



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

# **Released Item Booklet**

## **Benchmark Examination Grade 8**

**February and March 2006  
Administration**

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**Arkansas Department of Education**

**CALCULATOR NOT PERMITTED — ITEMS 1–8**

1. Use your ruler to determine which of the following rectangles could accurately represent a parking lot that is 50 m long and 20 m wide.

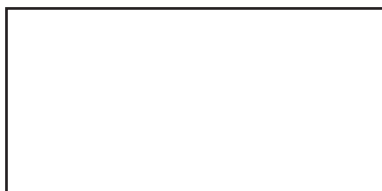
\* A.



B.



C.



D.



2. John is taking a trip by car. How could he compute his average speed in miles per hour?

- A. divide the number of miles that he travels by 2
- B. divide the number of hours that he drives by the miles that he travels
- C. multiply the miles that he travels by the number of hours that he drives
- \* D. divide the miles that he travels by the number of hours that he drives

3. Willis is 54 inches tall. Phil is 4 feet, 4 inches tall. Kimberley is 1 yard and 2 feet tall. Nell is 1 yard and 20 inches tall. Who is the tallest among the four individuals?

- A. Willis
- B. Phil
- \* C. Kimberley
- D. Nell

4. Eastern Middle School is giving away a door prize at the school dance. Every student who attends the dance gets one ticket. There are 200 attending students. There are 25 tables, with 8 students at each table. Jill and her friends are sitting at Table 5. What is the probability that someone at Table 5 will win the door prize?

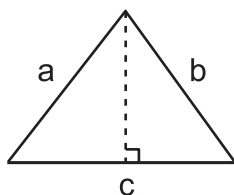
- A.  $\frac{1}{200}$
- \* B.  $\frac{1}{25}$
- C.  $\frac{1}{8}$
- D.  $\frac{8}{25}$

5. Jill has a square-shaped deck in her backyard with the dimensions  $15 \text{ ft} \times 15 \text{ ft}$ . She plans to enlarge the deck by adding the same amount to the length and the width of the current deck. If the length of the addition is  $a$ , which equation would provide the new area after the deck enlargement?

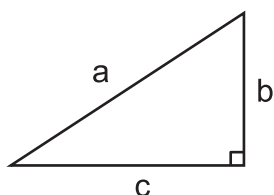
- A. Area =  $15a$
- B. Area =  $15^2 + a^2$
- C. Area =  $15(15 + a)$
- \* D. Area =  $(15 + a)(15 + a)$

6. Which figure **best** represents a triangle with sides  $a$ ,  $b$ , and  $c$  in which the relationship  $a^2 + b^2 = c^2$  is always true?

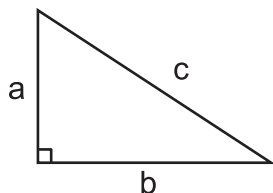
A.



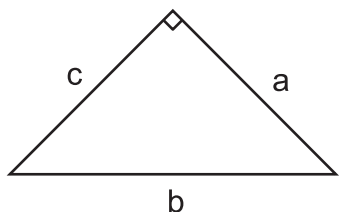
B.



\* C.



D.



7. How many hours does Harry work per week if he works  $2\frac{3}{4}$  hours a day for 5 days a week?

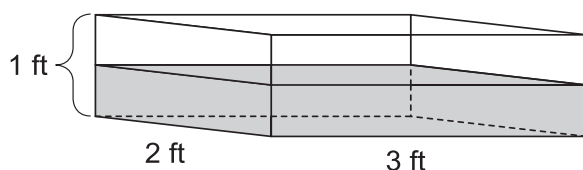
- A.  $10\frac{3}{4}$
- B.  $13\frac{1}{4}$
- \* C.  $13\frac{3}{4}$
- D.  $14\frac{1}{4}$

8. A city manager wants to graph the city's population growth across a period of 150 years. She will use the graph to illustrate changes in the rate of growth over time. Which graph would be **most** appropriate for that purpose?

- \* A. line graph
- B. circle graph
- C. double bar graph
- D. relative frequency histogram

CALCULATOR PERMITTED — ITEMS 9–40

9. A tank is half full of water, as shown below.



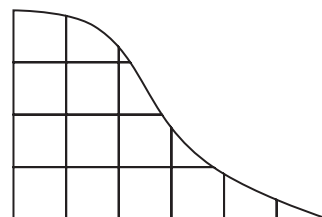
Several large stones are dropped into the tank, and the water level rises to  $\frac{3}{4}$  full. What is the total volume of the stones?

