ACTAAP

Arkansas Comprehensive Testing, Assessment, and Accountability Program

Released Item Booklet

Algebra I End-of-Course Examinations

2012–2013 Administrations

Arkansas Department of Education

Table of Contents

PART I Overview

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 2013 who had completed or were completing Algebra I by the end of first semester participated in the *Mid-Year Algebra I End-of-Course Examination*. Students in Arkansas public schools who had completed or were completing Algebra I by the end of the spring semester participated in the *Spring Algebra I End-of-Course Examination*. In addition to the Mid-Year and Spring administrations, a *Fall Algebra I End-of-Course Examination* and Fall and Spring administrations of the Online Alternative Test for Algebra I were offered for students retesting in Algebra I.

This Released Item Booklet for the Algebra I End-of-Course Examinations contains test questions or items that were asked of students during the 2012–2013 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 Fall and Mid-Year testing, approximately two hours each day to complete assigned test sessions during the two days of Spring testing, and one hour to complete each of the two sessions for the Online Alternative Test for Algebra I. 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 83 of this booklet.) All of the multiple-choice items within this booklet have the correct response marked with an asterisk (*).

The development of the Algebra I End-of-Course Examinations was based on the *Arkansas Algebra I 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 Algebra I 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 Algebra I Mathematics Curriculum Framework* are interrelated, there may be many cases in which 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 Algebra I End-of-Course Examinations were developed in close association with the Arkansas education community. Arkansas teachers participated as members of the Algebra I 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 Algebra I End-of-Course Examination items align or correlate with the *Arkansas Algebra I Mathematics Curriculum Framework* to provide models for classroom instruction.

PART I Scoring Student Responses to Algebra I Open-Response Items

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 Algebra I 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 Algebra I 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 Algebra I 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 Algebra I 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 Algebra I 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 Algebra I Items

1. What is the simplest form of the expression below?

$$2(12 \cdot 2 + 72 \div 6 - 2) \div 4$$

* A. 17
B. 18
C. 21
D. 68

2. Which shows the formula $v_f = v_o + at$, solved for a?

* A. $a = \dfrac{v_f - v_o}{t}$

B. $a = \dfrac{v_f}{t} - v_o$

C. $a = v_f - v_o - t$

D. $a = v_f - \dfrac{v_o}{t}$

3. For field days last year, Carver Middle School ordered ribbons for the events. The matrix shows the number and type of ribbons ordered for the two field days.

	Red	White	Blue
Fall	62	51	49
Spring	73	81	70

This year, Carver Middle School will order 4 times as many of each type of ribbon. Which matrix shows the number of ribbons that the school will order this year?

A.

	Red	White	Blue
Fall	248	204	196
Spring	73	81	70

B.

	Red	White	Blue
Fall	248	51	49
Spring	292	81	70

C.

	Red	White	Blue
Fall	66	55	53
Spring	77	85	74

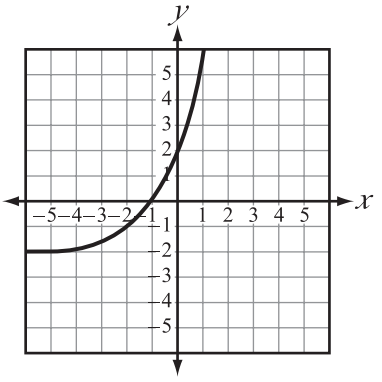
* D.

	Red	White	Blue
Fall	248	204	196
Spring	292	324	280

4. What is the midpoint of the segment with endpoints $(3, -4)$ and $(-7, 1)$?

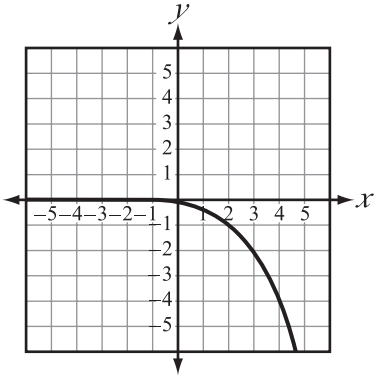
A. $(-2, -2.5)$
* B. $(-2, -1.5)$
C. $(5, -2.5)$
D. $(5, -1.5)$

5. Use the graph below to answer this question.

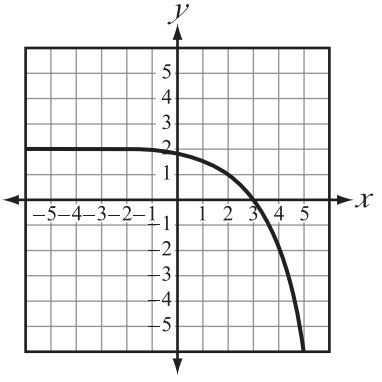


Which graph is the result of reflecting the above graph over the *x*-axis?

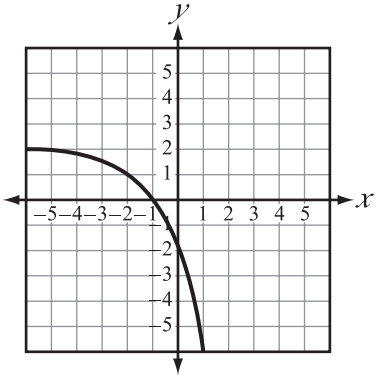
A.



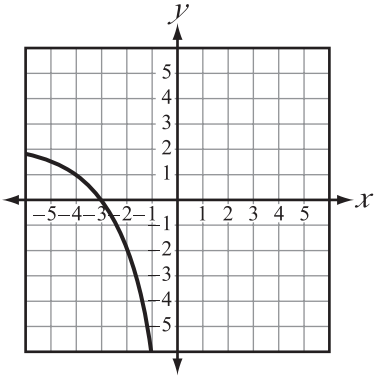
B.



* C.



D.



6. The following equation describes how gravity affects the vertical motion of a moving object:

$$v = \frac{h + 16t^2}{t}$$

where v = initial velocity in feet per second, h = height in feet, and t = time in seconds.

If a rubber ball strikes the ground and then reaches a height of 8 feet in 2 seconds, what was the ball's velocity, v, at the moment it left the ground?

A. 16 feet per second
B. 18 feet per second
C. 20 feet per second
* D. 36 feet per second

7. It is 211 miles from Paragould, Arkansas, to Rockwell, Arkansas. George's car averages 26.6 miles per gallon. What is the minimum number of whole gallons of gas George will need for the drive to Rockwell from Paragould?

A. 6
B. 7
* C. 8
D. 10

8. The stem-and-leaf plot below shows the scores on a science test taken by two classes. Which statement is supported by the data in the plot?

1st Period Class		5th Period Class
0 7	6	9
3 4 7 9	7	3 3 5 6 7 8 8
1 1 2 3 5 7 8	8	6
6	9	8

KEY: 7 | 6 | 9 means 67 for 1st Period and 69 for 5th Period

* A. The lowest score for 1st period was 60.

B. The classes have the same number of test takers.

C. The median score for the 5th period class was 76.

D. Of all test takers, two achieved scores in the $60-69$ range.

---

9. If $f(x)=3x+2$ what is $f\left(\frac{1}{3}\right)$?

A. $\frac{5}{3}$

* B. 3

C. 5

D. $5\frac{1}{3}$

PART II Mid-Year Released Algebra I Items

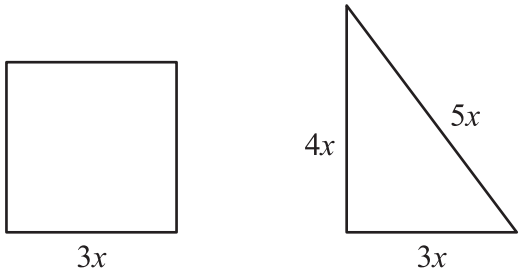
10. The table below shows the number of times Jack and Kevin jogged during the last ten months.

Month	1	2	3	4	5	6	7	8	9	10
Jack	9	12	8	20	25	19	17	19	18	16
Kevin	8	14	16	25	21	15	17	18	9	14

In which month did Kevin run twice as often as Jack?

A. 2
* B. 3
C. 9
D. 10

11. A square and a triangle are shown below.



What is the difference between the perimeters of the two shapes?

A. $3x^2$
B. $9x$
C. $3x$
* D. 0

12. Maria is planning a pizza party after the softball game. The pizza parlor tells her that one pizza can feed 4 people. Which statement must be true?

A. The number of pizzas Maria orders depends on the types of pizza available.
B. The number of people at the party depends on the number of pizzas ordered.
* C. The number of pizzas Maria orders depends on the number of people at her party.
D. The number of people at the party depends on the number of people who eat pizza.

13. Which statement is equivalent to the expression $\frac{1}{2}x \div 3$?

A. twice a number divided by three
B. three divided by half of a number
* C. half a number divided by three
D. half a number multiplied by three

14. What is the factored form of the expression below?

$$16x^2 - 25$$

A. $(4x-5)(4x-5)$
* B. $(4x+5)(4x-5)$
C. $(8x-1)(2x+25)$
D. $(16x-1)(x+25)$

15. Which is the domain (d) and range (r) for the table below?

x	y
-4.2	-6
0	-3.5
2.8	7.1

A. $d = \{4.2,\ 0,\ 2.8\}$
$r = \{6,\ 3.5,\ 7.1\}$

B. $d = \{-6,\ -3.5,\ 7.1\}$
$r = \{-4.2,\ 0,\ 2.8\}$

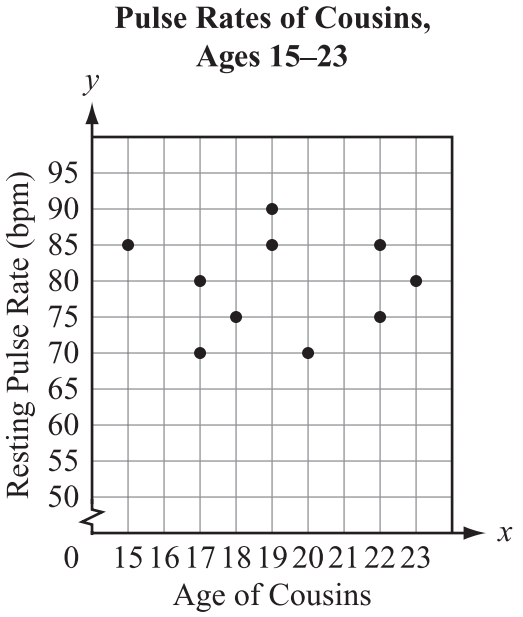
C. $d = \{-4.2,\ -6,\ -3.5\}$
$r = \{0,\ 2.8,\ 7.1\}$

* D. $d = \{-4.2,\ 0,\ 2.8\}$
$r = \{-6,\ -3.5,\ 7.1\}$

16. What are the solutions to $x^2 - 15x + 56 = 0$?

* A. $x = 7, x = 8$
B. $x = -8, x = 7$
C. $x = 8, x = -7$
D. $x = -4, x = 14$

17. Carnie gathered data about the ages and resting pulse rates of her 10 cousins. She plotted the data on the graph below.



Which statement does the scatter plot support?

A. All of Carnie's cousins are the same gender.

B. All of Carnie's cousins have good eating habits.

* C. There is no correlation between age and pulse rate.

D. There is a negative correlation between age and pulse rate.

18. Which value of x makes the expression $\frac{x^2-x-12}{x^2-8x+16}$ undefined?

A. -4

B. -3

C. 2

* D. 4

19. Malik is selling candy bars for \$2.00 to raise money for his school band. He has already raised \$50 of his \$250 goal. How many more candy bars does he need to sell to reach his goal?

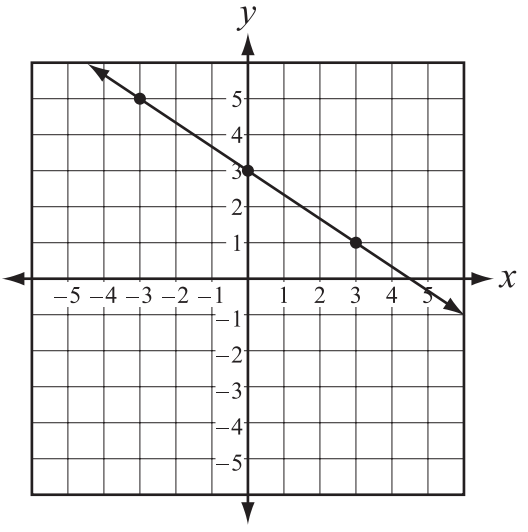
A. 25

* B. 100

C. 125

D. 200

20. What is the equation of the line graphed below?



A. $y=-\frac{3}{2}x+\frac{9}{2}$

B. $y=-\frac{2}{3}x+2$

C. $y=-\frac{3}{2}x+3$

* D. $y=-\frac{2}{3}x+3$

21. A line is graphed using the equation $y = 2x - 5$.

A second line is graphed using the equation $y = 1\frac{1}{2}x - 5$. Which describes the second line compared to the first line?

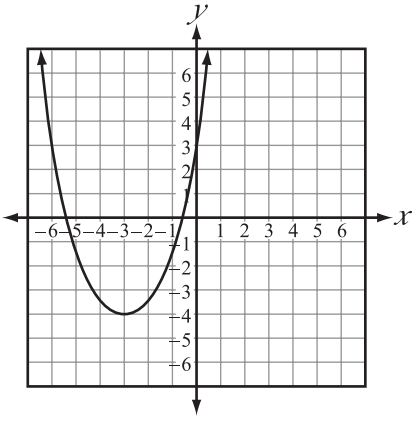
* A. The second line is less steep.

B. The second line is more steep.

C. The second line is five units lower.

D. The second line has an opposite slope.

22. Use the graph to answer the question.



What is the minimum of the graph?

A. $(0, 3)$

B. $(-3, 0)$

* C. $(-3, -4)$

D. $\left(-5\frac{1}{2}, 0\right), \left(-\frac{1}{2}, 0\right)$

23. What is the simplest form of $\frac{2^5}{2^2}$?

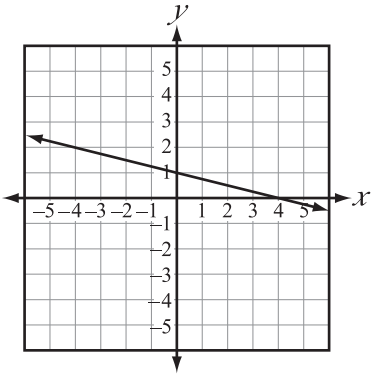
* A. 8

B. 16

C. 32

D. 128

24. What is the slope of the line graphed below?



A. -4

* B. $-\frac{1}{4}$

C. $\frac{1}{4}$

D. 4

25. The city recreation department recorded the ages and numbers of participants in its swimming program.

Age	Number of Participants
1–5	10
6–10	23
11–15	76
16–20	68
21–25	37

In a cumulative frequency histogram of this data, what would the top of the bar read for the age 16 – 20 group?

A. 68
B. 109
* C. 177
D. 214

26. The bank manager notices that more customers use the drive-up window than walk into the bank when it rains. Which of these is a reasonable cause of this pattern?

A. No matter how hard it rains, some customers will still walk into the bank.
B. Sunny days are more likely to occur when customers walk into the bank.
C. Using the drive-up window at the bank increases the likelihood of rain.
* D. Using the drive-up window decreases the likelihood of getting wet.

