <li>• Correct equation with correct procedure            for an incorrect slope shown of the original board in Part 1.</li> </ul>

- B.** The pizza restaurant made a pizza in the shape of a regular hexagon for Alejandro’s party. A circular pie was cut into 6 equal slices and then the outside corner parts were removed. The pie at this restaurant is 14 inches in diameter.



1. What is the area of the circular pie? Round your answer to the nearest hundredth of a square inch. Show your work or explain how you found your answer.
  
2. What is the area of each triangular piece of the hexagonal pizza? Round your answer to the nearest hundredth of a square inch. Show your work or explain how you found your answer.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

<b>Item B Scoring Rubric—2014 Geometry</b>
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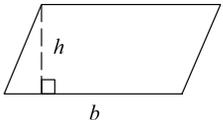
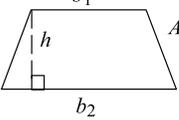
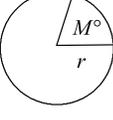
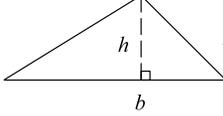
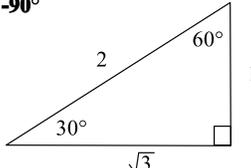
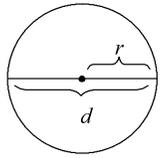
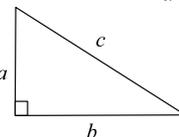
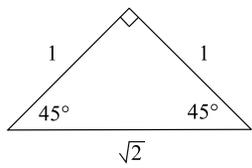
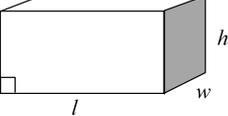
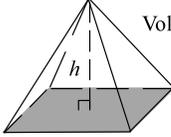
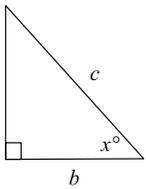
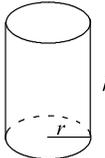
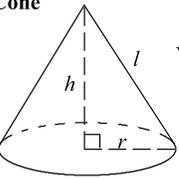
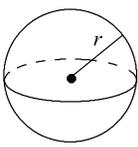
Score	Description
<b>4</b>	The student earns 5 points. The response contains no incorrect work.
<b>3</b>	The student earns $3\frac{1}{2}$ – $4\frac{1}{2}$ points.
<b>2</b>	The student earns 2 – 3 points.
<b>1</b>	The student earns $\frac{1}{2}$ – $1\frac{1}{2}$ points, or some minimal understanding is shown.
<b>0</b>	The student earns 0 points. No understanding is shown.
<b>B</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 END-OF-COURSE MATHEMATICS REFERENCE SHEET

## End-of-Course Mathematics Reference Sheet

<b>Parallelogram</b>  $P =$ sum of all sides $A = bh$	<b>Trapezoid</b>  $A = \frac{h(b_1 + b_2)}{2}$	<b>Arc and Sector</b>  Arc Length = $\left(\frac{M}{360}\right) \times 2\pi r$ Sector area = $\left(\frac{M}{360}\right) \times \pi r^2$
<b>Triangle</b>  $P =$ sum of all sides $A = \frac{bh}{2}$	<b>Rectangle</b>  $P = 2l + 2w$ $A = lw$	<b>30° -60° -90°</b> 
<b>Circle</b>  $C = 2\pi r$ $C = \pi d$ $A = \pi r^2$ $\pi \approx 3.14$	<b>Pythagorean Theorem</b> $a^2 + b^2 = c^2$ 	<b>45° -45° -90°</b> 
<b>Rectangular Solid</b>  $\text{Volume} = lwh$ $\text{Surface area} = 2lw + 2lh + 2wh$	<b>Pyramid</b> $B =$ area of base (shaded) $\text{Volume} = \frac{Bh}{3}$ 	<b>Trigonometric Ratios</b>  $\sin x^\circ = \frac{a}{c}$ $\cos x^\circ = \frac{b}{c}$ $\tan x^\circ = \frac{a}{b}$
<b>Cylinder</b>  $\text{Volume} = \pi r^2 h$ $\text{Surface area} = 2\pi rh + 2\pi r^2$	<b>Cone</b> $l =$ slant height $\text{Volume} = \frac{\pi r^2 h}{3}$ $\text{Surface area} = \pi rl + \pi r^2$ 	<b>Sphere</b>  $\text{Volume} = \frac{4\pi r^3}{3}$ $\text{Surface area} = 4\pi r^2$