- A.  $0.75 \text{ ft}^3$   
 \* B.  $1.5 \text{ ft}^3$   
 C.  $3.0 \text{ ft}^3$   
 D.  $4.5 \text{ ft}^3$
10. John has a deck of 10 cards. There are 4 red cards numbered from 1 to 4 and 6 black cards numbered from 1 to 6. John randomly picks one card from the deck without looking. Which pair of outcomes is equally likely?
- A. picking a 1 or picking a 5  
 B. picking a 4 or picking a 6  
 C. picking a red card or picking a black card  
 \* D. picking an even-numbered card or picking an odd-numbered card
11. What is the estimated angle distance between the hour hand and minute hand on a wristwatch when the time is 12:30?
- A.  $18^\circ$   
 B.  $85^\circ$   
 \* C.  $175^\circ$   
 D.  $355^\circ$

12. Which value completes the number sentence below?

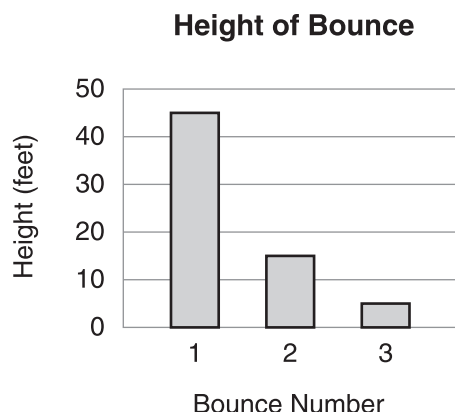
$$\frac{1}{4} \times 1.5 = \underline{\hspace{1cm}}$$

- \* A.  $\frac{3}{8}$   
 B. 0.60  
 C.  $\frac{5}{8}$   
 D. 2.10
13. What is the **approximate** area of the figure below?



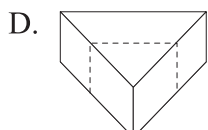
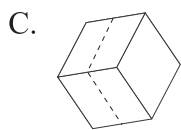
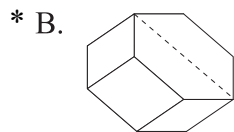
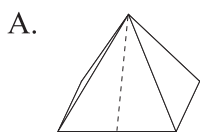
- A. 8 square units  
 B. 10 square units  
 \* C. 12 square units  
 D. 14 square units
14. Which of the following metric units of measure would be the **best** conversion choice to describe the volume of an object that is 2 inches long, 3 inches wide, and 4 inches tall?
- \* A.  $\text{cm}^3$   
 B.  $\text{cm}^2$   
 C.  $\text{km}^2$   
 D.  $\text{km}^3$

15. John dropped a golf ball from the window of a building. The graph and accompanying table give the height of each of the ball's first three bounces. Based on the data given, what is the predicted height of the 4th bounce?

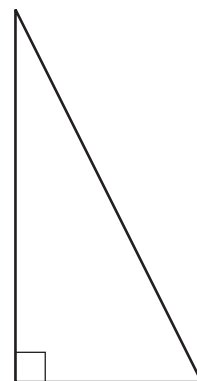


Height of Bounce				
Height (feet)	45	15	5	?
Bounce Number	1	2	3	4

- A. 1 foot 4 inches  
 B. 1 foot 6 inches  
 \* C. 1 foot 8 inches  
 D. 1 foot 10 inches
16. Zack made some polygons out of clay. If he makes a cross-sectional cut, as shown by the dotted line on each polygon, which one would result in two prisms with trapezoid bases?



17. Use your ruler to find the area of the triangle below.

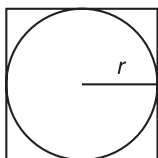


- A.  $2 \text{ cm}^2$   
 \* B.  $6.25 \text{ cm}^2$   
 C.  $12.5 \text{ cm}^2$   
 D.  $6.875 \text{ cm}^2$
18. At a local market, 18 pears sell for \$5.97. If a customer buys 12 pears at the same unit rate, how much will he pay?
- A. \$1.99  
 B. \$2.98  
 \* C. \$3.98  
 D. \$4.98
19. The area of a rectangle is 220 square feet. Its length is 2 feet more than twice its width. Let  $A$  = area and  $w$  = width. Which equation can be used to solve for the rectangle's width?
- A.  $A = (w)(2w)$   
 \* B.  $A = (w)(2w + 2)$   
 C.  $A = (w)(2w - 2)$   
 D.  $A = (2w)(2w + 2)$

20. Alan has 4 cards numbered from 1 to 4. He picks 2 cards simultaneously without looking. What is the probability that those 2 cards are consecutive numbers?

