



Arkansas Comprehensive Testing, Assessment, and Accountability Program

RELEASED ITEM
BOOKLET
Algebra I
End-of-Course Examinations
2011–2012 Administrations

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Arkansas Department of Education

PART II MID-YEAR RELEASED ALGEBRA I ITEMS

1. What is the value of x if $x = (7 + 9) \div (4 - 2)^2$?

- A. 1
- * B. 4
- C. 12
- D. 16

2. Adele's lawn has an area of $(x^2 - 5x - 6)$ square feet and a length of $(x + 1)$ feet. What is the width of the lawn in feet?

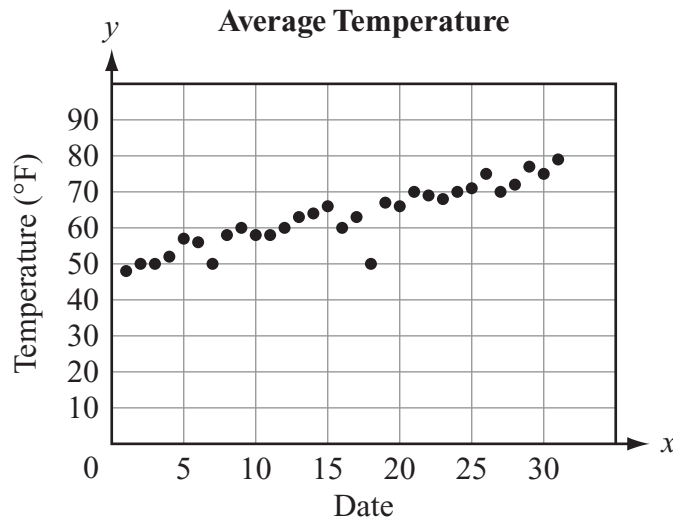
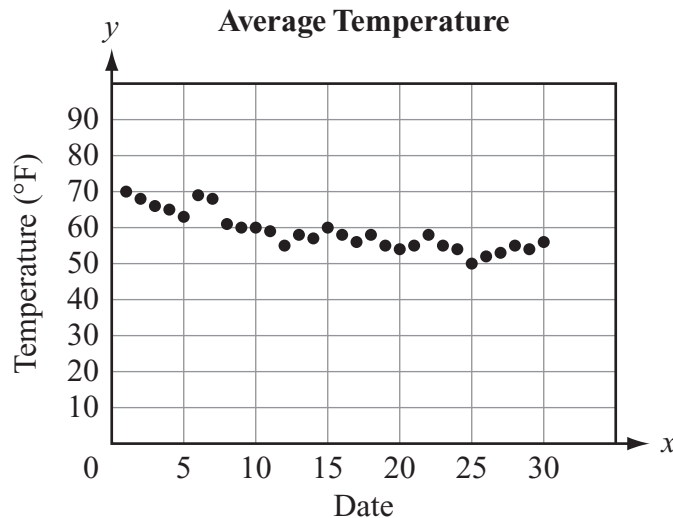
- * A. $(x - 6)$
- B. $(x + 6)$
- C. $(x^2 - 4x - 5)$
- D. $(x^2 - 6x - 7)$

3. Ana made a pizza with a circumference of 16π in. What is the radius, in inches, of the pizza?

- A. 0.13
- * B. 8
- C. 16
- D. 32

PART II MID-YEAR RELEASED ALGEBRA I ITEMS

4. The scatter plots below show the average daily temperature for two **different** months.



Which statement about the data shown is true?

- A. The data for each graph will have a positive correlation.
- B. The data in the first graph was collected over a much greater time period.
- * C. The range of the data for the second graph is greater than the first graph.
- D. The median temperature for the first graph is higher than the second graph.

PART II MID-YEAR RELEASED ALGEBRA I ITEMS

5. Which equation represents a line that passes through the points (4, 12) and (8, 9)?

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

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

C. $y = \frac{3}{4}x + 9$

* D. $y = -\frac{3}{4}x + 15$

6. If $a_n = 3n - 2$, what is the 15th term in the sequence?

A. 39

* B. 43

C. 45

D. 47

7. Which is the factored form of the polynomial $6x^2 + 7x - 5$?

* A. $(3x + 5)(2x - 1)$

B. $(2x + 5)(3x - 1)$

C. $(3x - 5)(2x + 1)$

D. $(2x - 1)(3x - 5)$

8. Consider these two events:

Event 1 — Devin sleeps through his alarm in the morning.

Event 2 — Devin misses the school bus.

Which of the following **best** describes the relationship between Event 1 and Event 2?

* A. causation

B. condition

C. correlation

D. combination

PART II MID-YEAR RELEASED ALGEBRA I ITEMS

9. Which expression is equivalent to $\sqrt{\frac{81}{72-8}}$?

- * A. $\frac{9}{8}$
- B. $\frac{9}{64}$
- C. $\frac{8}{9}$
- D. $\frac{72}{64}$

10. What are the solutions of the equation $3x^2 - 12 = 16x$?

- A. $x = 4, 1$
- B. $x = -2, 2$
- C. $x = \frac{2}{3}, -6$
- * D. $x = -\frac{2}{3}, 6$

11. Which expression is equivalent to 2^{-3} ?

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

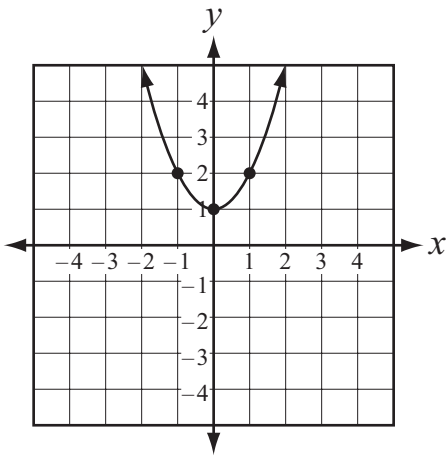
12. The object of a certain puzzle is to move rings off a post in the fewest number of steps. Moving the rings requires at least $2^n - 1$ steps, where n is the number of rings on the post. If the post contains 7 rings, what is the **fewest** number of moves that can be made?