27. What is the simplest form of $\frac{15}{\sqrt{5}}$?

A. 3
* B. $3\sqrt{5}$
C. $5\sqrt{3}$
D. $5\sqrt{5}$

28. What are the solutions of this equation?

$$|4-x|+9=10$$

* A. $x=3$ and $x=5$

B. $x=3$ and $x=23$

C. $x=-5$ and $x=-3$

D. $x=-15$ and $x=23$

29. What is the solution to the equation below?

$$\frac{5}{4}x-\frac{5}{2}=3$$

A. $x=\frac{2}{5}$

B. $x=\frac{13}{5}$

* C. $x=\frac{22}{5}$

D. $x=6$

30. What is the greatest common factor of $12x^2$, $24x^2y^2$, and $46xy$?

* A. $2x$

B. $3x$

C. $4x$

D. $6x$

PART II Mid-Year Released Algebra I Items

A. Amy records her fastest times at track practice each day in the table below.

Amy's Fastest Times

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Time (minutes)	2.8	2.6	2.2	2.3	2.1

At the end of every fifth day Amy finds her mean time for the 5 fastest runs over those days.

1. Find Amy's mean time for the 5 practices shown in the table. Show your work.

2. Amy wants to reduce her mean by at least 0.1 minutes. On Saturday she will run again. What does her time need to be in order to have a new five-run mean time for Tuesday through Saturday that is at least 0.1 minute less than the mean found in Part 1? Show your work.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

Item A Scoring Rubric—2013 Algebra I

Score	Description
4	The student earns 4 points. The response contains no incorrect work. Correct unit label of "minutes" 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.)

SOLUTION AND SCORING

4 points possible:

Part	Points
1	**1 point possible:** 1 point: Correct mean: 2.4 Correct procedure is shown and/or explained. Give credit for the following or equivalent: ● $\frac{2.8+2.6+2.2+2.3+2.1}{5}=\frac{12}{5}=2.4$ ● "I added up all the times and got 12. Then I divided by 5 and got 2.4" **OR** ½ point: ● Correct mean: 2.4 Procedure is incomplete or missing Or ● Mean is incorrect due to 1 calculation or copy error Correct procedure is shown and/or explained

Part	Points
2	**3 points possible:** 3 points: Correct time: 2.3 (minutes) *Or correct answer based on an incorrect mean in Part 1* Correct procedure is shown and/or explained. Give credit for the following or equivalent: ● $2.4 - 0.1 = 2.3$ (*not required*) $\frac{2.6+2.2+2.3+2.1+x}{5} = 2.3$ $9.2 + x = 11.5$ $x = 2.3$ ● Guess & Check: $2.6 + 2.2 + 2.3 + 2.1 + \mathbf{2.3} = 11.5$ $11.5 \div 5 = 2.3$ $2.4 - 0.1 = 2.3$ (*not required*) Saturday's time = 2.3 minutes **OR** 1½ points: ● Correct time: 2.3 Procedure is incomplete or missing Or ● Time is incorrect due to a calculation or copy error Correct procedure is shown and/or explained **OR** 1 point: Saturday's time and the procedure to find it based on a <u>*six-run mean time from Monday through Saturday*</u> *May be based on incorrect mean from Part 1* Give credit for the following or equivalent: ● $\frac{2.8+2.6+2.2+2.3+2.1+x}{6} = 2.3$ $12.0 + x = 13.8$ $x = 1.8$

B. The length of a rectangular field is 45 meters greater than its width.

1. Write an equation to find the perimeter, *P*, of the field. Be sure to identify your variables.

2. If the perimeter of the field is 450 meters, how wide is the field? Show your work and/or explain your answer.

3. What is the area of the field? Show your work and/or explain your answer.

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

Item B Scoring Rubric—2013 Algebra I

Score	Description
4	The student earns 5 points. The response contains no incorrect work. Correct unit label of "square meters" in Part 3.
3	The student earns 3½ – 4½ points.
2	The student earns 2 – 3 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

SOLUTION AND SCORING

5 points possible:

Part	Points
1	**1 point possible:** 1 point: Correct equation: $P = 2[w + (w + 45)]$ *or* $P = 4w + 90$; $w = width$ *or equivalent* *Note: Variables may be identified on a diagram* **OR** ½ point: ● Correct equation, variable(s) not identified Or ● Correct expression with variable(s) identified
2	**2 points possible:** 1 point: Correct answer: **90** (*meters*) *Or correct answer based on Part 1 equation/expression* **AND** 1 point: Correct and complete procedure shown or explained *Work may contain 1 calculation or copy error* Give credit for the following or equivalent: Ex. $P = 4w + 90$ $450 = 4w + 90$ $360 = 4w$ $w = 90$ m
3	**2 points possible:** 1 point: Correct answer: **12,150** (m^2) *Or correct answer based on Part 2* **AND** 1 point: Correct and complete procedure shown or explained *Work may contain 1 calculation or copy error* Give credit for the following or equivalent: Ex. $A = lw$ $l = w + 45 = 90 + 45 = 135$ m (*not required*) $A = 90 \times 135 = 12{,}150$ m^2

C. In the table below, the water level of a bathtub is related to how many minutes the water has been running.

Water in Bathtub

Time Water Runs (in minutes)	Level of Water (in inches)
1	0.5
2	1.0
3	1.5
4	2.0
5	2.5
6	3.0
7	3.5

1. What are the domain and range values of this relationship?

2. Create a new table of values, beginning at 1 minute, that represents the water level changing at a rate of 1.5 inches per minute.

3. If the domain and/or range are affected by the rate change in Part 2, explain how they are affected.

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

Item C Scoring Rubric—2013 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

SOLUTION AND SCORING

4 points possible:

<table>
<tr><th>Part</th><th>Points</th></tr>
<tr><td>1</td><td>
2 points possible:

1 point: Correct domain values: {1, 2, 3, 4, 5, 6, 7}

OR

½ point: Partially correct domain with 1 incorrect/missing value

AND

1 point: Correct range values: {0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5}

OR

½ point: Partially correct range with 1 incorrect/missing value
</td></tr>
<tr><td>2</td><td>
1 point possible:

1 point: Correct table
Give credit for the following or equivalent:
Ex.
Water in Bathtub
<table>
<tr><th>Time Water Runs (in minutes)</th><th>Level of Water (in inches)</th></tr>
<tr><td>1</td><td>1.5</td></tr>
<tr><td>2</td><td>3.0</td></tr>
<tr><td>3</td><td>4.5</td></tr>
<tr><td>4</td><td>6.0</td></tr>
<tr><td>5</td><td>7.5</td></tr>
<tr><td>6</td><td>9.0</td></tr>
<tr><td>7</td><td>10.5</td></tr>
</table>
Note: Full credit is awarded for a table that has the 1st three (or more) correct entries, with no incorrect entries
Note: Full credit is awarded for a table that has the range values of (Level of Water):{0.5, 2.0, 3.5, 5.0, 6.5, 8.0, 9.5}

OR

½ point:
• Partially correct table with 1 incorrect value

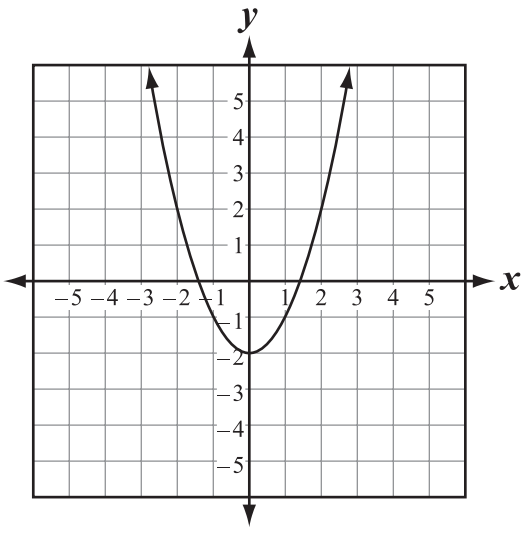
Or

• Table is incorrect due to 1 calculation error, all subsequent values are correct based on that 1 error
</td></tr>
</table>

Part	Points
3	**1 point possible:** 1 point: Correct explanation Give credit for the following or equivalent: Ex. "The domain values would not change, but the range values would. For example, for the same domain values of 1 to 7 minutes the range values would be {1.5, 3.0, 4.5, 6.0, 7.5, 9.0, 10.5} " Ex. "The range is affected. The values are tripled because the rate has tripled." *Note: A statement about the domain is not required since it does not change, however any statement made about it must be correct*

PART II Spring Released Algebra I Items

1. Look at the graph below.



Which equation is **best** represented by this graph?

A. $y = x^2$

B. $y = x - 2$

* C. $y = x^2 - 2$

D. $y = 2x - 2$

2. The heights in inches of players on a soccer team are 64, 67, 67, 64, 65, 68, 67, 66, and 65. A new player joins the team, whose height is taller than the median. How will this additional player affect the median height of the team?

A. increase it by 1.5 inches

* B. increase it by 0.5 inches

C. decrease it by 0.5 inches

D. remains the same

3. What is the product of the expression below?

$$(x^2 + 7x - 4)(5x + 2)$$

A. $7x^2 + 14x - 8$

B. $36x^2 - 6x - 8$

* C. $5x^3 + 37x^2 - 6x - 8$

D. $5x^3 + 2x^2 - 20x - 14$

4. What is the factored form of the expression below?

$$x^2 - 5x - 24$$

A. $(x+8)(x-3)$

B. $(x-6)(x+4)$

C. $(x+6)(x-4)$

* D. $(x-8)(x+3)$

5. Jamie paid \$3.50 for admission to the fair and each ride cost \$1.50. Use x for the number of rides he rode and y for Jamie's total cost at the fair. Which equation represents Jamie's total cost?

A. $y = (3.50 + 1.50)x$

* B. $y = 3.50 + 1.50x$

C. $y = 3.50x + 1.50$

D. $y = \dfrac{3.50 + 1.50}{x}$

6. If the equations $y = 0.3x - 4$ and $y = 0.3x - 100$ were graphed on the same coordinate grid, how would the two lines relate to one another?

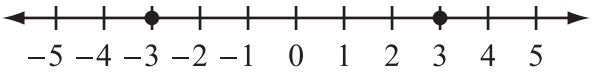
A. The lines would be vertical.

* B. The lines would be parallel.

C. The lines would be horizontal.

D. The lines would be neither parallel nor perpendicular.

7. Which equation has the complete solution set represented by this graph?



* A. $|x| = 3$

B. $|x| = -3$

C. $-|x| = 3$

D. $|-x| = -3$

8. Tom and Wendy traveled 5,200 miles on their vacation. Wendy drove 2,675 miles of the trip. Rounded to the nearest tenth, what percentage of the trip did Wendy drive?

A. 51.0%

* B. 51.4%

C. 51.5%

D. 52.0%

9. Given the function $f(x)=\frac{2x}{3}$, what is $f(4)$?

A. $\frac{2}{3}$

B. 2

* C. $\frac{8}{3}$

D. 8

10. Look at the table.

x	*y*
0	3
1	8
2	13
3	18

What is the equation of the line that contains the values given in the table?

* A. $y=5x+3$

B. $y=5x-37$

C. $y=5x-87$

D. $y=\frac{1}{5}x+\frac{63}{5}$

11. Which ordered pair is a solution to the system of equations given below?

$$x-y=11$$
$$x+y=17$$

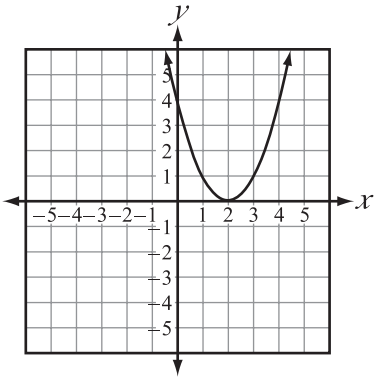
A. $(3,14)$

* B. $(14,3)$

C. $(-3,-14)$

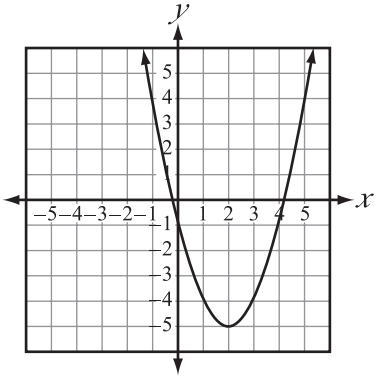
D. $(-14,-3)$

12. Use the graph to answer this question.

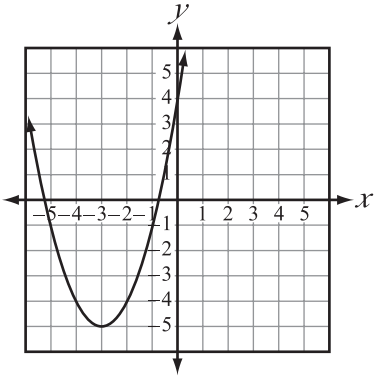


Which graph shows the above graph shifted vertically −5 units?

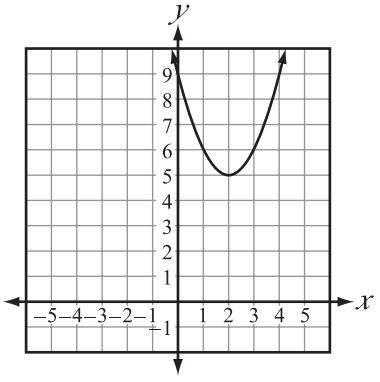
* A.



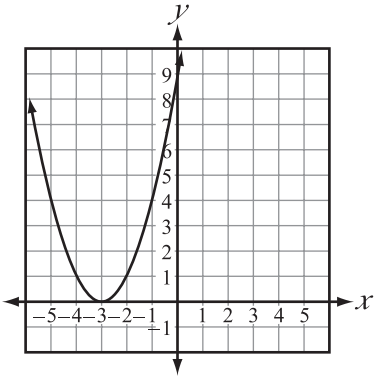
B.



C.



D.



13. Assuming $x \neq 0$ and $y \neq 0$, which shows the expression $\frac{26y^3}{18xy^2}$ completely simplified?

A. $\frac{8y}{x}$

* B. $\frac{13y}{9x}$

C. $\frac{26y}{18x}$

D. $\frac{13y^3}{9xy^2}$

14. Scientists use the word "work" when talking about the force needed to move an object. One formula for work is $W = Fd$, where $W =$ work, $F =$ force, and $d =$ distance.

Which equation could be used to find the force, F, if the work and distance are known?

A. $F = Wd$

B. $F = W - d$

C. $F = \frac{d}{W}$

* D. $F = \frac{W}{d}$

15. What are the solutions for $x^2 - 2x - 24 = 0$?

A. $x = 2, -12$

B. $x = -2, 12$

C. $x = -3, 8$

* D. $x = -4, 6$

16. What is the slope of the line passing through the points $(3, -9)$ and $(2, -6)$?

* A. -3

B. $-\frac{9}{11}$

C. $-\frac{1}{3}$

D. 15

17. Josh is the captain of the basketball team. Kara is the conductor of the marching band. Both are running for student government. A survey is conducted before the election to help predict the winner. Which sample of students would give the most accurate data?

A. the marching band

B. the basketball team

* C. students in the lunch line

D. students absent on election day

18. Four athletes spend different amounts of workout times maintaining flexibility (F), doing strength training (S), and doing aerobic exercise (A). Aimee spends 10, 20, and 70 minutes on each type respectively. LaVonda spends 15, 30, and 55 minutes respectively. Noor spends 20, 30, and 50 minutes, respectively, whereas Tasha spends 25, 25, and 50 minutes, respectively.