A.  $\frac{1}{16}$   
 B.  $\frac{1}{3}$   
 \* C.  $\frac{1}{2}$   
 D.  $\frac{2}{3}$

21. A circle is inscribed inside of a square, where the circle touches all four sides of the square, as shown below. Jan wants to calculate the ratio of the area of the square to the area of the circle. She knows that the area of the circle =  $\pi r^2$ . She determines that the ratio =  $4 : \pi$ . Why is that the case?



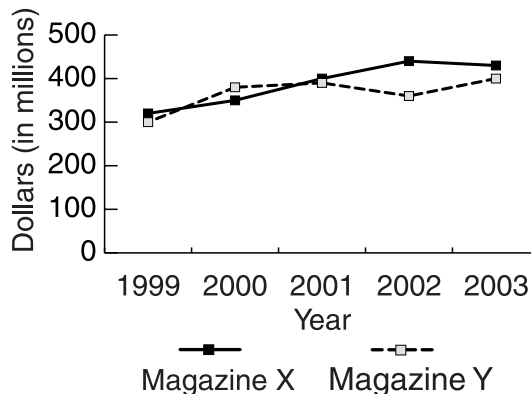
- A. A side of the square = the radius. Thus, the area of the square =  $r^2$ .  
 \* B. A side of the square = 2 times the radius. Thus, the area of the square =  $4r^2$ .  
 C. A side of the square = 4 times the radius. Thus the area of the square =  $16r^2$ .  
 D. A side of the square =  $\frac{1}{2}$  the radius.  
 Thus, the area of the square =  $\frac{1}{4} r^2$ .

22. Which of the following is the **most** reasonable estimate of the square root of 148?

A. 11  
 \* B. 12  
 C. 13  
 D. 14

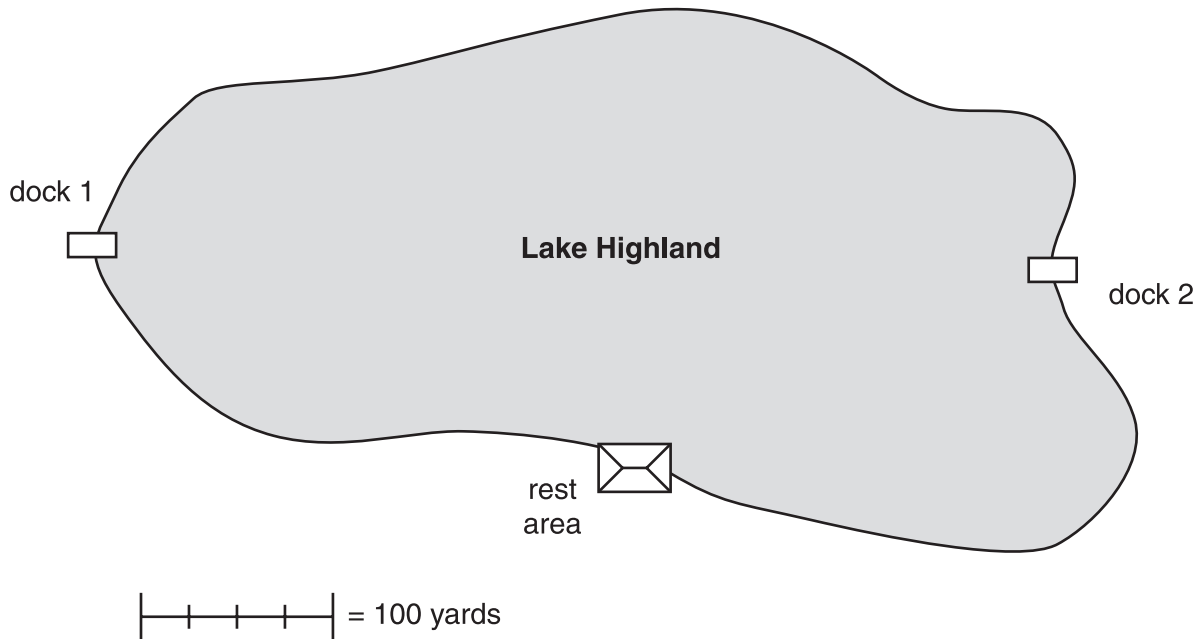
23. An advertising company graphs its expenditures for magazine advertising during a four-year period. The graph below shows the dollars, in millions, spent for advertising in two magazines. Which of the following can be inferred from the graph?