<b>Miscellaneous Formulas</b>	Area of an equilateral triangle	$A = \frac{s^2\sqrt{3}}{4}$ $s =$ length of a side
	Distance	rate $\times$ time
	Interest	principal $\times$ rate $\times$ time in years
	Sum of the angles of a polygon having $n$ sides	$(n - 2)180^\circ$
	Distance between points on a coordinate plane	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
	Midpoint	$\left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2}\right)$
	Slope of a nonvertical line (where $x_2 \neq x_1$ )	$m = \frac{y_2 - y_1}{x_2 - x_1}$
	Slope intercept (where $m =$ slope, $b =$ intercept)	$y = mx + b$
	Last term of an arithmetic series	$a_n = a + (n - 1)d$
	Last term of a geometric series (where $n \geq 1$ )	$a_n = ar^{n-1}$
	Quadratic formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
	Area of a square	$A = s^2$
	Volume of a cube	$V = s^3$
Area of a regular polygon	$A = \frac{1}{2}ap$ $a =$ apothem, $p =$ perimeter	

**The Arkansas Geometry Mathematics Curriculum Framework\***

Strands	Content Standards	Student Learning Expectations
1. LANGUAGE OF GEOMETRY (LG)	1. Students will develop the language of geometry including specialized vocabulary, reasoning, and application of theorems, properties, and postulates.	<ol style="list-style-type: none"> <li>1. Define, compare, and contrast inductive reasoning and deductive reasoning for making predictions based on real-world situations.                             <ul style="list-style-type: none"> <li>• Venn diagrams</li> <li>• matrix logic</li> <li>• conditional statements (statement, inverse, converse, and contrapositive)</li> <li>• figural patterns</li> </ul> </li> <li>2. Represent points, lines, and planes pictorially with proper identification, as well as basic concepts derived from these undefined terms, such as segments, rays, and angles.</li> <li>3. Describe relationships derived from geometric figures or figural patterns.</li> <li>4. Apply, with and without appropriate technology, definitions, theorems, properties, and postulates related to such topics as complementary, supplementary, vertical angles, linear pairs, and angles formed by perpendicular lines.</li> <li>5. Explore, with and without proper technology, the relationship between angles formed by two lines cut by a transversal to justify when lines are parallel.</li> <li>6. Give justification for conclusions reached by deductive reasoning. State and prove key basic theorems in geometry (i.e., the Pythagorean theorem, the sum of the measures of the angles of a triangle is <math>180^\circ</math>, and the line joining the midpoints of two sides of a triangle is parallel to the third side and half its length).</li> </ol>
2. TRIANGLES (T)	2. Students will identify and describe types of triangles and their special segments. They will use logic to apply the properties of congruence, similarity, and inequalities. The students will apply the Pythagorean Theorem and trigonometric ratios to solve problems in real-world situations.	<ol style="list-style-type: none"> <li>1. Apply congruence (SSS ...) and similarity (AA ...) correspondences and properties of figures to find missing parts of geometric figures, and provide logical justification.</li> <li>2. Investigate the measures of segments to determine the existence of triangles (triangle inequality theorem).</li> <li>3. Identify and use the special segments of triangles (altitude, median, angle bisector, perpendicular bisector, and midsegment) to solve problems.</li> <li>4. Apply the Pythagorean Theorem and its converse in solving practical problems.</li> <li>5. Use the special right triangle relationships (<math>30^\circ</math>-<math>60^\circ</math>-<math>90^\circ</math> and <math>45^\circ</math>-<math>45^\circ</math>-<math>90^\circ</math>) to solve problems.</li> <li>6. Use trigonometric ratios (sine, cosine, tangent) to determine lengths of sides and measures of angles in right triangles, including angles of elevation and angles of depression.</li> <li>7. Use similarity of right triangles to express the sine, cosine, and tangent of an angle, in a right triangle, as a ratio of given lengths of sides.</li> </ol>