- A. 13 moves
- B. 64 moves
- * C. 127 moves
- D. 128 moves

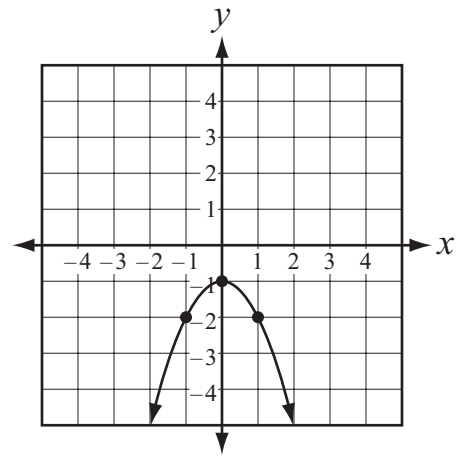
PART II MID-YEAR RELEASED ALGEBRA I ITEMS

13. Which of the following is the graph of $y = x^2 + 1$ after a reflection over the x -axis?

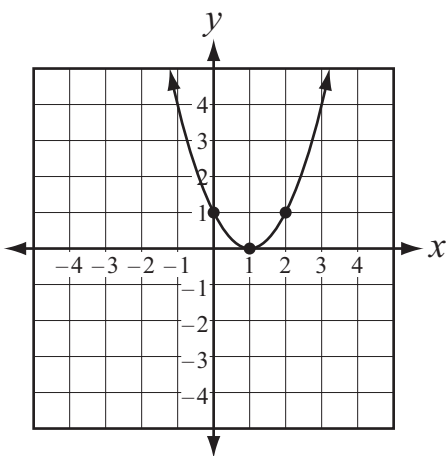
A.



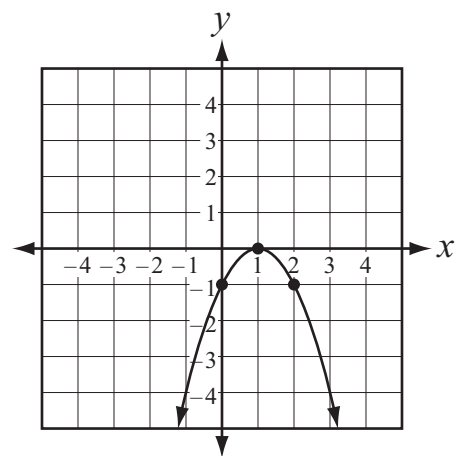
* B.



C.



D.