**Expenditures for Magazine Advertising**



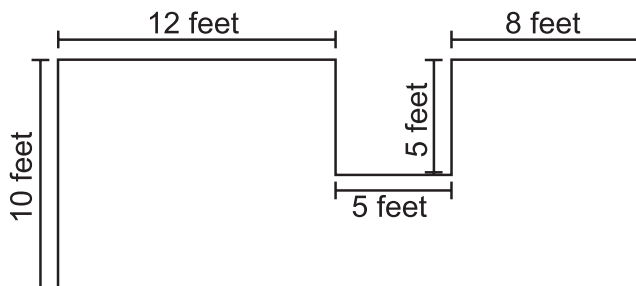
- A. Expenditures went up every year for both magazines.  
 B. Expenditures were greater for Magazine X every year.  
 \* C. The total expenditure on the two magazines combined went up every year.  
 D. The biggest increase in total expenditure for the two magazines was from 2000 to 2001.

24. A scale map of Lake Highland is shown below. Use your ruler to estimate the shortest distance on land between dock 2 and the rest area.



- A. 100 yards
- B. 300 yards
- \* C. 400 yards
- D. 500 yards

25. Mary plans to put carpeting in her house. The floor plan below shows the part of her house that will be carpeted. How many square feet of carpet will she need?



- A. 175
- B. 200
- \* C. 225
- D. 250

26. Barbara is on the school basketball team. Her team has one more game to play in a 20-game season. Her goal is to average 20 points per game. Barbara wants to compute how many points she will need in the final game to average 20 for the season. Which of the following should she do?

- A. add 20 to her current average
- B. subtract her current average from 20
- C. subtract her current total points from 200
- \* D. subtract her current total points from 400

27. The rectangular figure shown in Figure 1 is cut along the dotted line and reassembled as shown below in Figure 2.

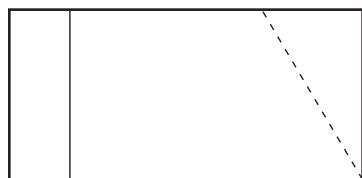


Figure 1

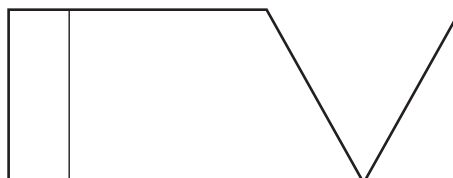
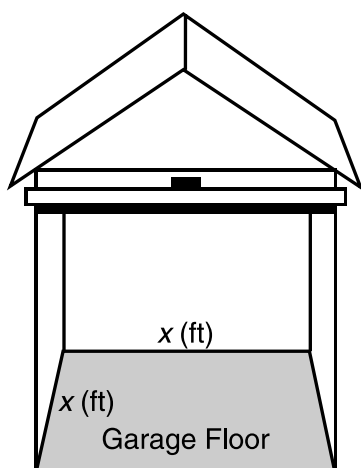


Figure 2

Which statement about the areas and perimeters of Figures 1 and 2 is true?

- A. The area of Figure 1 is equal to the area of Figure 2, and the perimeter of Figure 1 is equal to the perimeter of Figure 2.
- \* B. The area of Figure 1 is equal to the area of Figure 2, and the perimeter of Figure 2 is greater than the perimeter of Figure 1.
- C. The area of Figure 1 is greater than the area of Figure 2, and the perimeter of Figure 1 is greater than the perimeter of Figure 2.
- D. The area of Figure 1 is greater than the area of Figure 2, and the perimeter of Figure 1 is equal to the perimeter of Figure 2.

28. Anne's garage has a square-shaped floor. The length of each side is an integer number,  $x$ , of feet. Regardless of the length or width, the area of the garage floor is which type of number?



- A. odd number
- B. even number
- C. prime number
- \* D. perfect square

29. A market research company conducted interviews in order to determine which of four packages would enhance the sales of a household product. The results of the interviews are given in the table below.