Which matrix below reflects the number of minutes each athlete spends on each exercise type?

* A.

	F	S	A
Aimee	10	20	70
LaVonda	15	30	55
Noor	20	30	50
Tasha	25	25	50

B.

	F	S	A
Aimee	10	30	100
LaVonda	15	45	100
Noor	20	50	100
Tasha	25	50	100

C.

	F	S	A
Aimee	70	20	10
LaVonda	55	30	15
Noor	50	30	20
Tasha	50	25	25

D.

	F	S	A
Aimee	10	20	70
LaVonda	15	30	55
Noor	20	30	50
Tasha	20	30	50

19. Which set of ordered pairs represents a function?

A. $\{(22, 5),\ (23, 10),\ (22, 7),\ (23, 5)\}$

B. $\{(22, 5),\ (26, 10),\ (23, 7),\ (23, 5)\}$

* C. $\{(22, 10),\ (23, 10),\ (24, 7),\ (25, 5)\}$

D. $\{(24, 10),\ (23, 6),\ (22, 7),\ (24, 5)\}$

20. What is the simplest form of the expression below?

$$(\sqrt{4})(4) - \sqrt{4}$$

A. 0

B. 2

C. 4

* D. 6

21. What value of g makes $3g + 9 = 18$ a true statement?

A. $g = -3$

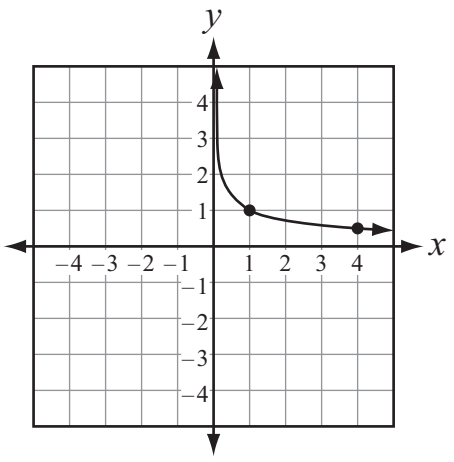
* B. $g = 3$

C. $g = 9$

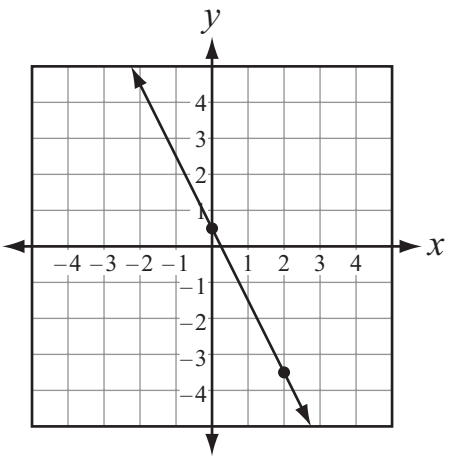
D. $g = 15$

22. Which graph **best** represents a quadratic function?

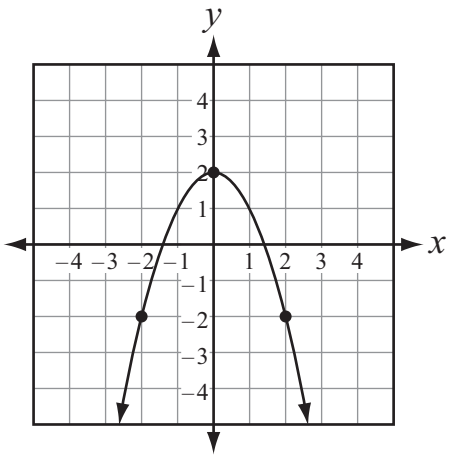
A.



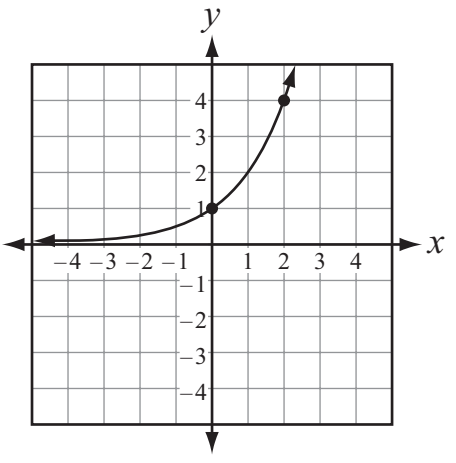
B.



* C.



D.



23. What is the simplified form of the expression below?

$$\frac{(4\times10^{8})(2.3\times10^{6})}{(3.1\times10^{7})}$$

* A. 2.97×10^{7}

B. $2.97\times10^{6.7}$

C. 29.7×10^{6}

D. 2.97×10^{2}

24. The new town water tank currently contains 140 gallons of water. The water utility is going to fill the tank at a rate of 2 gallons of water per second. Which equation represents the relationship between *w*, the total amount of water in the tank and *t*, the time spent pumping water into the tank?

A. $w = 2t$

B. $w = 140t$

C. $w = 140t + 2$

* D. $w = 2t + 140$

25. A math teacher checked in 36 algebra books and put them in a stack in her classroom. At the end of the day Sheila remembered she put a $10 bill in her book and returned to the classroom to find her money. She pulled a book from the stack at random, checked it for the money, and put the book to one side. She does that for 4 books without finding the money. What is the probability that the next book that she takes from the stack will have her money in it?

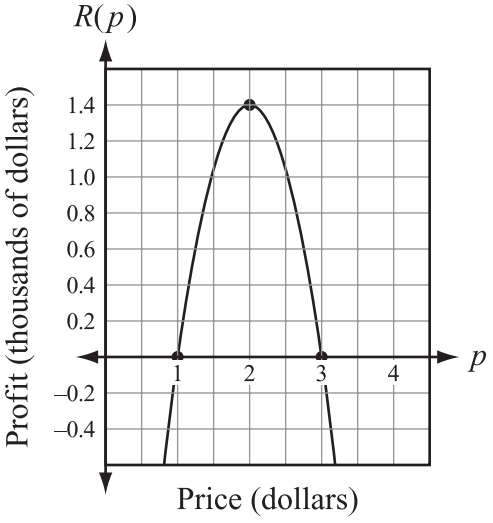
A. $\frac{1}{36}$

* B. $\frac{1}{32}$

C. $\frac{1}{9}$

D. $\frac{1}{4}$

26. A company that makes shoelaces found that when each pair sells for p dollars, the total profit will be $R(p)$. This is modeled by the function $R(p) = -p^2 + 4p - 3$, the graph of which is shown below.



At which price will the company make the greatest profit?

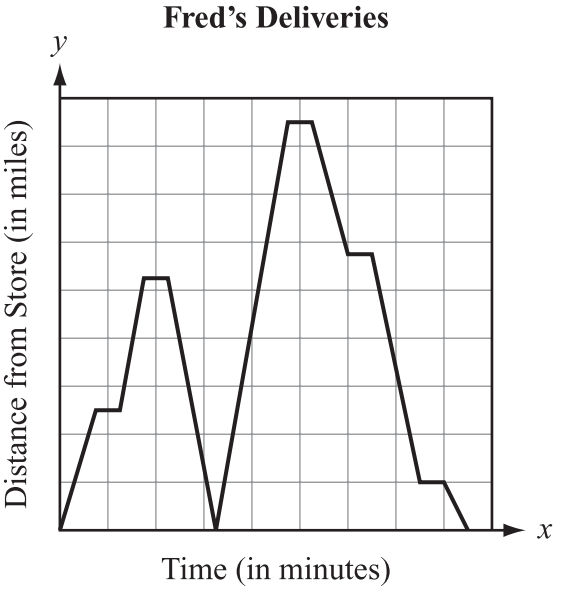
A. $1.00

B. $1.40

* C. $2.00

D. $3.00

27. Fred uses his car to make pizza deliveries. This graph shows his deliveries one night.



Which statement describes the situation on the graph?

A. Fred made 2 deliveries and then went back to the store.

B. Fred made 5 deliveries and then went back to the store.

* C. Fred made 2 deliveries, returned to the store, and then made 3 more deliveries before returning to the store.

D. Fred made 3 deliveries, returned to the store, and then made 2 more deliveries before returning to the store.

PART II Spring Released Algebra I Items

28. What is the simplest form of the following expression?

$$\frac{(4\cdot 20)}{(4+1)}+3(5-2\cdot 2)^2$$

* A. 19
B. 23
C. 124
D. 137

---

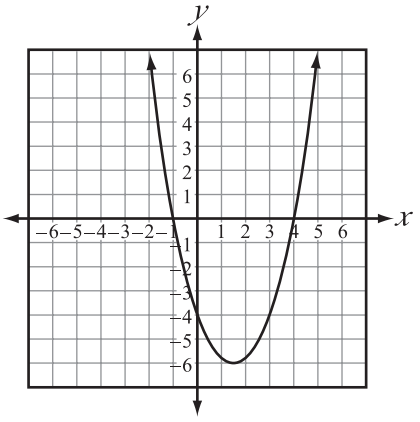
29. Leon is studying how soil temperature affects the average time a seed takes to germinate. He records the data as shown.

Soil Temperature (°F)	Average Germination Time (days)
75°	3
70°	6
65°	9
60°	12

Which best describes the pattern in the data for every five-degree drop in temperature?

A. The average germination time triples.
B. The average germination time doubles.
* C. The average germination time is 3 days greater.
D. The average germination time is 4 times greater.

30. A function is shown below.



What is the vertex of the function?

* A. $\left(\frac{3}{2}, -6\right)$

B. $(0, -4)$

C. $(-1, 0)$

D. $(4, 0)$

PART II Spring Released Algebra I Items

A. Ski rentals are $100 plus $18 per hour, as shown in the table below.

Ski Rentals

Time (in hours)	Rental Cost
1	$118
2	$136
3	$154
4	$172

1. Write an equation that represents this data using function notation. Let x represent the time in hours and $f(x)$ represent the rental cost.

2. What would be $f(6)$? Show your work.

3. If $f(x) = 235$, what is x? Show your work.

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

Item A Scoring Rubric—2013 Algebra I

Score	Description
4	The student earns 5 points. The response contains no incorrect work.
3	The student earns 4 points.
2	The student earns 2 – 3 points.
1	The student earns 1 point, or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
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

5 points possible:

Part	Points
1	**1 point possible:** 1 point: Correct equation: $f(x) = 18x + 100$ *or equivalent*
2	**2 points possible:** 1 point: Correct answer: **208** *(dollars)* *Or correct answer based on Part 1 equation* **AND** 1 point: Correct and complete procedure shown or explained *Work may contain 1 calculation or copy error* Give credit for the following or equivalent: Ex. $f(6) = 18(6) + 100$ $= 108 + 100$ $= 208$
3	**2 points possible:** 1 point: Correct answer: **7.5** *(hours)* *Or correct answer based on Parts 1 and/or 2* **AND** 1 point: Correct and complete procedure shown or explained *Work may contain 1 calculation or copy error* Give credit for the following or equivalent: Ex. $f(x) = 235$ $235 = 18x + 100$ $135 = 18x$ $7.5 = x$ Ex. "Guess & Check" $x = 7.5$ (*required*) $18(7.5) + 100 = 135 + 100 = 235$ (*required*) $18(7) + 100 = 226$ (*not required*) $18(8) + 100 = 244$

B. 1. Copy the table below into your answer document. Using the function $f(x) = x^2 - 1$, complete the table.

x	y
–2	
–1	
$-\frac{1}{2}$	
0	
$\frac{1}{2}$	
1	
2	

2. Use the grid in your answer document to graph the function $f(x) = x^2 - 1$. Label both axes. Plot and label the vertex.

3. Write the function that represents the reflection of $f(x) = x^2 - 1$ across the x-axis.

4. On the same grid, graph the function from Part 3.

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

Item B Scoring Rubric—2013 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.)

SOLUTION AND SCORING

4 points possible:

<table>
<tr><th>Part</th><th>Points</th></tr>
<tr><td>1</td><td>1 point possible:

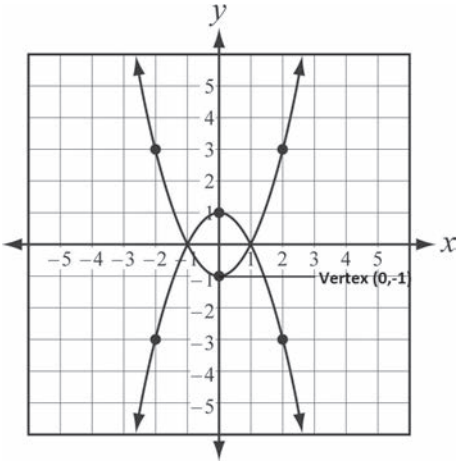
1 point: Correct and complete table, as shown below:

<table>
<tr><th>x</th><th>y</th></tr>
<tr><td>−2</td><td>3</td></tr>
<tr><td>−1</td><td>0</td></tr>
<tr><td>−½</td><td>−¾</td></tr>
<tr><td>0</td><td>−1</td></tr>
<tr><td>½</td><td>−¾</td></tr>
<tr><td>1</td><td>0</td></tr>
<tr><td>2</td><td>3</td></tr>
</table>

OR

½ point: Table contains 6 correct values of y and 1 incorrect/missing value of y</td></tr>
<tr><td>2</td><td>1 point possible:

1 point: Correct graph, as shown below:
Or correct graph of a quadratic function based on incorrect table in Part 1
Note: Part 4 parabola is included

<u>Graph must include:</u>
● Correctly labeled axes (1 or both missing = 1 error)
● Consistent intervals (1 error per axis)
● Correctly graphed parabola: All points (that are plotted) are correct (1 error per point) & connected by a curve, arrows are included(1 error)
● Correctly labeled vertex (missing = 1 error)

OR

½ point: Graph contains 1 error but is otherwise correct
Ex: Parabola is correctly graphed, but arrows are missing
Ex: Axes not labeled, but graph is otherwise correct</td></tr>
</table>

PART II Spring Released Algebra I Items

Part	Points
3	**1 point possible:** 1 point: Correct answer: $f(x) = -x^2 + 1$ *or equivalent* Ex. $y = -(x^2 - 1)$
4	**1 point possible:** 1 point: Correct reflection of **quadratic** function from Part 2: See above graph *Or correct graph of incorrect **quadratic** function given in Part 3* *Note: The prompt does not require labeling the graph as Part 4* *The Part 2 graph is distinguished by the labeling of the vertex* **OR** ½ point: Graph contains 1 error but is otherwise correct Ex. Parabola is correctly graphed, but arrows are missing Ex. 1 point is plotted incorrectly, but graph is otherwise correct *Note: If plotted on the same axes, no further reduction is made for missing labels or inconsistent intervals from Part 2*

C. The orbital period of a comet depends on the average distance from the Sun, *r*, and the eccentricity of the orbit, *e*.

1. If a comet is an average of 6.0×10^{17} *cm* from the Sun, and $e=1.5\times10^{13}$ *cm*, calculate the ratio $\frac{r}{e}$. Express your answer in scientific notation.

2. The time in years, *T*, it takes an object to orbit the Sun can be found using the equation $T=\sqrt{\left(\frac{r}{e}\right)^3}$. Calculate the number of years, *T*, it takes the comet to orbit the Sun. Show all of your work and leave your answer in scientific notation.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

Item C Scoring Rubric—2013 Algebra I

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.)