\*The Content Standards and Student Learning Expectations listed are those that specifically relate to the items in the 2014 Mid-Year and Spring End-of-Course Geometry Examinations.

## PART III CURRICULUM FRAMEWORK

### The Arkansas Geometry Mathematics Curriculum Framework\*

Strands	Content Standards	Student Learning Expectations
3. MEASUREMENT (M)	3. Students will measure and compare, while using appropriate formulas, tools, and technology, to solve problems dealing with length, perimeter, area, and volume.	<ol style="list-style-type: none"> <li>1. Calculate probabilities arising in geometric contexts. (Ex. Find the probability of hitting a particular ring on a dartboard.)</li> <li>2. Apply, using appropriate units, appropriate formulas (area, perimeter, surface area, volume) to solve application problems involving polygons, prisms, pyramids, cones, cylinders, and spheres, as well as composite figures, expressing solutions in both exact and approximate forms.</li> <li>3. Relate changes in the measurement of one attribute of an object to changes in other attributes. (Ex. How does changing the radius or height of a cylinder affect its surface area or volume?)</li> <li>4. Use (given similar geometric objects) proportional reasoning to solve practical problems (including scale drawings).</li> <li>5. Identify and apply properties of, and theorems about, parallel and perpendicular lines to prove other theorems and perform basic Euclidean constructions.</li> </ol>
4. RELATIONSHIPS BETWEEN TWO- AND THREE-DIMENSIONS (R)	4. Students will analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.	<ol style="list-style-type: none"> <li>1. Explore and verify the properties of quadrilaterals.</li> <li>2. Solve problems using properties of polygons. <ul style="list-style-type: none"> <li>• sum of the measures of the interior angles of a polygon</li> <li>• interior and exterior angle measure of a regular polygon or irregular polygon</li> <li>• number of sides or angles of a polygon</li> </ul> </li> <li>3. Identify and explain why figures tessellate.</li> <li>4. Identify the attributes of the five Platonic Solids.</li> <li>5. Investigate and use the properties of angles (central and inscribed), arcs, chords, tangents, and secants to solve problems involving circles.</li> <li>6. Solve problems using inscribed and circumscribed figures.</li> <li>7. Use orthographic drawings (top, front, side) and isometric drawings (corner) to represent three-dimensional objects.</li> <li>8. Draw, examine, and classify cross-sections of three-dimensional objects.</li> <li>9. Explore non-Euclidean geometries, such as spherical geometry, and identify its unique properties which result from a change in the parallel postulate.</li> </ol>
5. COORDINATE GEOMETRY AND TRANSFORMATIONS (CGT)	5. Students will specify locations, apply transformations, and describe relationships using coordinate geometry.	<ol style="list-style-type: none"> <li>1. Use coordinate geometry to find the distance between two points, the midpoint of a segment, and the slopes of parallel, perpendicular, horizontal, and vertical lines.</li> <li>2. Write the equation of a line parallel to a line through a given point not on the line.</li> <li>3. Write the equation of a line perpendicular to a line through a given point.</li> <li>4. Write the equation of the perpendicular bisector of a line segment.</li> <li>5. Determine, given a set of points, the type of figure based on its properties (parallelogram, isosceles triangle, trapezoid).</li> <li>6. Write, in standard form, the equation of a circle, given a graph on a coordinate plane or the center and radius of a circle.</li> <li>7. Draw and interpret the results of transformations and successive transformations on figures in the coordinate plane. <ul style="list-style-type: none"> <li>• translations</li> <li>• reflections</li> <li>• rotations (90°, 180°, clockwise and counterclockwise about the origin)</li> <li>• dilations (scale factor)</li> </ul> </li> </ol>

\*The Content Standards and Student Learning Expectations listed are those that specifically relate to the items in the 2014 Mid-Year and Spring End-of-Course Geometry Examinations.