Package Preference		
Package	Women	Men
1	10	25
2	15	24
3	35	25
4	40	26
<b>Total</b>	100	100

What inference can be made from the data?

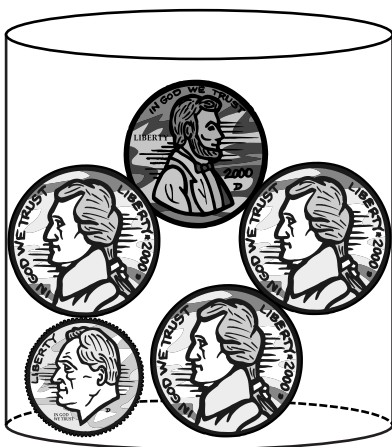
- A. Men will probably not buy this product.
- B. Both women and men prefer Package 3.
- \* C. The packaging probably will not influence sales of the product to men.
- D. The packaging probably will not influence sales of the product to women.



30. Tim can wash 2 dishes in 1 minute. Both Bob and Byron can wash 3 dishes in 1 minute. If all 3 boys worked together washing dishes in **different** sinks, how long would it take them to wash 48 dishes?

A. 5 minutes  
 \* B. 6 minutes  
 C. 8 minutes  
 D. 9 minutes

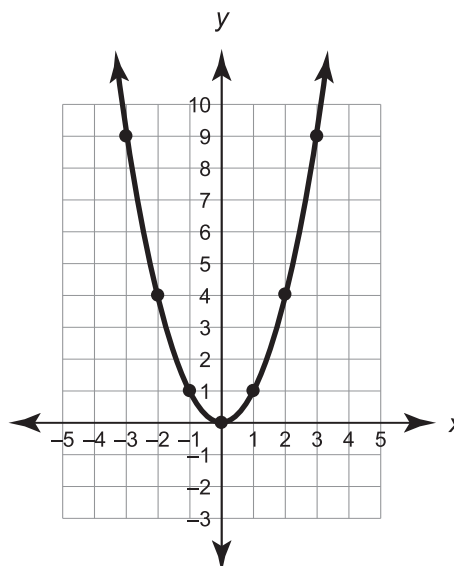
31. Jerry has a jar containing 3 nickels, 1 dime, and 1 penny, as shown below.



He randomly takes out 2 coins without looking and adds their values. Which of the following is the **least** likely event?

A. The coins add up to 6 cents.  
 B. The coins add up to 10 cents.  
 \* C. The coins add up to 11 cents.  
 D. The coins add up to 15 cents.

32. Which equation is depicted in the graph below?



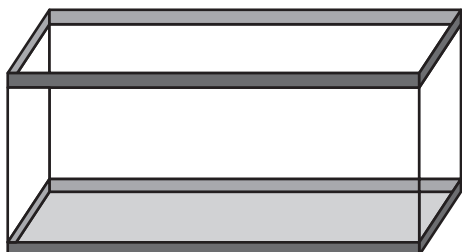
A.  $y = x$   
 \* B.  $y = x^2$   
 C.  $y = |x|$   
 D.  $y = (x + 2)^2$

33. A refrigerator advertises a storage capacity of  $115 \text{ ft}^3$ . What is that same volume in cubic meters? Use the information below to help you.

$$35.3 \text{ ft}^3 \approx 1 \text{ m}^3$$

A.  $38.3 \text{ m}^3$   
 B.  $11.5 \text{ m}^3$   
 C.  $4.9 \text{ m}^3$   
 \* D.  $3.3 \text{ m}^3$

34. Amy wants to buy a rectangular-shaped fish tank for her goldfish, as shown below. She learns that a good fish tank should have a large surface area at the top to provide the most oxygen for the fish.



She looks at four fish tanks at the pet store. Which tank has the **greatest** surface area for the open top?

- \* A. Tank A has a length of 23 in. and a width of 17 in.
- B. Tank B has a length of 24 in. and a width of 12 in.
- C. Tank C has a length of 26 in. and a width of 10 in.
- D. Tank D has a length of 28 in. and a width of 11 in.