PART II Spring Released Algebra I Items

Solution and Scoring

4 points possible:

Part	Points
1	**2 point possible:** 2 point: Correct answer: 4.0×10^4 *Note: No other answers are acceptable* *Work is not required* **OR** 1 point: Answer of: 4×10^4 (*equivalent to the correct answer but does not have 2 significant digits*)
2	**2 points possible:** 2 points: Correct answer: 8.0×10^6 (*years*) *Or correct answer, **written in scientific notation**, based on an incorrect answer in Part 1* Correct procedure is shown and/or explained Give credit for the following or equivalent: ● $T=\sqrt{(4.0\times10^4)^3}=\sqrt{64\times10^{13}}=8.0\times10^6$ **OR** 1 point: ● Correct answer: 8.0×10^6 Procedure is incomplete or missing, *but not incorrect* Or ● Answer of: 8×10^6 *(equivalent to the correct answer but does not have 2 significant digits)* Correct procedure is shown and/or explained Or ● Answer is incorrect due to 1 calculation or copy error, but is *correctly written in **scientific notation*** Correct procedure is shown and/or explained Or ● Answer of : $8,000,000$ Correct procedure is shown and/or explained

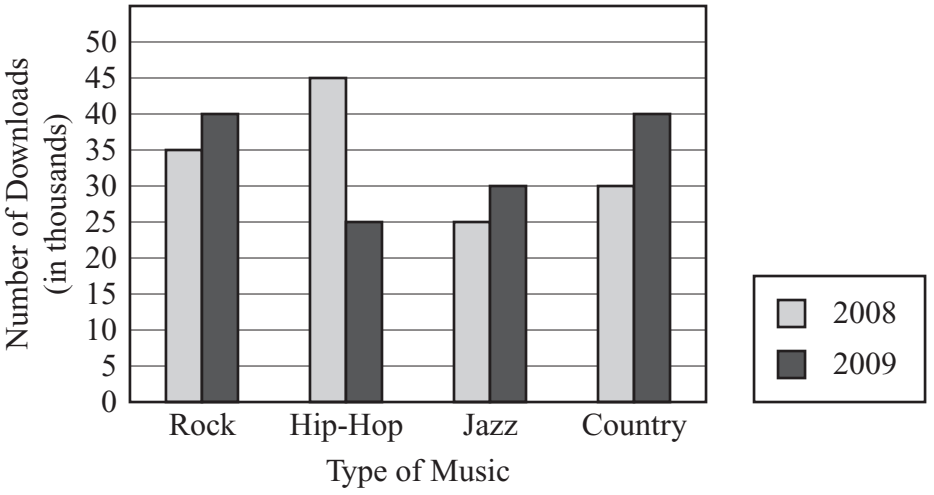
1. Mollie runs 2 miles in 19.1 minutes. If she maintains this same speed, how long will it take her to run a total of 5 miles?

A. .52 minutes
B. 7.64 minutes
* C. 47.75 minutes
D. 85.5 minutes

2. From 5000 cars produced, the quality control department samples 200 to check for defects. Of those checked, 2 cars are found to be defective. What is the **estimated** total number of cars that are defective?

* A. 50
B. 400
C. 2,500
D. 4,800

3. The graph below shows the number of songs downloaded from a music web site in 2008 and 2009, sorted according to type of music.



Which two types of music had the same total number of downloads in 2008 and 2009 combined?

A. Rock and Country
B. Hip-Hop and Jazz
C. Rock and Hip-Hop
* D. Hip-Hop and Country

---

4. Which expression is equivalent to $\frac{3a^2 + 6a}{9a}$, when $a \neq 0$?

A. $\frac{a+6}{3}$

* B. $\frac{a+2}{3}$

C. $\frac{7a}{3}$

D. $3a$

5. A school club sells t-shirts. The first day, the club sells 38 shirts. For each of the remaining days, the club sells 3 fewer shirts than they sold the day before. How many shirts does the club sell in 7 days?

* A. 203
B. 245
C. 263
D. 266

6. Which expression is equivalent to $(3x^4 + 4yz) - (2yz + 2x^4)$?

A. $x^4 - 2yz$

* B. $x^4 + 2yz$

C. $5x^4 - 2yz$

D. $5x^4 + 6yz$

7. Martha's age is 8 years less than 3 times Andrew's age. Which of the following represents the relationship between Martha's age, x, and Andrew's age, y?

* A. $x = 3y - 8$

B. $x = 8 - 3y$

C. $x = 8y - 3$

D. $x = 3(y - 8)$

8. If the graph of $y = 6x^2 + 2$ is shifted down 5 units, what is the equation of the new graph?

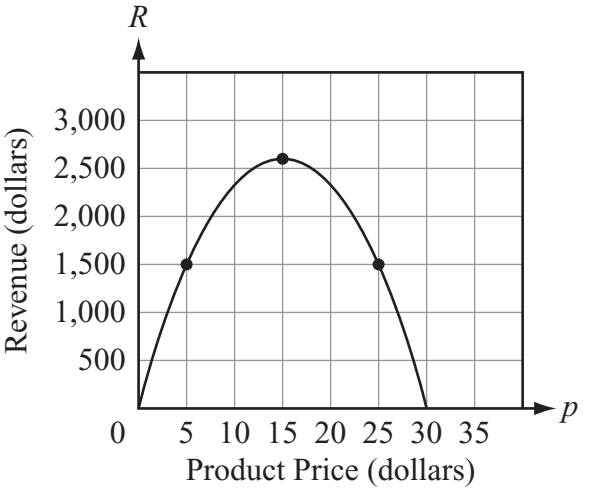
A. $y = x^2 + 2$

B. $y = x^2 - 3$

C. $y = 6x^2 + 7$

* D. $y = 6x^2 - 3$

9. A company's revenue can be modeled by the function $R = -12p^2 + 360p$ where p is equal to the product price. What is the maximum revenue the company can earn?



A. $30

B. $1,500

* C. $2,700

D. $3,000

10. Use the data set below to answer the following question.

0.45, 0.45, 0.45, 0.56, 0.63, 0.63, 0.67

Which measure of this data set is **greatest**?

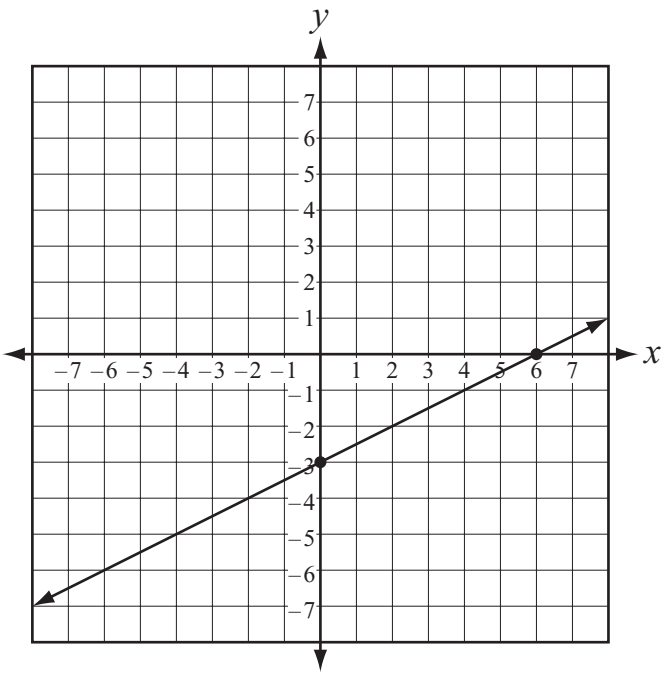
A. mode

B. mean

C. range

* D. median

11. Look at the graph below.



The graph of which equation is parallel to the line on the graph above?

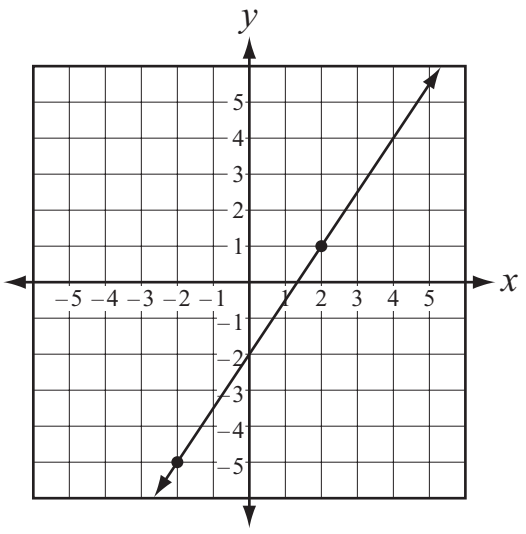
* A. $y = \frac{1}{2}x + 1$

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

C. $y = -x - 3$

D. $y = x - 3$

12. Look at the graph below.



What is the slope of the line in the graph?

A. -2

B. $\frac{2}{3}$

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

* D. $\frac{3}{2}$

13. Which is equivalent to the expression $4\sqrt{7}-\sqrt{28}$?

A. 0

B. 2

* C. $2\sqrt{7}$

D. $6\sqrt{7}$

14. Which survey question shows bias?

* A. Aren't dogs the best pets?

B. What time do you wake up for school?

C. How often do you eat out at restaurants?

D. Which season of the year is your favorite?

15. What expression is equivalent to $144-x^2$?

A. $(12-x)(12-x)$

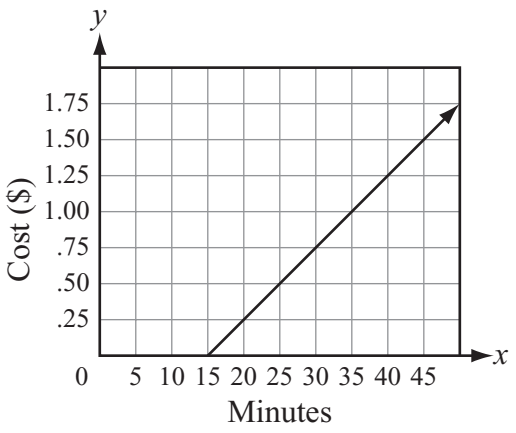
* B. $(12-x)(12+x)$

C. $(x-12)(x+12)$

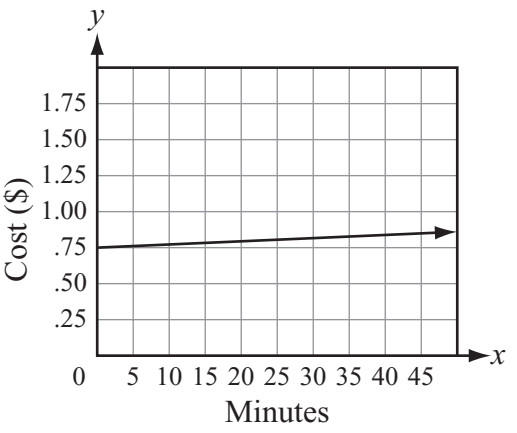
D. $(x-12)(x-12)$

16. An online video conference service is free for the first 15 minutes each month. After that, the cost per minute is \$0.05. Which graph could show the monthly cost of the service?

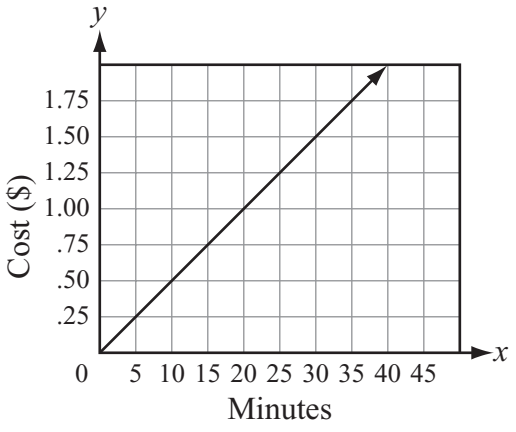
* A.



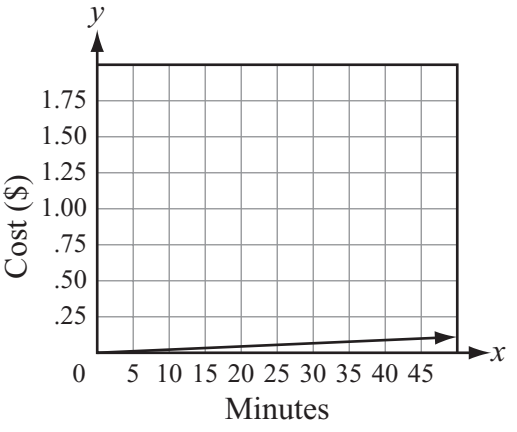
B.



C.



D.



---

17. A copy machine can make 600 copies in 25 minutes. How many copies can it make in 1 hour?

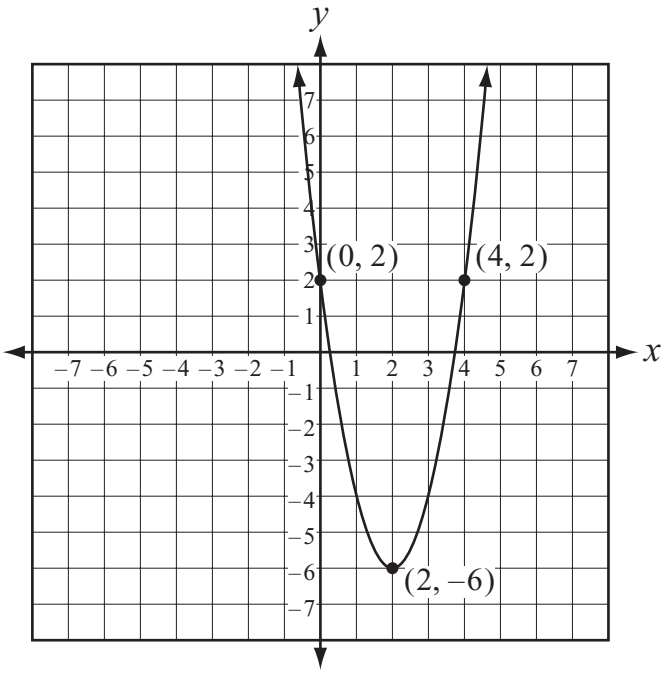
A. 840

B. 850

C. 1200

* D. 1440

18. Use the graph below to answer the following question.



Which appears to be the minimum value of this graph?