14. What value of p satisfies the equation $5p - 3 = 8(p - 1) + 7p$?

A. $p = -\frac{2}{5}$

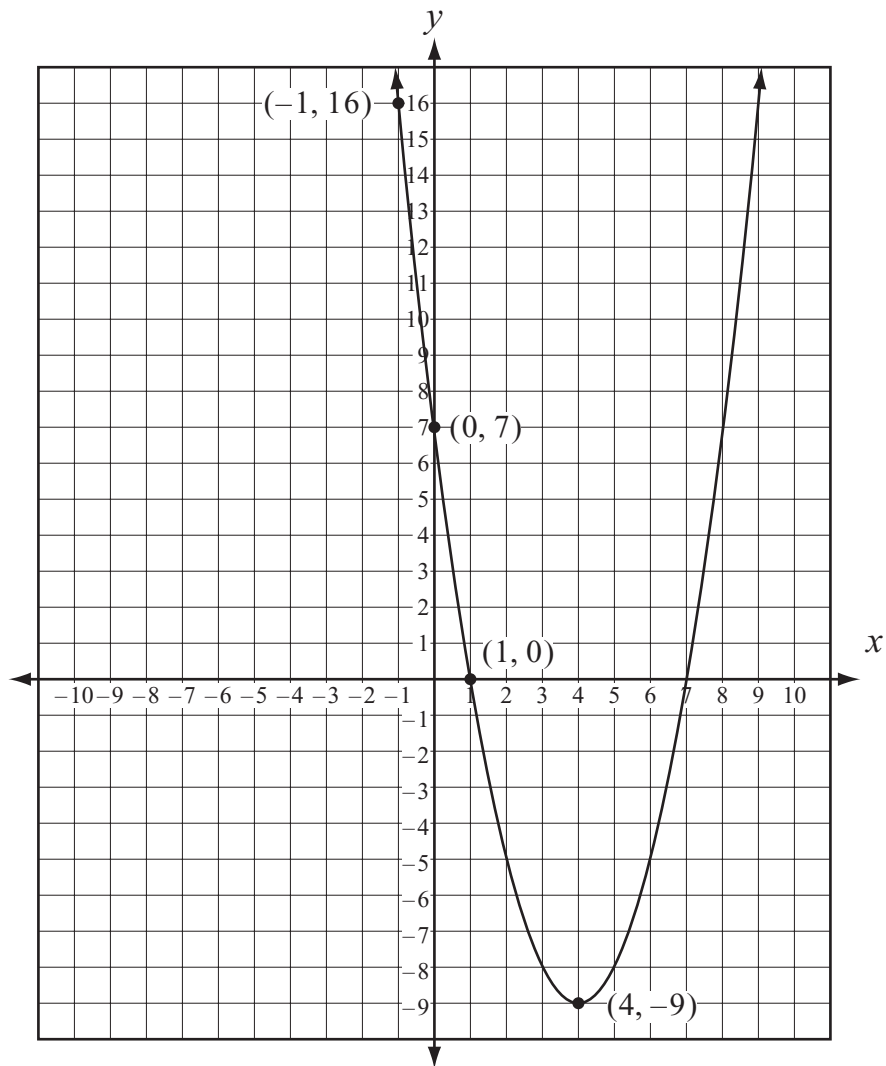
B. $p = -\frac{1}{5}$

* C. $p = \frac{1}{2}$

D. $p = \frac{11}{10}$

PART II MID-YEAR RELEASED ALGEBRA I ITEMS

15. A function is graphed below.



What are the coordinates of the minimum of this function?

- A. $(-1, 16)$
- B. $(0, 7)$
- C. $(1, 0)$
- * D. $(4, -9)$

PART II MID-YEAR RELEASED ALGEBRA I ITEMS

16. Which data set has a domain of 0, 1, 2, 4?

A.

x	y
1	-3
-1	4
0	2
-5	-8

B.

x	y
-2	2
-1	1
0	0
-4	4

C.

x	y
-4	-3
-2	-1
-1	0
0	1

* D.

x	y
0	1
1	2
2	4
4	8

17. Lee is painting a fence. If Lee can paint 6 boards every 15 minutes, how many boards can Lee paint in 3 hours?

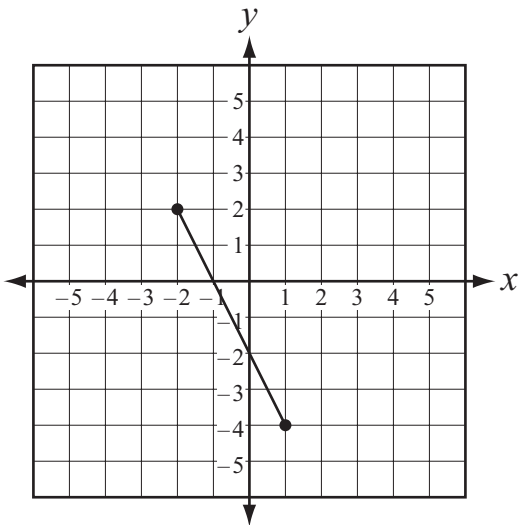
- A. 1.2
- * B. 72
- C. 360
- D. 450

18. Consider the graph of $y = 2x + b$. If the constant, b , is decreased by 2, in which direction will the graph shift?

- A. up
- * B. down
- C. left
- D. right

PART II MID-YEAR RELEASED ALGEBRA I ITEMS

19. Look at the line segment graphed below.



What is the midpoint of the line segment?

- A. $\left(\frac{1}{2}, 1\right)$
- B. $\left(-\frac{3}{2}, 3\right)$
- C. $(-1, -2)$
- * D. $\left(-\frac{1}{2}, -1\right)$

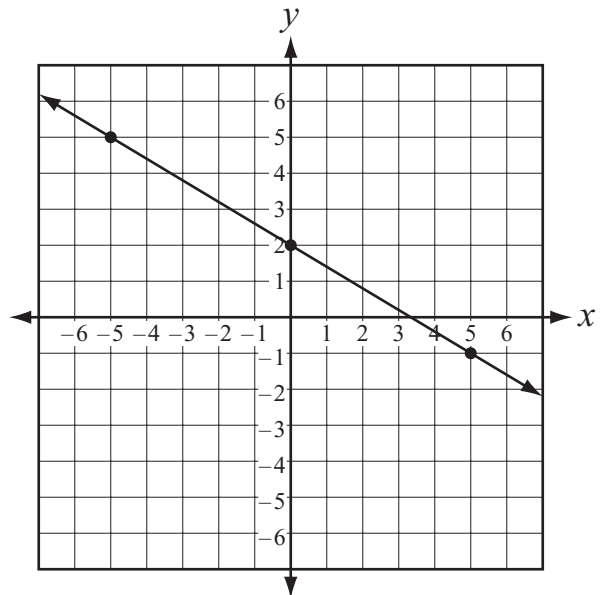
20. A system of equations is shown below.

$$\begin{aligned} 2x + y &= 7 \\ 3x - 2y &= 0 \end{aligned}$$

What is the solution to this system?

- * A. $(2, 3)$
- B. $(2, -3)$
- C. $(-7, 21)$
- D. $(7, -21)$

21. Look at the graph below.

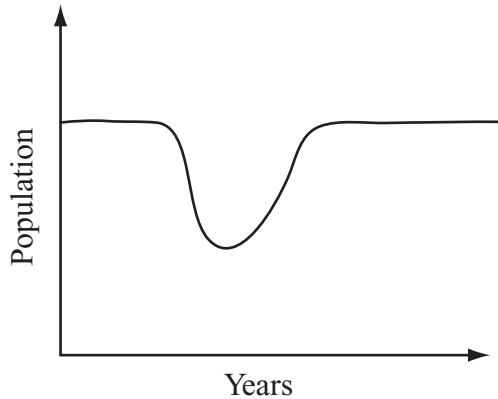


What is the slope of the line shown above?