35. Use your ruler to measure the line below.



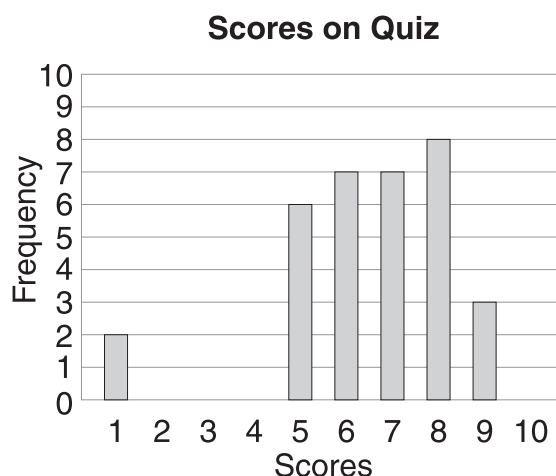
What is the length of the line in meters?

- A. 300 m
- B. 3 m
- \* C. 0.03 m
- D. 0.003 m

36. The radius of a circle is 2 inches. Where does the value of the circle's area fall on a number line?

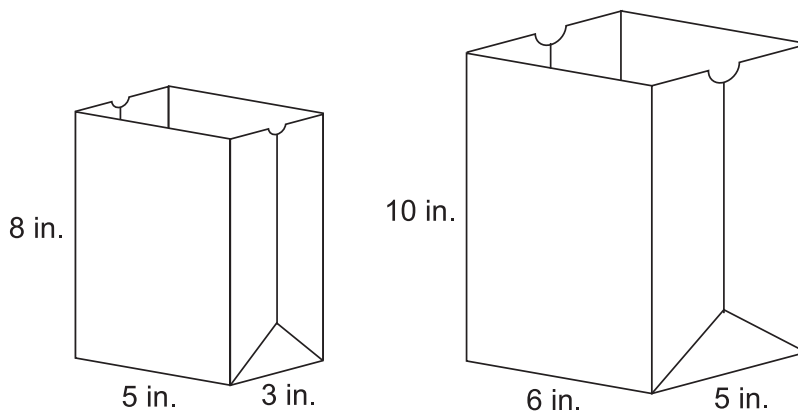
- A. between 11 and 12
- \* B. between 12 and 13
- C. between 13 and 14
- D. between 14 and 15

37. A quiz is given to 33 students. Scores on the quiz can range from 1 to 10. Based on the results graphed below, which conclusion can be drawn regarding the measures of central tendency?



- A. The median is lower than the mean or mode.
- B. The mode is lower than the mean or median.
- \* C. The mean is lower than the mode or median.
- D. The mean, median, and mode are approximately equal.

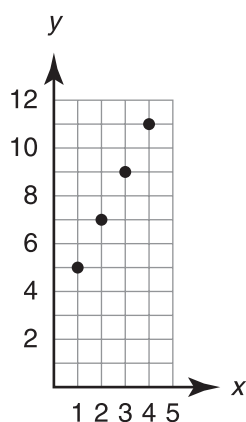
38. For a fund-raiser, the school is planning to sell popcorn at the next open house. The two bags that will be used to hold popcorn are shown below.



The school would like to charge \$1.00 for the small bag. If the volume-to-price ratio is proportional, what should be the price of the large bag, based on the dimensions given?

- A. \$0.40
- B. \$0.80
- \* C. \$2.50
- D. \$3.00

39. Given the points below, which linear equation describes the relationship between  $x$  and  $y$ ?



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

40. Which of the following is the **most** reasonable estimate of  $99^3$ ?

- A. 10,000
- B. 729,000
- \* C. 1,000,000
- D. 10,000,000

**PART II Released Mathematics Items – 2006 Benchmark Grade 8**

**MATHEMATICS OPEN-RESPONSE ITEM A**

A. Four students at Wilmore High School, Carl, Elsie, Alex, and Marcus, sold T-shirts for homecoming.

- Elsie sold twice as many as Carl.
- Alex sold 4 fewer than Elsie.
- Marcus sold half as many as Carl.

Let  $C$  represent the number of T-shirts that Carl sold. Let  $A$  represent the number of T-shirts that Alex sold. Let  $E$  represent the number of T-shirts that Elsie sold. Let  $M$  represent the number of T-shirts that Marcus sold.

1. Write an equation in terms of  $C$ , showing the number of shirts,  $A$ , that Alex sold. Show your work.
2. Write an equation in terms of  $C$ , showing the total number,  $N$ , of shirts sold. Show your work.
3. Elsie sold 24 T-shirts. How many shirts did Marcus sell? Show your work.
4. T-shirts were sold for \$13 each. What was the total amount of money received from selling homecoming T-shirts?