A. -7

* B. -6

C. 0

D. 2

---

19. Which shows the equation $A = Prt$, solved for t?

A. $t = A - Pr$

B. $t = \dfrac{A - P}{r}$

* C. $t = \dfrac{A}{Pr}$

D. $t = \dfrac{A}{P} - r$

20. Which values of x will satisfy the equation $3x^2 - 4x + 1 = 0$?

A. -4 and 1

* B. $\dfrac{1}{3}$ and 1

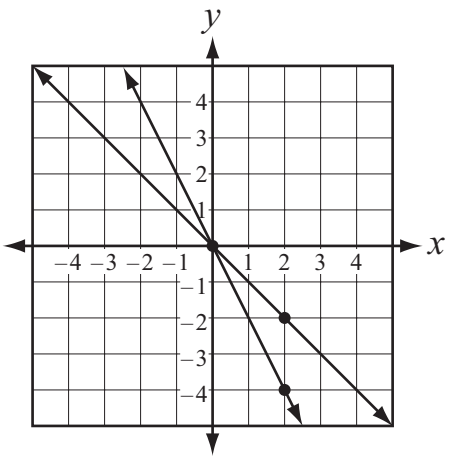
C. $\dfrac{4}{3}$ and 1

D. 3 and -1

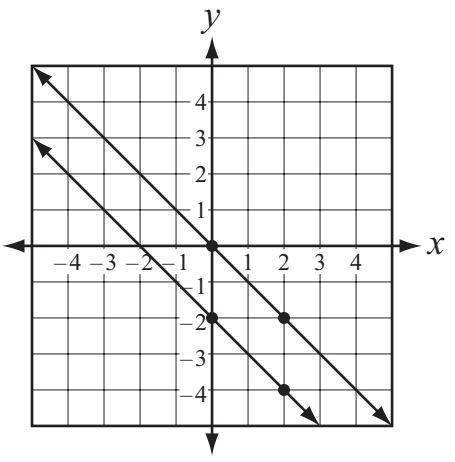
PART II RETEST RELEASED ALGEBRA I ITEMS

21. Which graph displays lines generated by the equations $y = -x$ and $y = -x + 2$?

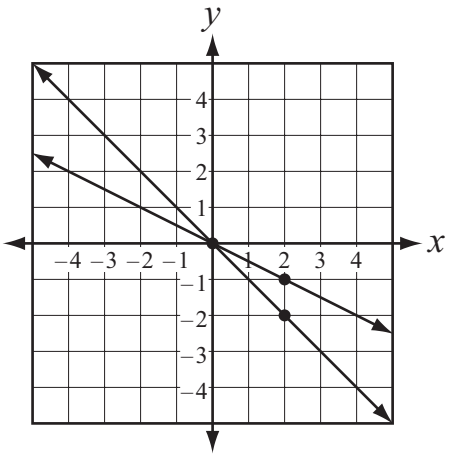
A.



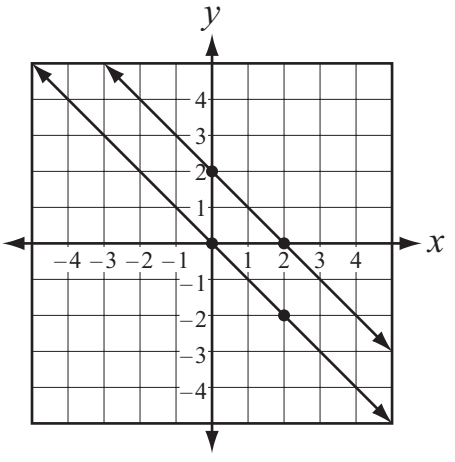
B.



C.



* D.



---

22. Nathan is inflating a spherical balloon for a parade. When it is fully inflated, the balloon will have a surface area of 530 square feet. What is the approximate radius of the balloon when it is fully inflated? The formula for the surface area of a sphere is $S = 4\pi r^2$.

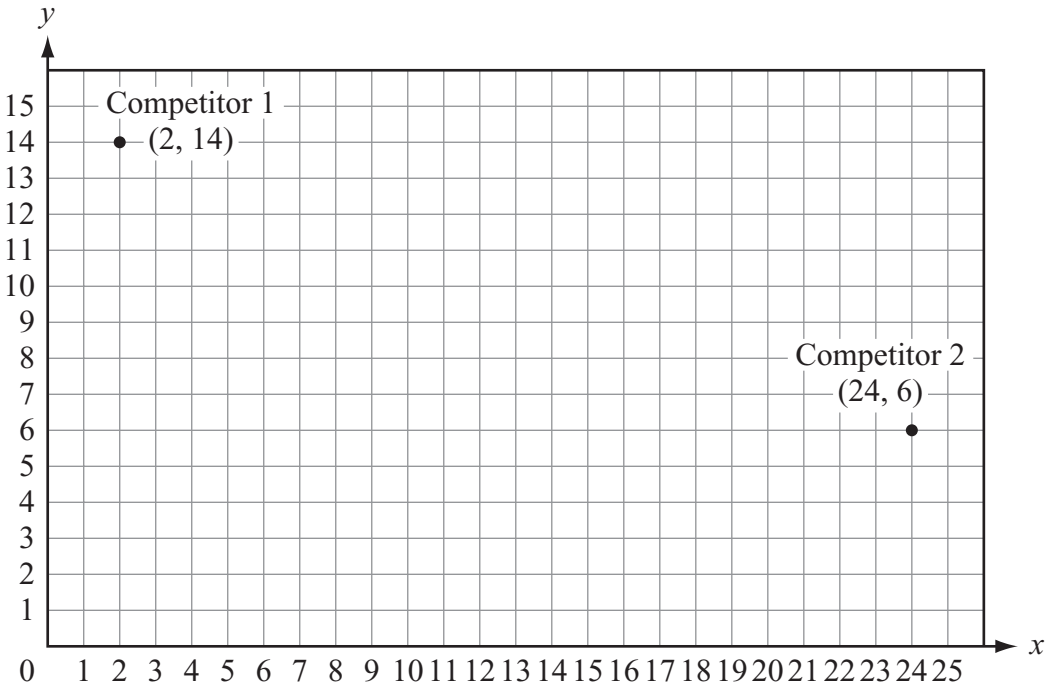
* A. 6.5 feet

B. 26.0 feet

C. 42.2 feet

D. 81.6 feet

23. A business owner is selecting a location for his new building. He does not want to be too close to either of his competitors. Using the map below, he locates the midpoint between the two nearest competitors.



At what coordinates will the building be half-way between each of the competitors?

A. (12, 3)

* B. (13, 10)

C. (10, 13)

D. (22, 8)

24. Which expression is equivalent to $\frac{2}{\sqrt{5}}$?

A. 2

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

* C. $\frac{2\sqrt{5}}{5}$

D. $\frac{2\sqrt{5}}{25}$

25. Rubin makes $300.00 per week bussing tables. He also gets 10% of the money from the tip jar at the end of the week. If there is $78.20 in the jar, how much money did Rubin make this week?

A. $ 7.82

B. $108.20

* C. $307.82

D. $387.20

26. What is the value of the expression $\left(\frac{a}{4}\right)^3 + 2(a+6)$ when $a = -2$?

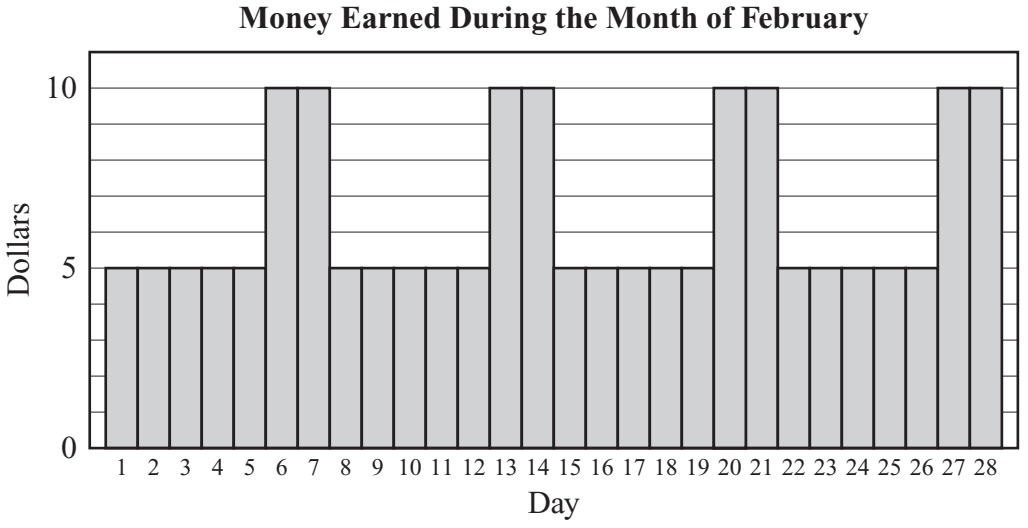
A. 0

B. $1\frac{7}{8}$

C. 6

* D. $7\frac{7}{8}$

27. The graph below shows the money Micah earns walking dogs each day during the month of February.

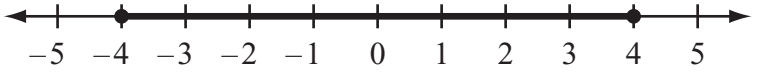


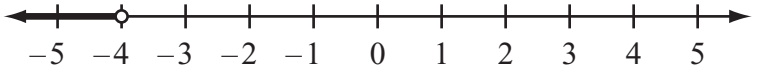
What is the independent variable in this situation?

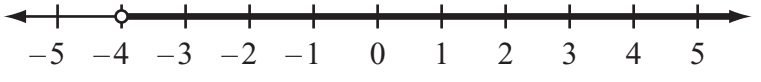
A. miles walked
B. dollars earned
* C. day of the month
D. month of the year

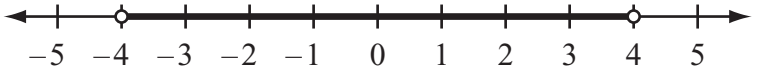
---

28. Which graph represents the solution to the inequality $|x| < 4$?

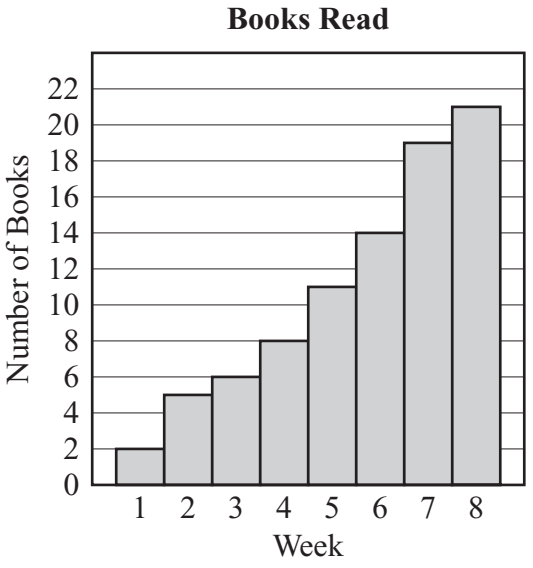
A.


B.


C.


* D.


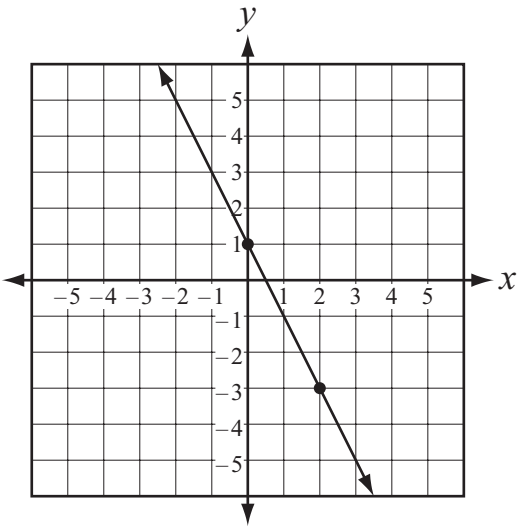
29. The cumulative frequency histogram below shows the number of books Denise read each week during the summer.



How many books did Denise read in week 6?

* A. 3
B. 5
C. 12
D. 14

30. Look at the graph below.

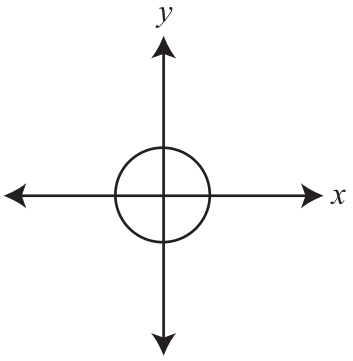


What is the equation of the line in the graph above?

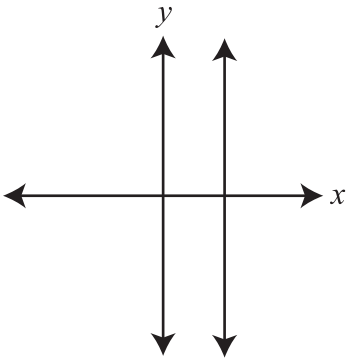
A. $y = 2x + 5$
B. $y = -2x - 1$
* C. $y = -2x + 1$
D. $y = -2x + 4$

31. For which graph is the relationship shown a function of y in terms of x?

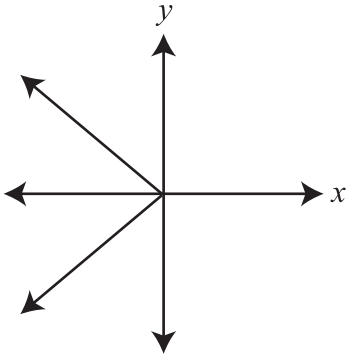
A.



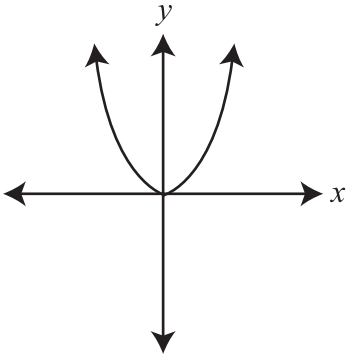
B.



C.



* D.



32. What are the missing terms of the pattern shown below?

6, 9, 15, 27, 51, __, __, …

A. 66, 84
B. 75, 99
* C. 99, 195
D. 153, 459

33. Which expression is equivalent to $(n^6)^3$?

* A. n^{18}
B. n^9
C. n^3
D. n^2

34. Adrienne wants to get an A in math like her friends. She knows they always wear blue socks, so Adrienne starts wearing blue socks too. Which statement about Adrienne's reasoning is true?

A. Adrienne's reasoning is correct.

B. Adrienne has it backwards. If she does well in math, she will prefer blue socks.

C. Adrienne is right about the socks, and should also consider wearing blue sweaters and pants.

* D. Two things happening at the same time does not mean blue socks will make Adrienne get an A in math.

35. Which expression is a complete factorization of $x^2 - 10x + 24$?

A. $(x + 24)(x + 1)$

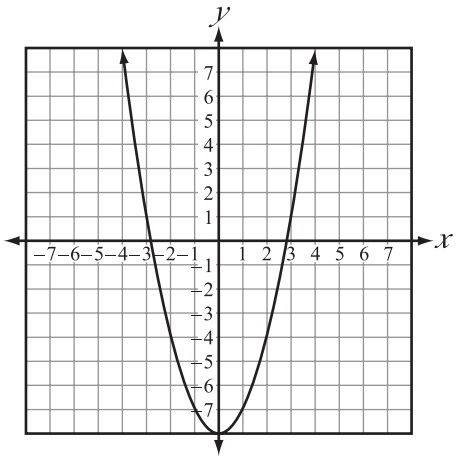
B. $(x - 12)(x - 2)$

C. $(x - 3)(x - 8)$

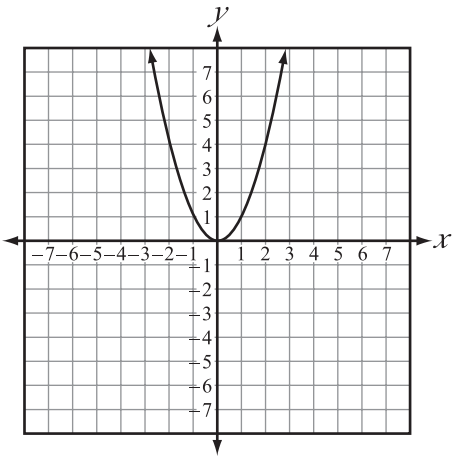
* D. $(x - 6)(x - 4)$

36. Which graph shows the equation $y = x^2 - 4$ after an upward shift of 4 units?

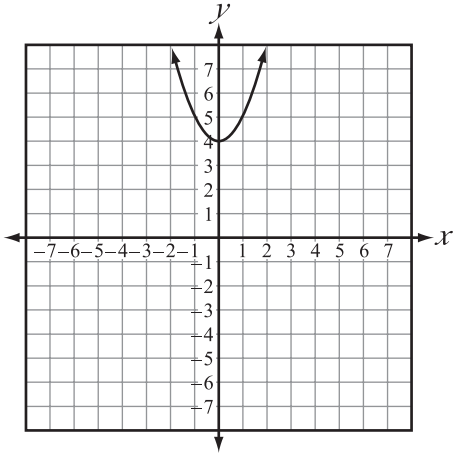
A.