- * A. $-\frac{3}{5}$
- B. $-\frac{5}{3}$
- C. $-\frac{1}{3}$
- D. -3

PART II MID-YEAR RELEASED ALGEBRA I ITEMS

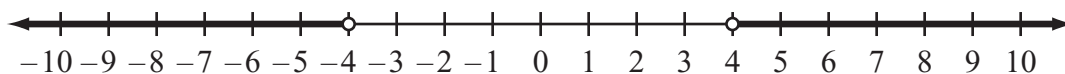
22. The graph below shows the population of deer over several years.



This graph best represents which of the following statements?

- A. The deer population remained stable over the years.
 - B. Once a predator was removed, the deer population increased.
 - C. Over the years the habitat area decreased, causing the deer population to decrease.
 - * D. An extremely cold winter killed off a large portion of the population. Afterward, the population recovered and stabilized.
-

23. Look at the graph below.



Which inequality **best** describes the graph above?

- A. $|x| < 4$
- B. $|x| \leq 4$
- * C. $|x| > 4$
- D. $|x| \geq 4$

PART II MID-YEAR RELEASED ALGEBRA I ITEMS

24. The matrices below show the number of T-shirts sold by day and by size and the price of each size.

	Number of T-shirts sold			Price of T-shirts sold		
	S	M	L	S	M	L
Monday	12	15	22	\$6.00	\$8.00	\$10.00
Tuesday	14	24	18			

How much money was collected on Tuesday from medium (M) T-shirt sales?

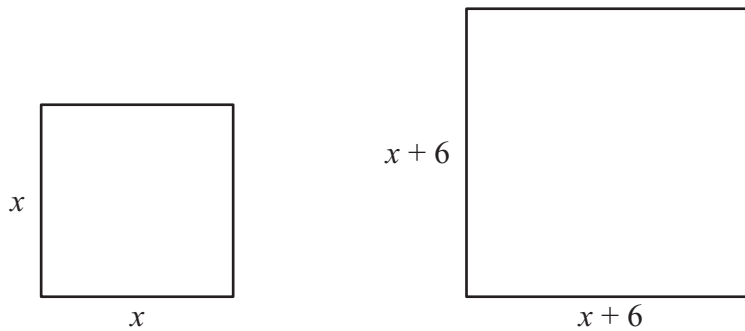
- | | |
|---|---|
| <p>25. Why is $\frac{(\sqrt{x} - \sqrt{11})^2}{x - 11}$ undefined when $x = 11$?</p> <p>A. The square root of 11 is undefined.</p> <p>B. The value of 0 squared is undefined.</p> <p>C. A fraction with a numerator of 0 is undefined.</p> <p>* D. A fraction with a denominator of 0 is undefined.</p> <p>26. Gaspar's Internet provider charges \$0.04 per minute each month for web service plus a monthly flat fee for a modem. If Gaspar paid \$67 last month and used 1,500 minutes of web service, how much does the modem cost per month?</p> <p>A. \$ 1.17</p> <p>B. \$ 2.68</p> <p>* C. \$ 7.00</p> <p>D. \$60.00</p> | <p>27. A classroom has 30 chairs of various colors; 5 yellow, 10 red, 4 blue, and the rest green. The first student in the room sits in a green chair. If the second student coming into the room chooses a chair at random, what is the probability the chair will be green?</p> <p>A. $\frac{11}{30}$</p> <p>B. $\frac{19}{30}$</p> <p>* C. $\frac{10}{29}$</p> <p>D. $\frac{18}{29}$</p> <p>28. Which is the simplified form of the expression $10z - 4 + 8(z - 1)$?</p> <p>A. $6z$</p> <p>B. $11z - 12$</p> <p>C. $18z - 5$</p> <p>* D. $18z - 12$</p> |
|---|---|

PART II MID-YEAR RELEASED ALGEBRA I ITEMS

29. Before driving to her grandmother's house, Paula buys 10 gallons of gasoline for \$23.00. She drives 300 miles over 6 hours. At the end of each hour, she records how many miles she has driven. In a graph of her distance over time, what would be the dependent variable?

- * A. miles
 - B. hours
 - C. dollars
 - D. gallons
-

30. Jan has a deck in the shape of a square. Jan extends each side of the deck by 6 feet. The area of the extended deck is 324 square feet. What was the side-length of the original deck in feet?



- A. 6
- * B. 12
- C. 18
- D. 24

PART II MID-YEAR RELEASED ALGEBRA I ITEMS

- A. Roger has a lawn care business and charges a flat fee of \$20 dollars plus x dollars per hour to mow yards. It takes Roger 3 hours to mow one yard, 2 hours to mow a second yard, 1 hour to mow a third yard, and 4 hours to mow a fourth yard.
1. Write four different expressions, each expression representing Roger's charge for one of the yards.
 2. Using the four different expressions from Part 1, write an expression that represents the sum of the charges for the four different yards. Show your work.
 3. If Roger earns \$175 mowing the four yards, how much does he charge per hour?

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

Item A Scoring Rubric—2012 Algebra I

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

PART II MID-YEAR RELEASED ALGEBRA I ITEMS

B. The nutrition facts for three different brands of chocolate cookies are listed below.

Nutrition Facts	
Serving Size 2 cookies	
Amount Per Serving	
Calories	130
Calories from Fat	50
Total Fat	6 g
Sodium	80 mg

Cookie #1

Nutrition Facts	
Serving Size 2 cookies	
Amount Per Serving	
Calories	130
Calories from Fat	40
Total Fat	4.5 g
Sodium	80 mg

Cookie #2

Nutrition Facts	
Serving Size 2 cookies	
Amount Per Serving	
Calories	160
Calories from Fat	63
Total Fat	7 g
Sodium	190 mg

Cookie #3

A marketing company wants to create a matrix that will compare the calories, calories from fat, total fat, and the sodium per serving for the three brands of cookies.