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

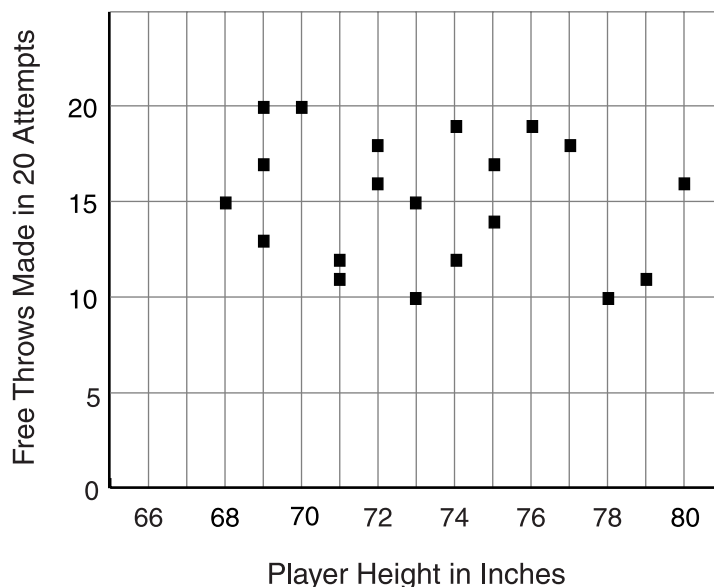
**RUBRIC FOR MATHEMATICS OPEN-RESPONSE ITEM A**

SCORE	DESCRIPTION
4	The student earns 4 points. "\$" is included in Part 4. The response contains no incorrect 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: Ex. 62 shirts sold with no other credit. Ex. Correct # of shirts for any student with no other credit.
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" assigned for the item.)

**MATHEMATICS OPEN-RESPONSE ITEM B**

- B.** A basketball coach believed that shorter players were better free throw shooters than taller players. He gathered together 20 players and noted each individual's height. He had each player shoot 20 free throws. The scatterplot below gives each player's height, in inches, and the number of free throws each player made out of 20.

**Player Height vs. Free Throws Made**



1. According to the scatterplot, only two players made all 20 free throws. How tall are they?
2. According to the scatterplot, what percentage of the players made 15 or more of their free throws?
3. Based on the scatterplot, is there a relationship between the height of the shooter and the number of free throws made? Explain your response.

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

**RUBRIC FOR MATHEMATICS OPEN-RESPONSE ITEM B**

SCORE	DESCRIPTION
4	The student earns 4 points. Correct labels of “inches” or “feet, inches” in Part 1. The response contains no incorrect 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: Ex. Part 1 – 69 inches = 5 ft. 7 ½ in.
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” assigned for the item.)

**MATHEMATICS OPEN-RESPONSE ITEM C**

- C. The bakery chef at Gourmet Sweets is collecting ingredients to bake some brownies. His cookbook contains the ingredient list below.

Ingredients for Brownies	
$\frac{1}{2}$ cup butter	1.5 ounces unsweetened chocolate
$\frac{3}{4}$ cup all-purpose flour	1 cup sugar
$\frac{1}{3}$ cup chopped nuts	2 eggs
$\frac{1}{2}$ teaspoon of baking powder	1 teaspoon vanilla
Use a 6-inch by 9-inch baking pan.	

However, the chef needs to use a commercial-size baking pan that measures 18 inches by 2 feet. The brownies will be the same thickness in either pan.

1. What is the area of the baking pan in the original recipe? Show your work.
2. What is the area of the commercial-size baking pan? Show your work.
3. How much will the chef need to adjust the ingredients in order to make brownies in the commercial-size pan? Show your work.

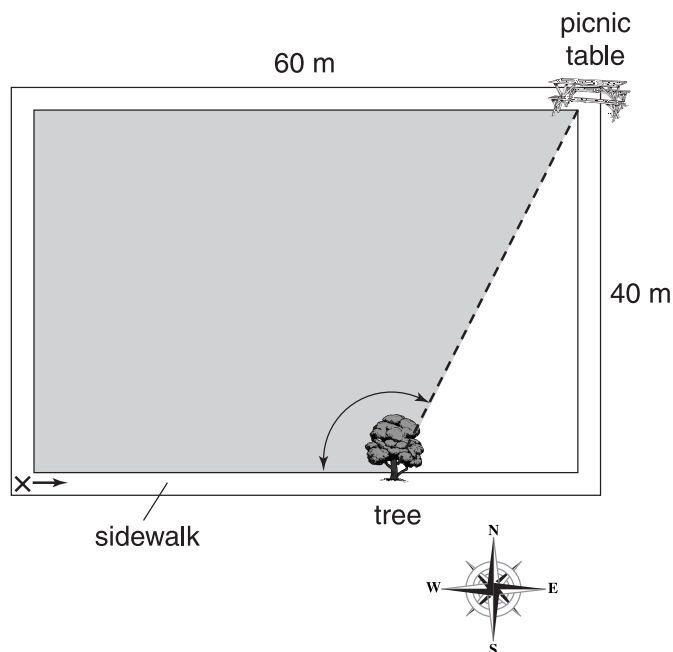
BE SURE TO LABEL YOUR RESPONSES 1, 2, AND 3.