## PART IV ITEM CORRELATION WITH CURRICULUM FRAMEWORK

### Mid-Year Released Geometry Items\*

Strands	Content Standards
1— LANGUAGE OF GEOMETRY (LG)	1. Students will develop the language of geometry including specialized vocabulary, reasoning, and application of theorems, properties, and postulates.
2— TRIANGLES (T)	2. Students will identify and describe types of triangles and their special segments. They will use logic to apply the properties of congruence, similarity, and inequalities. The students will apply the Pythagorean Theorem and trigonometric ratios to solve problems in real-world situations.
3— MEASUREMENT (M)	3. Students will measure and compare, while using appropriate formulas, tools, and technology, to solve problems dealing with length, perimeter, area, and volume.
4— RELATIONSHIPS BETWEEN TWO- AND THREE-DIMENSIONS (R)	4. Students will analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.
5— COORDINATE GEOMETRY AND TRANSFORMATIONS (CGT)	5. Students will specify locations, apply transformations, and describe relationships using coordinate geometry.

Item	Strand	Content Standard	Student Learning Expectation
1	LG	1	3
2	T	2	1
3	M	3	3
4	CGT	5	2
5	T	2	3
6	LG	1	5
7	CGT	5	7
8	R	4	4
9	CGT	5	1
10	R	4	2
11	R	4	8
12	T	2	6
13	LG	1	1
14	LG	1	4
15	M	3	4
16	CGT	5	4
17	M	3	5
18	M	3	3
19	T	2	4
20	CGT	5	5
21	R	4	5
22	T	2	5
23	LG	1	2
24	M	3	2
25	R	4	6
26	CGT	5	6
27	T	2	7
28	M	3	1
29	R	4	3
30	LG	1	4
A	CGT	5	3
B	R	4	5
C	T	2	1

\*Only the predominant Strand, Content Standard, and Student Learning Expectation are listed for the Geometry items.

## PART IV ITEM CORRELATION WITH CURRICULUM FRAMEWORK

### Spring Released Geometry Items\*

Strands	Content Standards
1— LANGUAGE OF GEOMETRY (LG)	1. Students will develop the language of geometry including specialized vocabulary, reasoning, and application of theorems, properties, and postulates.
2— TRIANGLES (T)	2. Students will identify and describe types of triangles and their special segments. They will use logic to apply the properties of congruence, similarity, and inequalities. The students will apply the Pythagorean Theorem and trigonometric ratios to solve problems in real-world situations.
3— MEASUREMENT (M)	3. Students will measure and compare, while using appropriate formulas, tools, and technology, to solve problems dealing with length, perimeter, area, and volume.
4— RELATIONSHIPS BETWEEN TWO- AND THREE-DIMENSIONS (R)	4. Students will analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.
5— COORDINATE GEOMETRY AND TRANSFORMATIONS (CGT)	5. Students will specify locations, apply transformations, and describe relationships using coordinate geometry.

Item	Strand	Content Standard	Student Learning Expectation
1	M	3	4
2	LG	1	5
3	T	2	2
4	R	4	9
5	LG	1	3
6	T	2	1
7	M	3	5
8	R	4	6
9	T	2	3
10	R	4	1
11	M	3	1
12	LG	1	4
13	CGT	5	7
14	R	4	2
15	M	3	2
16	CGT	5	3
17	LG	1	1
18	T	2	6
19	M	3	3
20	R	4	7
21	CGT	5	5
22	LG	1	5
23	CGT	5	1
24	T	2	5
25	M	3	2
26	R	4	4
27	CGT	5	6
28	T	2	7
29	LG	1	6
30	CGT	5	2
A	CGT	5	4
B	R	4	6

\*Only the predominant Strand, Content Standard, and Student Learning Expectation are listed for the Geometry items.