1. Construct one matrix that includes the data from all three nutrition tables. Be sure to include all labels.
2. The marketing company decides to compare Cookie #2 with Cookie #3. The company wants a matrix that shows the differences in calories, calories from fat, total fat, and the sodium per serving. Construct a matrix that displays these data. Be sure to include all labels.
3. The marketing company decides to also compare Cookie #2 with Cookie #3 for the differences in calories, calories from fat, total fat, and the sodium per cookie. Construct a matrix that displays these data. Be sure to include all labels.

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

Item B Scoring Rubric—2012 Algebra I

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

PART II MID-YEAR RELEASED ALGEBRA I ITEMS

C. Copy the table below into your answer document.

x	y
-2	
-1	
0	
1	
2	

1. Complete the table in your answer document using values from the equation $y = -x^2 + 1$.
2. On the grid provided in your answer document, graph the function containing the points in the table.
3. What is the vertex of the function? Show your work or explain your answer.
4. If the function were reflected over the x -axis, what would be the coordinates of the new vertex? Show your work or explain your answer.

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

Item C Scoring Rubric—2012 Algebra I

Score	Description
4	The student earns 5 points. The response contains no incorrect work.
3	The student earns $3\frac{1}{2} - 4\frac{1}{2}$ points.
2	The student earns 2 – 3 points.
1	The student earns $\frac{1}{2} - 1\frac{1}{2}$ 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.)

PART II SPRING RELEASED ALGEBRA I ITEMS

1. Nico puts \$250 into a savings account that earns 6% per year simple interest. How long will it take for Nico to earn \$90 interest?

A. 0.02 years
B. 0.17 years
* C. 6 years
D. 46 years

2. A nursery records the weights of 6 newborn babies in pounds. The weights are shown below.

7.7, 8.3, 7.5, 6.7, 9.0, 8.1

After the next baby is born, the mean weight of the 7 babies becomes 7.8 pounds. What is the weight of the seventh baby in pounds?

* A. 7.3
B. 7.8
C. 7.9
D. 8.1

3. Lupe wants to survey a group of people to find out which three pop songs are the most popular. Which of the following groups would provide the **best** random sample?

A. her group of friends
B. the DJs at the local country radio station
* C. every 10th person entering the shopping mall
D. the members of the town symphony orchestra

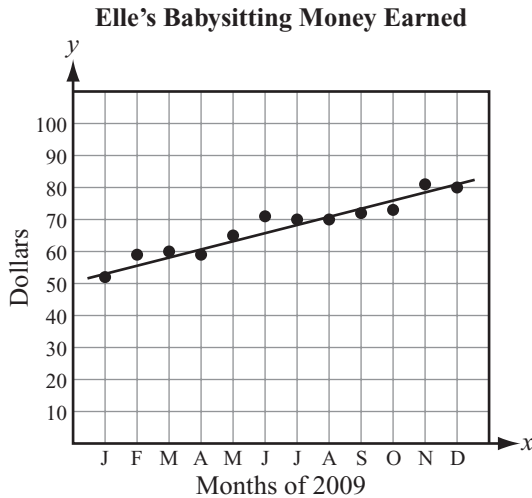
4. What are the solutions to the equation $0 = 6x^2 + 13x - 5$?

A. $-\frac{5}{3}$ or $\frac{1}{2}$
B. $\frac{5}{6}$ or -1
* C. $\frac{1}{3}$ or $-\frac{5}{2}$
D. $\frac{1}{3}$ or $\frac{5}{2}$

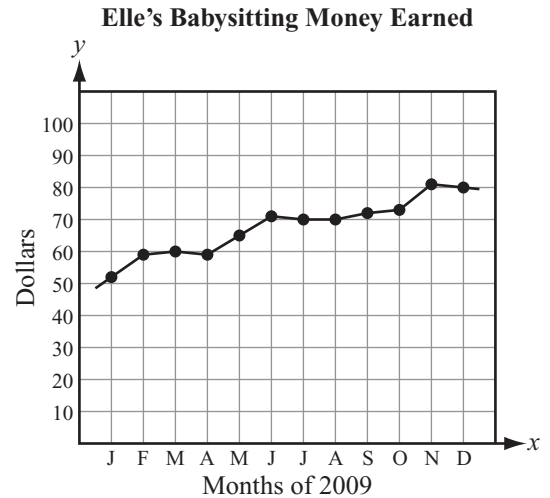
PART II SPRING RELEASED ALGEBRA I ITEMS

5. Elle babysits every month for a year and uses a scatterplot to show how much money she made. Which of the graphs below shows the line of best fit drawn correctly?

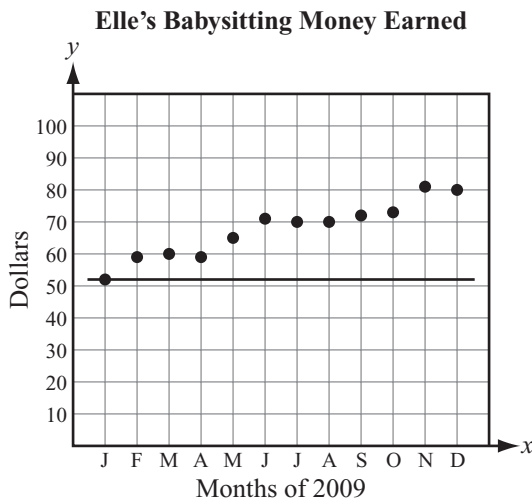
* A.