**RUBRIC FOR MATHEMATICS OPEN-RESPONSE ITEM C**

SCORE	DESCRIPTION
4	The student earns 4 points. Correct units must be used in Part 1 (sq. in.) and Part 2 (sq. in. or sq. ft.). The response contains no incorrect 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: Ex. Part 1: $9 \times 6 = 54$ sq. in., $54 \div 12 = 4.5$ sq. ft. (Correctly finds area in sq. in. before proceeding incorrectly.)
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” assigned for the item.)

## MATHEMATICS OPEN-RESPONSE ITEM D

- D. The figure below shows the rectangular perimeter of Maple Hill Park. Andre is meeting friends for a picnic in the park. He walks east on the sidewalk until he reaches a tree. The tree is  $\frac{2}{3}$  of the distance from the west side of the park. At that point, Andre cuts across the grass and heads directly to the picnic table.

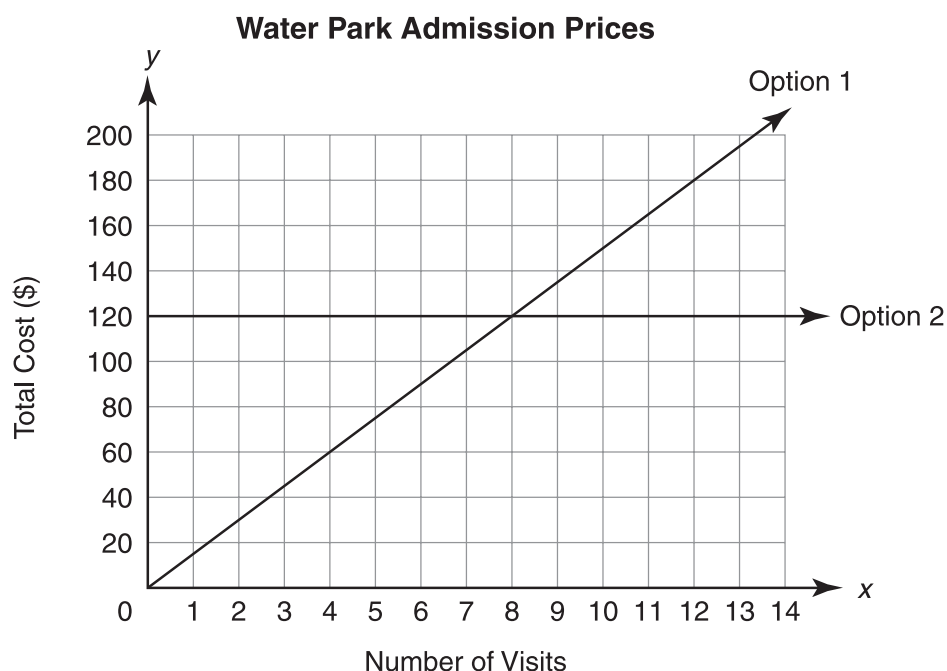


1. Use your protractor to determine the angle that Andre cut across the grass.
2. How far, in meters, did Andre travel on the grass? Show your work.
3. Calculate the sum of the interior angles of the park perimeter. Calculate the sum of the interior angles of the shaded region. How do they compare?

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

MATHEMATICS OPEN-RESPONSE ITEM E

E. The admission prices of a local water park are shown in the graph below. There are two payment options.



1. Describe the prices of both options.
2. If Joe were to go to the park 4 times in one season, which option would be **least** expensive?
3. During one season, how many visits would it take before both options are equal in total dollars spent?
4. How much money would be saved from purchasing a season pass if Joe visited the park on 12 occasions during one season?

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