## PART IV ITEM CORRELATION WITH CURRICULUM FRAMEWORK

### Mid-Year Non-Released Geometry Items\*

Strands	Content Standards
1— LANGUAGE OF GEOMETRY (LG)	1. Students will develop the language of geometry including specialized vocabulary, reasoning, and application of theorems, properties, and postulates.
2— TRIANGLES (T)	2. Students will identify and describe types of triangles and their special segments. They will use logic to apply the properties of congruence, similarity, and inequalities. The students will apply the Pythagorean Theorem and trigonometric ratios to solve problems in real-world situations.
3— MEASUREMENT (M)	3. Students will measure and compare, while using appropriate formulas, tools, and technology, to solve problems dealing with length, perimeter, area, and volume.
4— RELATIONSHIPS BETWEEN TWO- AND THREE-DIMENSIONS (R)	4. Students will analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.
5— COORDINATE GEOMETRY AND TRANSFORMATIONS (CGT)	5. Students will specify locations, apply transformations, and describe relationships using coordinate geometry.

Strand	Content Standard	Student Learning Expectation
CGT	5	7
LG	1	2
R	4	7
R	4	4
T	2	4
M	3	1
M	3	4
LG	1	5
M	3	3
CGT	5	6
M	3	2
M	3	5
R	4	1
T	2	5
T	2	2
CGT	5	3
M	3	4
T	2	1
R	4	9
LG	1	6
R	4	1
T	2	3
LG	1	3
CGT	5	2
LG	1	1
R	4	7
M	3	4
LG	1	6
CGT	5	5
T	2	2
CGT	5	1
LG	1	2

\*Only the predominant Strand, Content Standard, and Student Learning Expectation are listed for the Geometry items.

## PART IV ITEM CORRELATION WITH CURRICULUM FRAMEWORK

### Spring Non-Released Geometry Items\*

Strands	Content Standards
1— LANGUAGE OF GEOMETRY (LG)	1. Students will develop the language of geometry including specialized vocabulary, reasoning, and application of theorems, properties, and postulates.
2— TRIANGLES (T)	2. Students will identify and describe types of triangles and their special segments. They will use logic to apply the properties of congruence, similarity, and inequalities. The students will apply the Pythagorean Theorem and trigonometric ratios to solve problems in real-world situations.
3— MEASUREMENT (M)	3. Students will measure and compare, while using appropriate formulas, tools, and technology, to solve problems dealing with length, perimeter, area, and volume.
4— RELATIONSHIPS BETWEEN TWO- AND THREE-DIMENSIONS (R)	4. Students will analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.
5— COORDINATE GEOMETRY AND TRANSFORMATIONS (CGT)	5. Students will specify locations, apply transformations, and describe relationships using coordinate geometry.

Strand	Content Standard	Student Learning Expectation
CGT	5	5
R	4	8
T	2	4
M	3	3
LG	1	2
CGT	5	7
CGT	5	6
CGT	5	1
LG	1	1
CGT	5	4
R	4	3
M	3	3
T	2	3
T	2	1
R	4	7
LG	1	4
T	2	4
M	3	4
CGT	5	2
LG	1	6
M	3	5
LG	1	3
R	4	1
T	2	6
R	4	6
LG	1	2
R	4	5
T	2	2
M	3	4
M	3	1
T	2	5
M	3	3
LG	1	3

\*Only the predominant Strand, Content Standard, and Student Learning Expectation are listed for the Geometry items.







# ACTAAP

**Arkansas Comprehensive Testing, Assessment, and Accountability Program**

DEVELOPED FOR THE ARKANSAS DEPARTMENT OF EDUCATION, LITTLE ROCK, AR 72201

QAI-13269 Geo-RIB AR1404



QAI13269