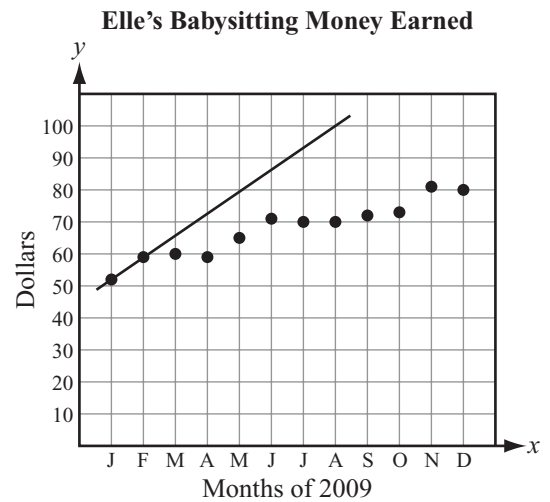
B.



C.



D.



PART II SPRING RELEASED ALGEBRA I ITEMS

6. The verbal expression “the difference between three times a number x and 12, increased by the quotient of 5 and the number x ” is equivalent to which algebraic expression?

- A. $3(x-12) + \frac{x}{5}$
* B. $(3x-12) + \frac{5}{x}$
C. $3(x-12) + 5 + x$
D. $(3x-12) + 5 + x$

7. Below is a list of coordinate pairs with the variable x listed in place of one of the domain values.

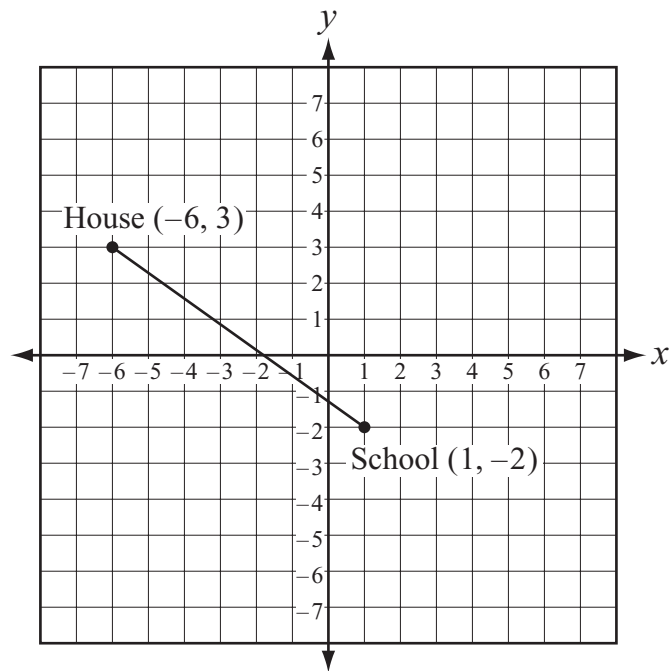
$$\{(2, 6), (x, 6), (5, 7), (6, 8), (8, 9)\}$$

Which value of x will make the relation above a function?

- * A. 3
B. 5
C. 6
D. 8

PART II SPRING RELEASED ALGEBRA I ITEMS

8. Tim maps his neighborhood on a grid, as shown below.



If the fountain is located at the midpoint of the segment that connects Tim's house and the school, what are the coordinates of the fountain?

- A. $\left(-\frac{3}{2}, \frac{1}{2}\right)$
- B. $\left(-2\frac{1}{2}, -1\right)$
- * C. $\left(-2\frac{1}{2}, \frac{1}{2}\right)$
- D. $\left(-4, \frac{1}{2}\right)$

PART II SPRING RELEASED ALGEBRA I ITEMS

9. If $f(x) = -4x + 2$, what is $f(-3)$?

- A. -10
- B. -5
- C. 12
- * D. 14

10. What is the expression equivalent to $\frac{8}{\sqrt{3}}$?

- A. $8\frac{2}{3}$
- B. 24
- C. $8\sqrt{3}$
- * D. $\frac{8\sqrt{3}}{3}$

11. What are the factors of $81x^2 + 36x + 4$?

- A. $(9x + 2)(x + 2)$
- * B. $(9x + 2)(9x + 2)$
- C. $(9x - 2)(9x - 2)$
- D. $(9x + 2)(9x - 2)$

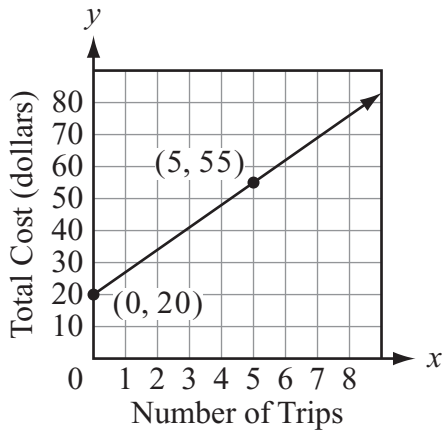
12. If $3b + 12 = 5(b - 4)$, what is b ?