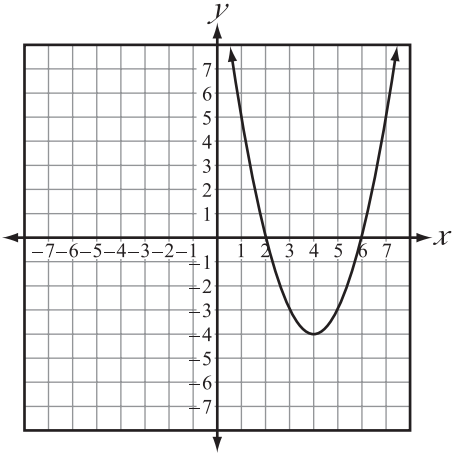
* B.



C.



D.



---

37. Nancy plans to drive 1,335 miles in three days. She plans to drive 465 miles the first day. How many miles does she need to average the next two days to follow her plan?

* A. 435

B. 445

C. 465

D. 870

38. Dorothy's oven gets hotter than the temperature shown on the dial. She has found that to get 350°F she has to set the dial 10° lower; to get 375°F she must set the dial 20° lower; and to get 400°F she must set the oven 30° lower. She makes a matrix that shows where to set the oven-temperature dial to get the desired temperature. Which matrix shows the correct settings to get 350°F, 375°F, and 400°F?

A. $\begin{matrix}\text{Temp} \\ \text{Dial}\end{matrix}\begin{bmatrix} 350 & 375 & 400 \\ 320 & 355 & 390 \end{bmatrix}$

B. $\begin{matrix}\text{Temp} \\ \text{Dial}\end{matrix}\begin{bmatrix} 350 & 375 & 400 \\ 360 & 395 & 430 \end{bmatrix}$

C. $\begin{matrix}\text{Temp} & \text{Dial}\end{matrix}$
$\begin{bmatrix} 340 & 330 \\ 355 & 335 \\ 370 & 340 \end{bmatrix}$

* D. $\begin{matrix}\text{Temp} & \text{Dial}\end{matrix}$
$\begin{bmatrix} 350 & 340 \\ 375 & 355 \\ 400 & 370 \end{bmatrix}$

39. For which value of x is the expression $\dfrac{17}{3x-21}$ undefined?

A. -7

* B. 7

C. 17

D. 21

40. Which equation represents $y=|x|-4$ shifted vertically downward 1 unit?

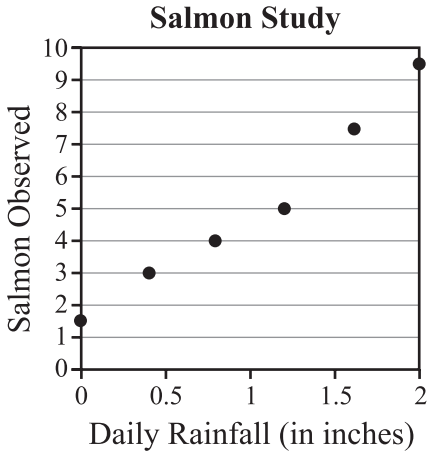
A. $y=-|x|-5$

B. $y=|x|+5$

* C. $y=|x|-5$

D. $y=|x|-3$

41. Jane records the number of salmon observed and the rainfall at a river dam each day. What can be inferred from her scatter plot?



* A. When rainfall is greater, more salmon are observed.

B. When there is less rainfall, more salmon are observed.

C. The number of salmon observed is nearly the same regardless of the rainfall.

D. There is no correlation between the number of salmon observed and rainfall.

42. The formula for the surface area of a hemisphere is $A = 2\pi r^2$. What is the formula solved for r?

A. $r = \sqrt{2\pi A}$

B. $r = \dfrac{\sqrt{2A}}{\pi}$

C. $r = \sqrt{\dfrac{2A}{\pi}}$

* D. $r = \sqrt{\dfrac{A}{2\pi}}$

43. Rashid weighs five packages at the post office and lists the package numbers and weights in kilograms as ordered pairs:

{(1, 2.6), (2, 3.0), (3, 7.0), (4, 4.5), (5, 10.3)}

What are the domain and range of Rashid's data?

A. Domain = {3}
Range = {1, 10.3}

B. Domain = {1, 2, 3, 4, 5}
Range = {2.6, 10.3}

* C. Domain = {1, 2, 3, 4, 5}
Range = {2.6, 3.0, 4.5, 7.0, 10.3}

D. Domain = {2.6, 3.0, 4.5, 7.0, 10.3}
Range = {1, 2, 3, 4, 5}

44. What are the solutions for x in $x^2 - 10x + 25 = 0$?

A. $x = -5, x = 5$

B. $x = 1, x = 25$

C. $x = -10, x = 25$

* D. $x = 5, x = 5$

---

45. Sherry is interested in a job in the transportation sector. She printed the mean annual incomes for some transportation occupations from the Internet.

Arkansas 2009 Transportation Occupations Mean Annual Income

Occupation	Income
Airline pilots, copilots, and flight engineers	$95,600
Commercial pilots	$68,610
Air traffic controllers	$90,300
Ambulance drivers and attendants, except EMTs	$29,850
Bus drivers, transit and intercity	$24,750
Bus drivers, school	$23,690
Truck drivers, heavy and tractor-trailer	$35,450
Truck drivers, light or delivery services	$26,240
Taxi drivers and chauffeurs	$18,570

Based on the table above, which statement accurately represents Sherry's data?

A. A school bus driver earns slightly more than an intercity bus driver.

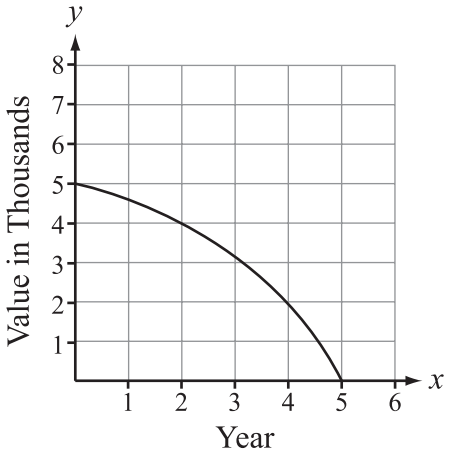
B. A tractor-trailer driver earns slightly more than double a taxi driver.

* C. An air traffic controller earns more than three times an ambulance driver.

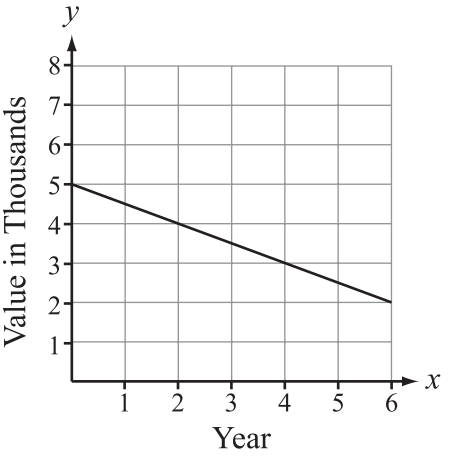
D. Commercial pilots have the highest mean annual income of any occupation in the table.

46. The value of a new racing bicycle is $5,000 and decreases by $500 per year. Which graph shows the value of the bicycle for the first 6 years?

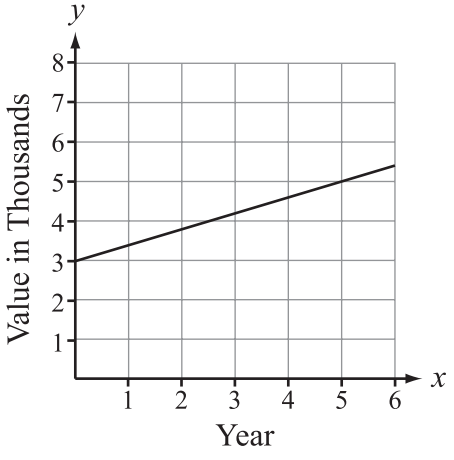
A.



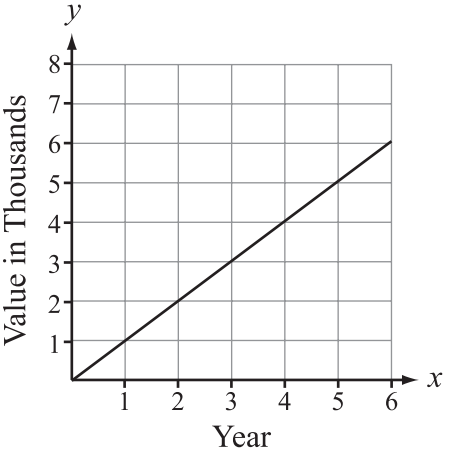
* B.



C.



D.



47. Assuming no denominator equals 0, which expression is equivalent to $\frac{14x^3 - 21x^2}{7x^2}$?

A. $7x - 28$

B. $7x - 14$

C. $2x + 3$

* D. $2x - 3$

48. Which ordered pair satisfies both equations below for x and y?

$$\begin{cases} x + y = 9 \\ x - y = 5 \end{cases}$$

A. (6, 1)

B. (6, 3)

* C. (7, 2)

D. (8, 1)

49. What is the solution of the following equation?

$$\frac{3}{2}(x+4)-x=9$$

A. $x=3$

* B. $x=6$

C. $x=10$

D. $x=30$

50. A homeowner is designing a deck for her home. The area of the deck is to be 300 square feet, and she wants the length to be three times the width. How long should the deck be?

A. 10 feet

B. 20 feet

* C. 30 feet

D. 100 feet

51. Anthony created a table of function values using different types of functions.

		$f(x)$			
		Column 1	**Column 2**	**Column 3**	**Column 4**
x	0	–1	–1	–1	–1
	1	0	0	0	0
	2	2	3	1	7
	3	6	8	2	26

Which column for $f(x)$ represents a linear function of x?

A. Column 1
B. Column 2
* C. Column 3
D. Column 4

52. The graphs of which pair of equations are perpendicular?

A. $y = x$
$4y = x$

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

C. $y = 4x - 2$
$y = 4x + 3$

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

53. What is the simplified form of $(x^2 + 5x - 3) + (-2x + 7)$?

* A. $x^2 + 3x + 4$
B. $x^2 + 3x - 10$
C. $-x^2 + 5x + 4$
D. $-x^2 + 12x - 3$

54. Which inequality represents the statement "the product of a number and -6, decreased by 3, is less than 57"?

A. $6n - 3 > 57$
B. $6n - 3 < 57$
C. $-6n - 3 > 57$
* D. $-6n - 3 < 57$

55. What is the equation of a line with a slope of 4 and through the point (1, 5)?

A. $y = 4x - 1$
* B. $y = 4x + 1$
C. $y = 4x - 19$
D. $y = 5x - 20$

56. Sylvia drives 7 miles to the supermarket in 18 minutes. Approximately how long will it take her to drive 16 miles to the library at this rate?

A. 6 minutes
B. 16 minutes
C. 36 minutes
* D. 41 minutes

57. The owner of two restaurants recorded the glasses of juice that were sold in each of his restaurants on Friday morning. He recorded the numbers in the matrices shown.

Downtown Juice Sales

	S	M	L
Apple	8	6	5
Orange	13	10	4
Grape	4	2	3

Plaza Juice Sales

	S	M	L
Apple	6	2	3
Orange	11	6	6
Grape	2	0	1

Which matrix represents the glasses of juice that were sold at both restaurants on Friday morning?

A.

	S	M	L
Apple	2	4	2
Orange	2	4	2
Grape	2	2	2

B.

	S	M	L
Apple	7	4	4
Orange	12	8	5
Grape	3	1	2

C.

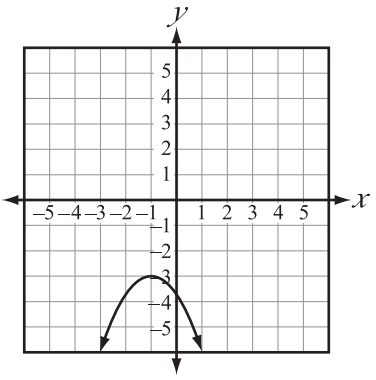
	S	M	L
Apple	14	15	6
Orange	17	16	2
Grape	7	8	4

* D.

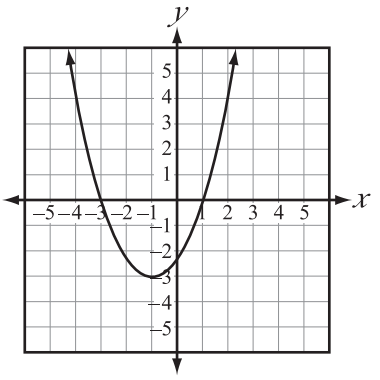
	S	M	L
Apple	14	8	8
Orange	24	16	10
Grape	6	2	4

58. Which graph has a minimum and vertex at $(-1, -3)$ and zeros of $(-3, 0)$ and $(1, 0)$?

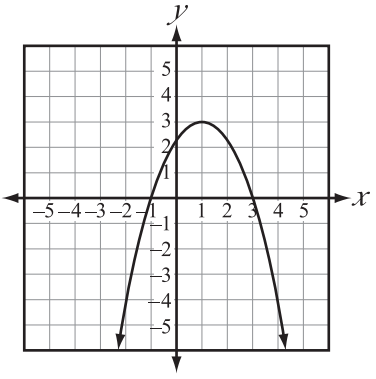
A.



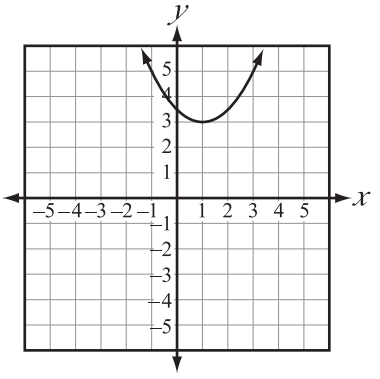
* B.



C.



D.



59. A water processing facility puts 8.4×10^{8} gallons of water into 2.1×10^{6} tanks. How much water is in each tank?

A. 2.5×10^{-3} gallons

B. 2.5×10^{-2} gallons

* C. 4.0×10^{2} gallons

D. 4.0×10^{8} gallons

60. If $f(x) = 2x + 8$, what is $f(-2)$?

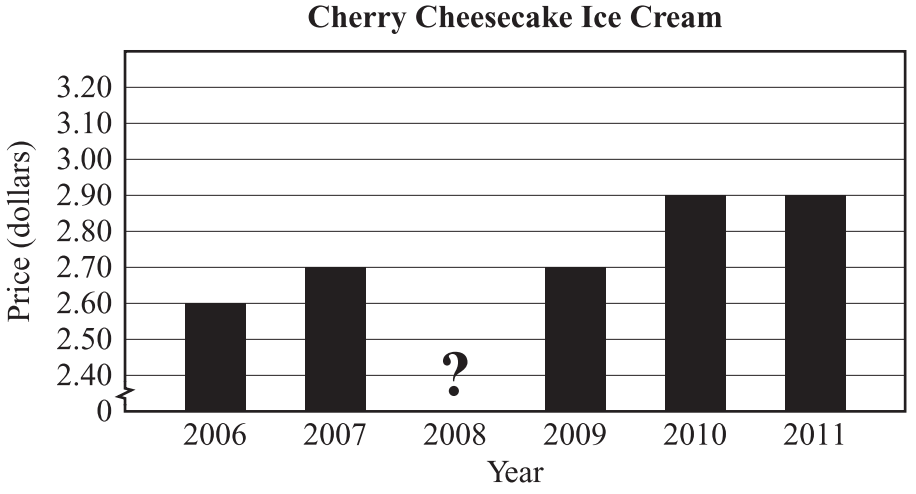
A. -20

* B. 4

C. 8

D. 12

61. The average price of a pint of Cherry Cheesecake ice cream has changed over time.



What is the most likely average price of Cherry Cheesecake ice cream in 2008?

A. $2.65
* B. $2.70
C. $2.80
D. $2.90

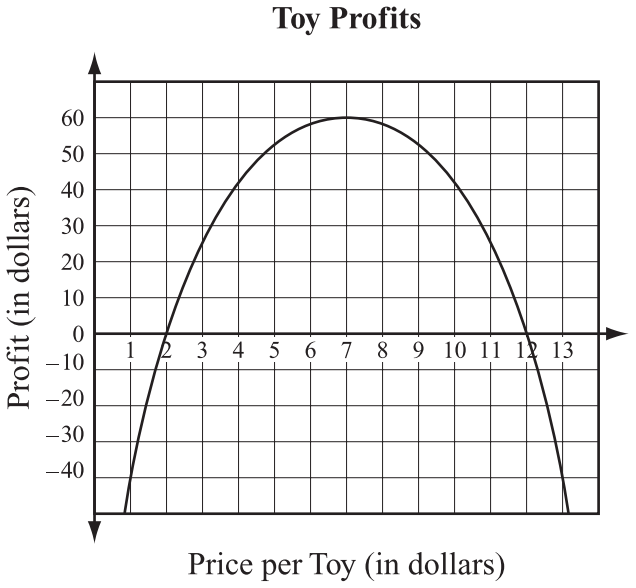
62. If $f(x) = 5(x+2)$, then what is $f(0)$?

A. 0
B. 2
C. 7
* D. 10

63. Which is the complete factorization of the polynomial $x^2 + 5x - 36$?

* A. $(x+9)(x-4)$
B. $(x-9)(x+4)$
C. $(x+12)(x-3)$
D. $(x-12)(x+3)$

64. Action Toys projects their profit on a new toy using the graph below. The graph shows the profit they would make per toy as a function of the price of the toy.



Which price is a zero of the function?

A. -40

B. 0

C. 7

* D. 12

65. Which ordered pair is a solution to the system of equations given below?

$$\begin{cases} x - y = 4 \\ x + y = 5 \end{cases}$$

* A. $(4.5, 0.5)$

B. $(-4.5, 9.5)$

C. $(4.5, -0.5)$

D. $(-4.5, -8.5)$

66. What is the solution to the equation below?

$$\frac{3}{7}q - 12 = 30$$

* A. $q = 98$

B. $q = 42$

C. $q = 18$

D. $q = 7\frac{5}{7}$

67. Which table represents a function?

* A.

x	*y*
−2	4
−1	2
0	0
1	−2
2	−4

B.

x	*y*
−1	6
−1	7
0	8
1	9
1	10

C.

x	*y*
1	1
2	2
3	3
3	4
4	5

D.

x	*y*
5	10
4	8
4	6
3	6
3	4

68. What is $\frac{5\sqrt{20}}{\sqrt{5}}$ in its simplest form?

A. 2

* B. 10

C. $\sqrt{20}$

D. $2\sqrt{5}$

69. What is the solution to the expression below?

$$1{,}320 \cdot 12^0$$

A. 15,840

* B. 1,320

C. 110

D. 0

70. What is the value of the expression $36 + 24 \div 3 - 3^2 + 2$?

A. −15

B. 13

* C. 37

D. 1683

71. All the employees at a certain company are paid at one of two different hourly rates. The equation that describes the hourly rates, h, is shown below.

$$|h - 13.25| = 1.50$$

What are the two hourly rates?

A. \$13.25 or \$14.75
* B. \$14.75 or \$11.75
C. \$13.25 or \$11.75
D. \$14.75 or \$16.25

72. What is the distance between the points (0, 4) and (4, 7)?

* A. 5.0 units
B. 7.0 units
C. 7.5 units
D. $\sqrt{137}$ units

73. What are the solutions for $2x^2 - 5x - 12 = 0$?

A. $x = \frac{5}{2}$ and $x = 6$

B. $x = \frac{3}{2}$ and $x = -4$

* C. $x = -\frac{3}{2}$ and $x = 4$

D. $x = -\frac{5}{2}$ and $x = -6$

74. Sean was supposed to graph the equation $y = 4x - 2$, but he drew the graph 5 units lower than he should have. Which equation represents the line that Sean drew?

A. $y = 4x + 3$
* B. $y = 4x - 7$
C. $y = 9x - 2$
D. $y = -x - 2$

75. Washington County has three animal shelters. The animals in the shelters are listed in the following matrices by animal type and gender: male (M), female (F), and neutered (N).

Main Street Shelter

	M	F	N
Cats	5	2	6
Dogs	1	2	3
Other	0	2	0

Pine Street Shelter

	M	F	N
Cats	1	5	11
Dogs	3	0	4
Other	0	0	1

Green Street Shelter

	M	F	N
Cats	5	4	9
Dogs	3	8	2
Other	2	0	0

Which matrix would represent the total animal population if they were all combined into one shelter?

A. $\begin{bmatrix} 5 & 5 & 11 \\ 3 & 8 & 4 \\ 2 & 2 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 6 & 7 & 17 \\ 4 & 2 & 7 \\ 0 & 2 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 26 & 9 & 1 \\ 11 & 10 & 2 \\ 11 & 7 & 2 \end{bmatrix}$

* D. $\begin{bmatrix} 11 & 11 & 26 \\ 7 & 10 & 9 \\ 2 & 2 & 1 \end{bmatrix}$

---

76. What happens to the median and mean of the set below if the numbers 8, 8, 75, and 100 are added to the set?

1, 1, 2, 2, 2, 9, 10, 10, 11, 11, 12

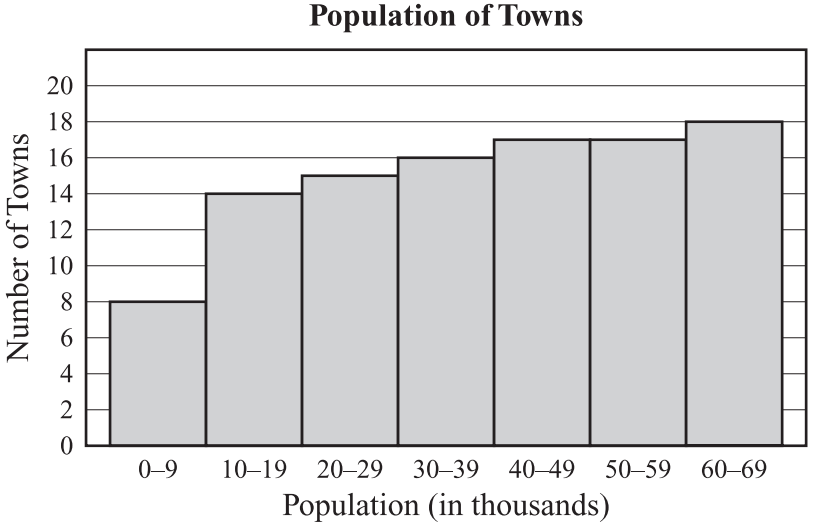
* A. The median will remain the same, but the mean will increase.

B. Both the mean and the median will remain the same.

C. Both the mean and the median will decrease.

D. Both the mean and the median will increase.

77. A state government examined the populations of the 18 largest towns in a county. Below is a cumulative frequency histogram of the populations of all 18 towns.



Which statement concerning the information in the cumulative frequency histogram is correct?

A. Nearly all of the county's people live in its largest town.

* B. The county has no towns between 50,000 and 59,000 people.

C. Of the 18 towns, 14 have between 10,000 and 19,000 people.

D. More than half of the towns have populations greater than 30,000 people.

78. Which is true of an undefined rational expression?

A. The numerator of the expression equals zero.

B. The numerator and the denominator are equal.

* C. The denominator of the expression equals zero.

D. The denominator of the expression is a negative number.

79. Which equation can be solved using $y = 4$ and $x = 3$?

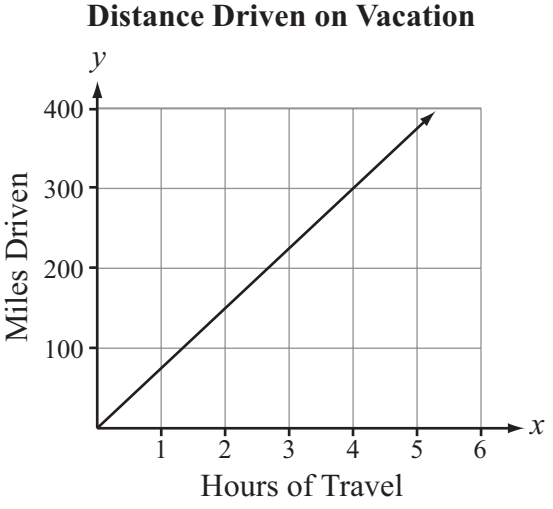
A. $y = \frac{4}{3}x - 1$

B. $y = \frac{3}{4}x + 1$

C. $y = 3x + 1$

* D. $y = x + 1$

80. What is the independent variable on the line graph shown below?



A. miles driven

* B. hours of travel

C. vacation destination

D. distance driven on vacation

---

81. Look at the table below, where cost is a function of weight.

Weight of Package (lb)	Cost to Ship (dollars)
1	$5
2	$10
5	$25
10	$50
25	$125

What is the range of the data set in the table above?

A. {5, 10, 25}

B. {1, 2, 5, 10, 25}

* C. {5, 10, 25, 50, 125}

D. {1, 2, 5, 10, 25, 5, 10, 25, 50, 125}

82. What are the solutions of $x^2 - 16x = -64$?

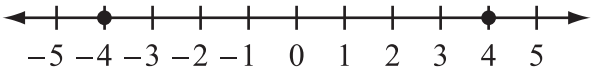
* A. $x = 8, x = 8$

B. $x = 0, x = 16$

C. $x = 16, x = 4$

D. $x = -8, x = -8$

83. What equation is represented by the graph shown below?



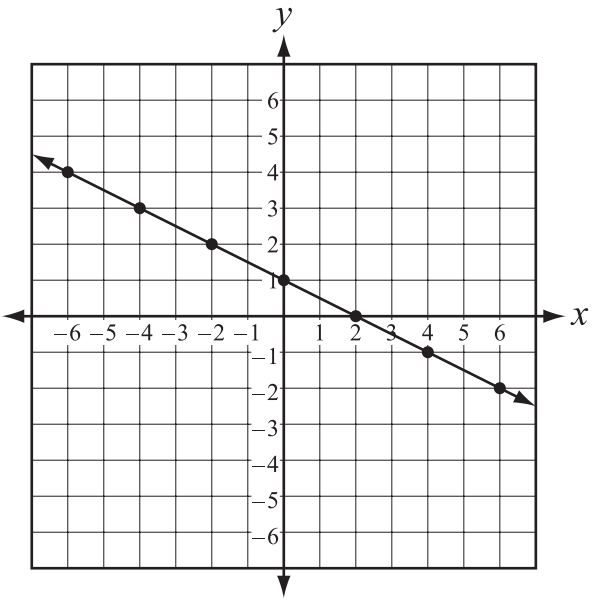
A. $x = 4$

* B. $|x| = 4$

C. $x = -4$

D. $|x| = -4$

84. What is the slope of the line given in the graph below?



* A. $-\frac{1}{2}$

B. $-\frac{3}{4}$

C. $-\frac{5}{6}$

D. -2

85. What is the simplest form of the expression below?

$$(\sqrt{5})(2\sqrt{8})$$

A. 20

B. $8\sqrt{5}$

C. $10\sqrt{8}$

* D. $4\sqrt{10}$

86. A bin contains spools of thread that are identical except for color. There are 3 brown, 3 blue, 6 black, and 8 white spools. Anna reaches into the bin and randomly picks two spools of white thread. Without replacing either of the white spools, she randomly picks a third spool. What is the probability of Anna choosing another spool of white thread?

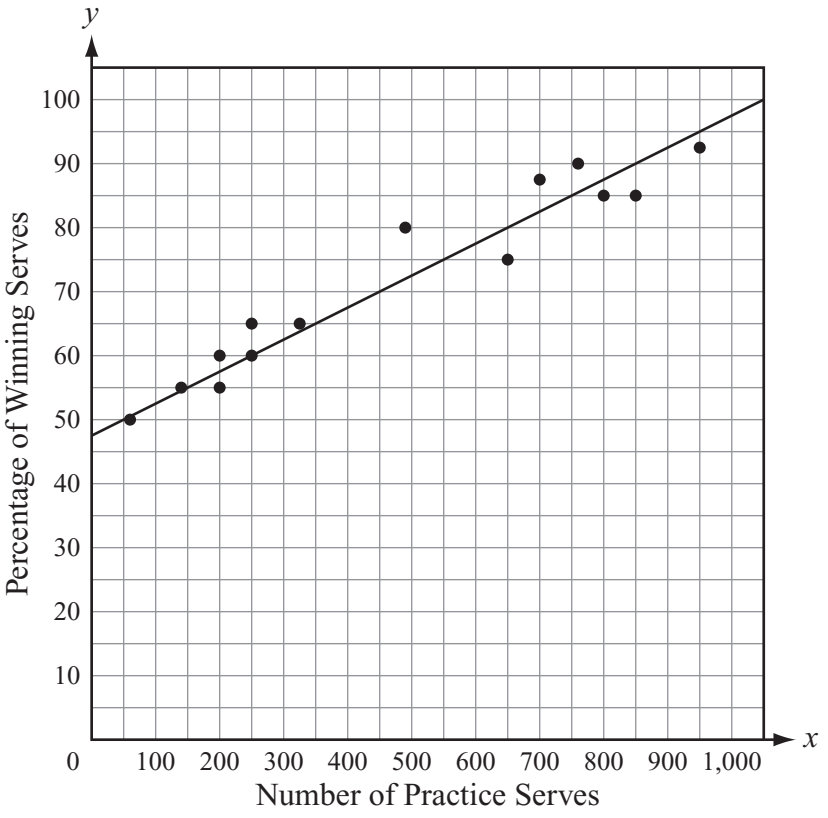
A. $\frac{3}{10}$

* B. $\frac{1}{3}$

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

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

87. The graph below compares the number of practice serves made by tennis players during preseason to the percentage of winning serves made during matches.



Approximately what percent of winning shots would be expected by a player who took 350 practice shots?