- A. 4
- B. 6
- C. 8
- * D. 16

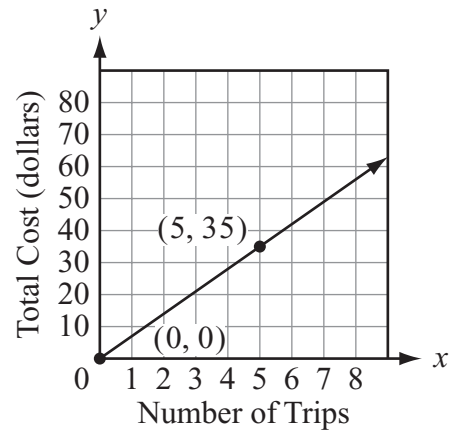
PART II SPRING RELEASED ALGEBRA I ITEMS

13. A travel club arranges bus trips for its members. The club charges \$20 to become a member and \$7 for each bus trip taken. Which graph represents the cost of taking bus trips with the club?

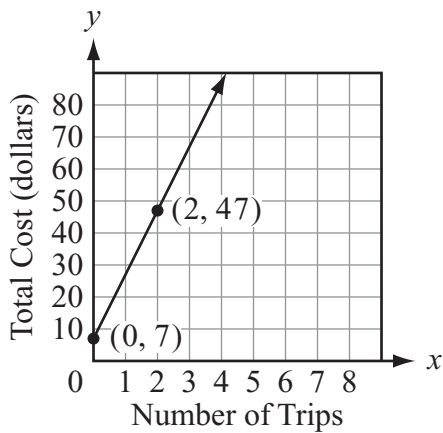
* A.



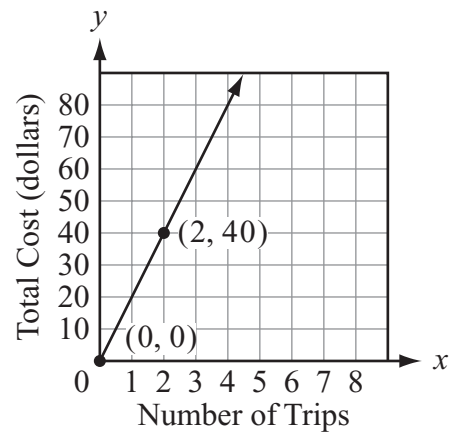
B.



C.



D.

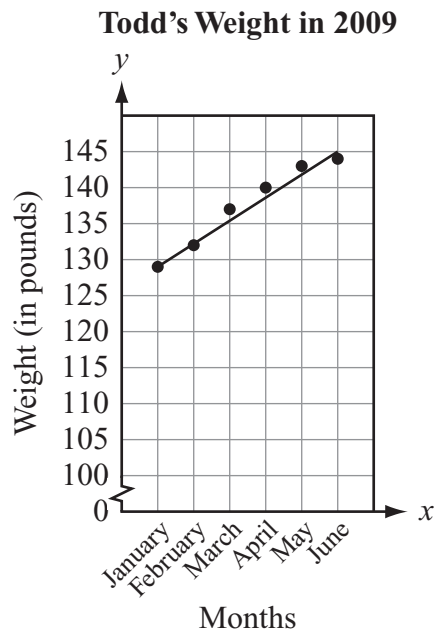
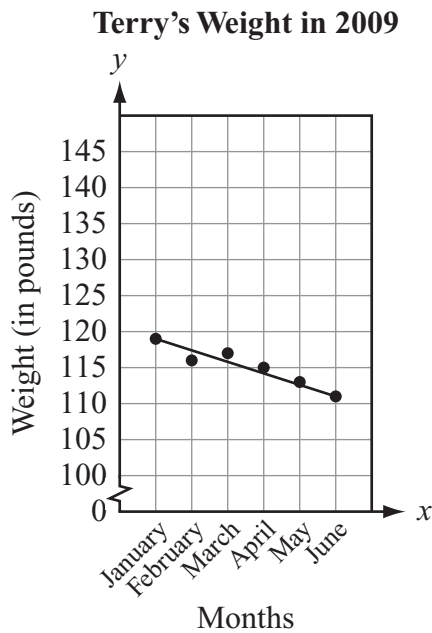


14. Which expression is equivalent to $\sqrt{27} - \sqrt{12}$?

- A. 1
- * B. $\sqrt{3}$
- C. $\sqrt{15}$
- D. $3\sqrt{3} - 2$

PART II SPRING RELEASED ALGEBRA I ITEMS

15. Terry and Todd each plot their weights from January to June on separate scatter plots shown below.



Which of the following is true based on these scatter plots?

- * A. Todd is gaining weight at a faster rate than Terry is losing weight.
- B. Terry is losing weight at the same rate that Todd is gaining weight.
- C. Todd's weight is increasing while Terry's weight remains constant.
- D. At these rates, Terry and Todd will be the same weight in December.

16. What are the solutions to the equation $3x^2 + 11x - 4 = 0$?

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

17. What is the value of the expression $\sqrt{(x + y)^2 + (3z + 2)}$ when $x = 5$, $y = 6$, and $z = 7$?

- A. $\sqrt{34}$
- B. 11
- * C. 12
- D. $2\sqrt{37}$

PART II SPRING RELEASED ALGEBRA I ITEMS

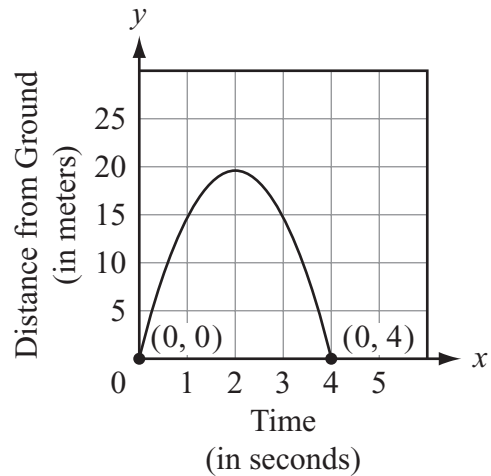
18. Which is equivalent to $(5^3)(5^9)$?

- * A. 5^{12}
- B. 5^{27}
- C. 10^{12}
- D. 25^{27}

19. The function $f(C) = \frac{9}{5}C + 32$ is used to convert the temperature from degrees Celsius to degrees Fahrenheit. If the temperature is currently -4° Celsius, what is the temperature in degrees Fahrenheit?

- A. -20°
- * B. 24.8°
- C. 17.77°
- D. 50.4°

20. A toy rocket is launched from the ground. The graph below shows the height of the rocket over time, x .



At what time, x , does the rocket reach its maximum height?

- A. $x = 0$ seconds
- * B. $x = 2$ seconds
- C. $x = 4$ seconds
- D. $x = 20$ seconds

21. An equation has been derived to estimate a person's maximum heart rate. Using that equation, the maximum heart rate of a 60-year-old is 160 beats per minute and the maximum heart rate of a 35-year-old is 185 beats per minute. If x represents age and y represents heart rate, which of the following could be the equation in point-slope form?

- A. $y - 35 = 25(x - 185)$
- B. $y - 60 = 1(x - 185)$
- * C. $y - 160 = -1(x - 60)$
- D. $y - 35 = 25(x - 160)$

PART II SPRING RELEASED ALGEBRA I ITEMS

22. Look at the function table shown below.

x	y
-4	16
2	-8
4	-16
8	-32

What is the domain of the function?

- A. {2, 4, 8}
 - * B. {-4, 2, 4, 8}
 - C. {2, 4, 8, 16}
 - D. {16, -8, -16, -32}
23. A ball is thrown straight up into the air with an initial velocity of 64 feet per second. The equation modeling the ball's motion is $h = -16t^2 + 64t$ where h is the ball's height and t is time in seconds. What is the ball's height in feet after 3 seconds?
- * A. 48
 - B. 67
 - C. 144
 - D. 336

24. A store manager pays his sales associates \$29 for every shift worked. The manager also offers a bonus of \$1.50 for each item sold. The manager creates a graph that plots x , the number of items an employee sells, versus y , the amount of money each employee can earn per shift. What is the y -intercept for this graph?

- A. $(0, 1\frac{1}{2})$
 - B. $(0, 27\frac{1}{2})$
 - * C. (0, 29)
 - D. $(0, 30\frac{1}{2})$
25. Which of the following shows causation with the statement, "Derek won the cross-country state championship."?
- A. Derek trained every day.
 - * B. Derek ran faster than the other racers.
 - C. Derek was in better shape than the other racers.
 - D. Derek was well rested the day of the state championship.
26. The function $y = 2x^2$ is graphed on a coordinate plane. Which change in the function will result in a vertical shift up 3 units?
- A. $y = 5x^2$
 - B. $y = 6x^2$
 - * C. $y = 2x^2 + 3$
 - D. $y = 2x^2 - 3$

PART II SPRING RELEASED ALGEBRA I ITEMS

27. Which of the following is true of the lines given by the equations $y = 4x - 4$ and $y = -\frac{1}{4}x + 4$?

- A. They never intersect each other.
- B. They are identical to each other.
- C. They are parallel to each other.
- * D. They are perpendicular to each other.

28. Which pattern of numbers can be produced by the formula $a_n = 3n + 4$?

- A. {3, 10, 17, 24}
- B. {4, 8, 12, 16}
- * C. {7, 10, 13, 16}
- D. {7, 11, 15, 19}

29. If x and y vary directly, and $y = -20$ when $x = 5$, what is the value of y when $x = 12$?

- A. -80
- * B. -48
- C. 48
- D. 80

30. Which expression is equivalent to $\frac{x^2 - 4}{x + 2}$, if $x \neq -2$?

- * A. $(x - 2)$
- B. $(x + 2)$
- C. $(x - 6)$
- D. $(x^3 - 2)$

PART II SPRING RELEASED ALGEBRA I ITEMS

- A. A restaurant charges a reservation fee of \$15 for its party room, plus \$21.50 per person.
1. Write an equation in slope-intercept form showing what the total cost, y , would be for a group of x number of people to hold a party there.
 2. On the grid in your answer document, graph the equation from Part 1.
 3. If the bill was \$445, how many people were at the party? Show your work or explain your answer.
 4. Describe how the graph from Part 2 would change if the reservation fee were raised to \$25.

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

Item A Scoring Rubric—2012 Algebra I

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

PART II SPRING RELEASED ALGEBRA I ITEMS

- B.** The formula $s = \sqrt{30df}$ is used to find how fast a car was traveling before an accident, where s = speed (in mph), d = the length (in feet) of the skid mark left by the car, and f = the coefficient of friction (road condition). Sophie, a police officer, must decide if the driver in a car accident was speeding in a 35 mph speed zone. The car's skid-mark length (d) is 76 feet. The coefficient of friction (f) is 0.80.
1. Write the equation Sophie needs to use, substituting in the values of d and f , to determine the speed of the car before the accident.
 2. Solve the equation in Part 1. Round your answer to the nearest tenth.
 3. Was the driver speeding in the 35 mph speed zone? Show your work and/or explain your answer.
 4. If the skid mark had been 4 times longer, how many times as fast would the driver have been going as compared to the speed found in Part 2? Show your work and/or explain your answer.

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

Item B Scoring Rubric—2012 Algebra I

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