A. 55%

* B. 65%

C. 75%

D. 85%

88. A human red blood cell is approximately 0.000091 meters long. How is this number written in scientific notation?

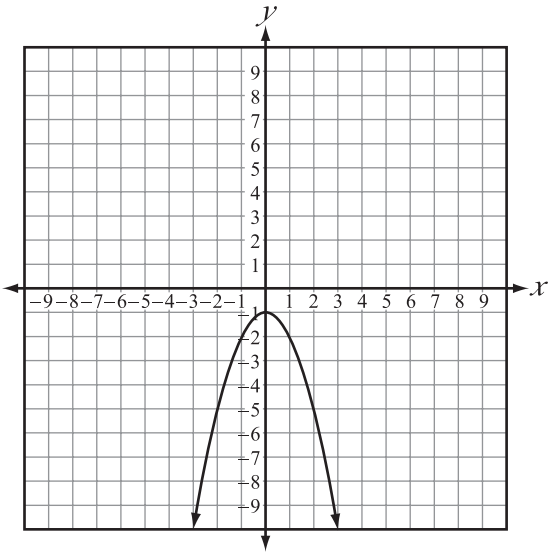
A. 0.91×10^{-5}

B. 9.1×10^{-6}

* C. 9.1×10^{-5}

D. 91×10^{-6}

89. Look at the graph.



What is the equation of the graph?

* A. $y=-x^2-1$

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

C. $y=-x^2+1$

D. $y=x^2-1$

90. The table below shows how y varies indirectly with x.

x	1	2	3	4
y	24	12	8	6

Which is the **correct** equation that shows the inverse variation between x and y?

A. $y=x+24$

B. $y=24x$

C. $y=\frac{x}{24}$

* D. $y=\frac{24}{x}$

PART II Retest Released Algebra I Items

A. The width of a rectangular field is 125 yards and the length of the field is 350 yards. A scale drawing of the field needs to be drawn such that 1 inch represents 25 yards.

1. Find the length and width, in inches, of the field in the scale drawing. Show or explain your work.

2. Write a fraction that represents the ratio of the area of the model in square inches to the area of the field in square yards.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

Item A Scoring Rubric—2013 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.)

SOLUTION AND SCORING

4 points possible:

Part	Points
1	**2 points possible:** ½ point: Correct length: **14** *(in.)* **AND** ½ point: Correct procedure is shown and/or explained *Work may contain 1 calculation or copy error* Give credit for the following or equivalent: • $\frac{1}{25} = \frac{l}{350}$ $25l = 350$ $l = \#$ • $\frac{350}{25} = \#$ **AND** ½ point: Correct width: **5** *(in.)* **AND** ½ point: Correct procedure is shown and/or explained *Work may contain 1 calculation or copy error* Give credit for the following or equivalent: • $\frac{1}{25} = \frac{w}{125}$ $25w = 125$ $w = \#$ • $\frac{125}{25} = \#$ *Note: If the dimensions in Part 1 are unidentified:* *The work can be used as identification.* *Or* *The first value will be assumed to be the length and the second value to be the width since they are asked for in that order ("Find the length and width…").* *Or* *If found on a diagram, the "long side" will be considered the length and the "short side" will be considered the width.*

Part	Points
2	**2 points possible:** 2 points: Correct answer: $\frac{1}{625}$ *or* $\frac{70}{43750}$ *or equivalent* *Or correct answer based on an incorrect length and/or width in Part 1* *Note: Work is not required* *Note: Fraction does not need to be reduced to lowest terms* **OR** 1 point: ● Correct ratio (*not in fraction form*): 70 **:** 43750 *or equivalent* Or ● Reciprocal of correct fraction: $\frac{43750}{70}$ *or equivalent*

B. Peter wants to make a rectangular table for his dining room. Because of the dimensions of the room, the table's length will be 1 foot more than 2 times its width.

1. Write an equation for the length (l), in feet, of the table, in terms of the width (w), in feet, of the table.

2. Write an equation for the area (a), in square feet, of the table, in terms of the width (w), in feet, of the table.

3. If the area of the table is 15 square feet, what are the width and length of the table? Show your work and/or explain your answer.

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

Item B Scoring Rubric—2013 Algebra I

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

PART II RETEST RELEASED ALGEBRA I ITEMS

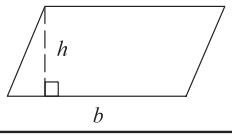
SOLUTION AND SCORING

4 points possible:

Part	Points
1	**1 point possible:** 1 point: Correct equation: $l = 2w + 1$ **OR** ½ point: Correct expression: $2w + 1$
2	**1 point possible:** 1 point: Correct equation: $a = w(2w + 1)$ or $a = 2w^2 + w$ *Or correct equation based on Part 1* **OR** ½ point: Correct expression: $w(2w + 1)$ or $2w^2 + w$ *Or correct expression based on Part 1*
3	**2 points possible:** 1 point: Correct dimensions: $w = \frac{5}{2}$ or 2.5 (*ft*) & $l = 6$ (*ft*) O*r correct dimensions based on incorrect **NON-LINEAR** equation/expression from Part 2* **AND** 1 point: Correct and complete procedure shown and/or explained *Work may contain 1 calculation or copy error* Give credit for the following or equivalent: ● Using Factoring: $2w^2 + w = 15$ $2w^2 + w - 15 = 0$ $(2w - 5)(w + 3) = 0$ $2w - 5 = 0 \quad 2w = 5 \quad w = 2.5 \quad l = 2(2.5) + 1 = 6$ $w + 3 = 0 \quad w = -3$ (*reject*) ● Using the Quadratic Formula: $w = \frac{-1 \pm \sqrt{1 - 4[2(-15)]}}{4} = \frac{-1 \pm \sqrt{121}}{4} = \frac{10}{4}$ *or* $\frac{-12}{4}$ (*reject*) $l = 2(2.5) + 1 = 6$ ● Using "Guess and Check" : $w = 2.5,$ $(2.5 \times 2) + 1 = 6 = l$ (*All steps required*) $2.5 \times 6 = 15 = a$

End-of-Course Mathematics Reference Sheet

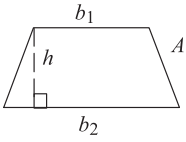
Parallelogram



P = sum of all sides

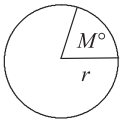
$A = bh$

Trapezoid



$A = \frac{h(b_1 + b_2)}{2}$

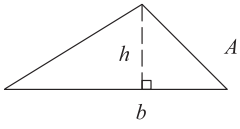
Arc and Sector



Arc Length = $\left(\frac{M}{360}\right) \times 2\pi r$

Sector area = $\left(\frac{M}{360}\right) \times \pi r^2$

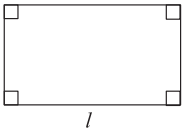
Triangle



P = sum of all sides

$A = \frac{bh}{2}$

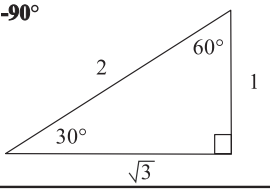
Rectangle



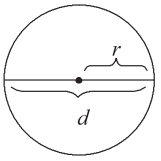
$P = 2l + 2w$

$A = l\,w$

30° -60° -90°



Circle



$C = 2\pi r$

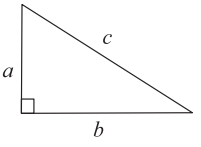
$C = \pi d$

$A = \pi r^2$

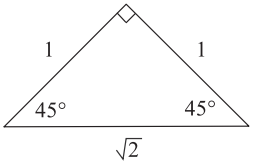
$\pi \approx 3.14$

Pythagorean Theorem

$a^2 + b^2 = c^2$

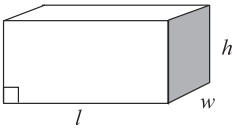


45° -45° -90°



Rectangular Solid

Volume = lwh

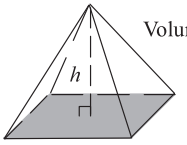


Surface area = $2lw + 2lh + 2wh$

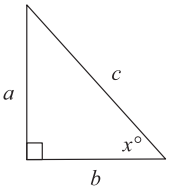
Pyramid

B = *area of base (shaded)*

Volume = $\frac{Bh}{3}$



Trigonometric Ratios

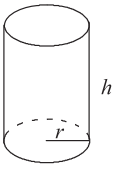


$\sin x° = \frac{a}{c}$

$\cos x° = \frac{b}{c}$

$\tan x° = \frac{a}{b}$

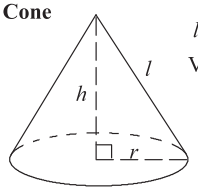
Cylinder



Volume = $\pi r^2 h$

Surface area = $2\pi rh + 2\pi r^2$

Cone

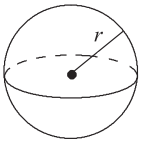


l = slant height

Volume = $\frac{\pi r^2 h}{3}$

Surface area = $\pi rl + \pi r^2$

Sphere



Volume = $\frac{4\pi r^3}{3}$

Surface area = $4\pi r^2$

Miscellaneous Formulas

Area of an equilateral triangle	$A = \frac{s^2\sqrt{3}}{4}$ s = length of a side
Distance	rate × time
Interest	principal × rate × time in years
Sum of the angles of a polygon having n sides	$(n-2)180°$
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 Last term of a geometric series (where $n \geq 1$)	$a_n = a + (n-1)\,d$ $a_n = ar^{n-1}$
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 Algebra I Mathematics Curriculum Framework*

Strands	Content Standards	Student Learning Expectations
1. LANGUAGE OF ALGEBRA (LA)	1. Students will develop the language of algebra including specialized vocabulary, symbols, and operations.	1. Evaluate algebraic expressions, including radicals, by applying the order of operations. 2. Translate word phrases and sentences into expressions, equations, and inequalities, and vice versa. 3. Apply the laws of (integral) exponents and roots. 4. Solve problems involving scientific notation, including multiplication and division. 5. Perform polynomial operations (addition, subtraction, multiplication) with and without manipulatives. 6. Simplify algebraic fractions by factoring. 7. Recognize when an expression is undefined. 8. Simplify radical expressions such as $\frac{3}{\sqrt{7}}$. 9. Add, subtract, and multiply simple radical expressions like $3\sqrt{20} + 7\sqrt{5}$ and $4\sqrt{5} \bullet 2\sqrt{3}$.
2. SOLVING EQUATIONS AND INEQUALITIES (SEI)	2. Students will write, with and without appropriate technology, equivalent forms of equations, inequalities, and systems of equations, and solve with fluency.	1. Solve multi-step equations and inequalities with rational coefficients • numerically (from a table or guess and check) • algebraically (including the use of manipulatives) • graphically • technologically 2. Solve systems of two linear equations • numerically (from a table or guess and check) • algebraically (including the use of manipulatives) • graphically • technologically 3. Solve linear formulas and literal equations for a specified variable (Ex. Solve for p in I = prt.) 4. Solve and graph simple absolute value equations and inequalities. Ex. $\lvert x \rvert = 5$, $\lvert x \rvert \leq 5$, $\lvert x \rvert > 5$ 5. Solve real-world problems that involve a combination of rates, proportions, and percents. 6. Solve problems involving direct variation and indirect (inverse) variation to model rates of change. 7. Use coordinate geometry to represent and/or solve problems (midpoint, length of a line segment, and Pythagorean Theorem). 8. Communicate real-world problems graphically, algebraically, numerically, and verbally.

*The Content Standards and Student Learning Expectations listed are those that specifically relate to the items in the *2012–2013 Mid-Year, Spring, and Retest End-of-Course Algebra I Examinations.*

The Arkansas Algebra I Mathematics Curriculum Framework*

Strands	Content Standards	Student Learning Expectations
3. LINEAR FUNCTIONS (LF)	3. Students will analyze functions by investigating rates of change, intercepts, and zeros.	1. Distinguish between functions and nonfunctions/relations by inspecting graphs, ordered pairs, mapping diagrams, and/or tables of data. 2. Determine domain and range of a relation from an algebraic expression, graphs, set of ordered pairs, or table of data. 3. Know and/or use function notation, including evaluating functions for given values in their domain. 4. Identify independent variables and dependent variables in various representational modes: words, symbols, and/or graphs. 5. Interpret the rate of change/slope and intercepts within the context of everyday life. Ex. telephone charges based on base rate (*y*-intercept) plus rate per minute (slope) 6. Calculate the slope given. • two points • the graph of a line • the equation of a line 7. Determine by using slope whether a pair of lines are parallel, perpendicular, or neither. 8. Write an equation in slope-intercept, point-slope, and standard forms, given • two points • a point and *y*-intercept • *x*-intercept and *y*-intercept • a point and slope • a table of data • the graph of a line 9. Describe the effects of parameter changes, slope, and/or *y*-intercepts, on graphs of linear functions and vice versa.
4. NON-LINEAR FUNCTIONS (NLF)	4. Students will compare the properties in the family of functions.	1. Factor polynomials. • greatest common factor • binomials (difference of squares) • trinomials 2. Determine minimum, maximum, vertex, and zeros, given the graph. 3. Solve quadratic equations using the appropriate methods with and without technology. • factoring • quadratic formula with real-number solutions 4. Recognize function families and their connections, including vertical shift and reflection over the *x*-axis. • quadratics (with rational coefficients) • absolute value • exponential functions 5. Communicate real-world problems graphically, algebraically, numerically, and verbally.

*The Content Standards and Student Learning Expectations listed are those that specifically relate to the items in the 2012–*2013 Mid-Year, Spring, and Retest End-of-Course Algebra I Examinations.*

The Arkansas Algebra I Mathematics Curriculum Framework*

Strands	Content Standards	Student Learning Expectations
5. DATA INTERPRETATION AND PROBABILITY (DIP)	5. Students will compare various methods of reporting data to make inferences or predictions.	1. Construct and use scatterplots and line of best fit to make inferences in real-life situations. 2. Use simple matrices in addition, subtraction, and scalar multiplication. 3. Construct simple matrices for real-life situations. 4. Determine the effects of changes in the data set on the measures of central tendency. 5. Use two or more graphs (i.e., box-and-whisker, histograms, scatter plots) to compare data. 6. Construct and interpret a cumulative frequency histogram in real-life situations. 7. Recognize linear functions and non-linear functions by using a table or a graph. 8. Compute simple probability with and without replacement. 9. Recognize patterns using explicitly defined and recursively defined linear functions. 10. Communicate real-world problems graphically, algebraically, numerically, and verbally. 11. Explain how sampling methods, bias, and phrasing of questions in data collection impact the conclusions. 12. Recognize when arguments based on data confuse correlation with causation.

*The Content Standards and Student Learning Expectations listed are those that specifically relate to the items in the 2012–*2013 Mid-Year, Spring, and Retest End-of-Course Algebra I Examinations.*

Mid-Year Released Algebra I Items*

Strands	Content Standards
1— Language of Algebra (LA)	1. Students will develop the language of algebra including specialized vocabulary, symbols, and operations.
2— Solving Equations and Inequalities (SEI)	2. Students will write, with and without appropriate technology, equivalent forms of equations, inequalities, and systems of equations, and solve with fluency.
3— Linear Functions (LF)	3. Students will analyze functions by investigating rates of change, intercepts, and zeros.
4— Non-linear Functions (NLF)	4. Students will compare the properties in the family of functions.
5— Data Interpretation and Probability (DIP)	5. Students will compare various methods of reporting data to make inferences or predictions.

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

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

PART IV Item Correlation with Curriculum Framework

Spring Released Algebra I Items*

Strands	Content Standards
1— Language of Algebra (LA)	1. Students will develop the language of algebra including specialized vocabulary, symbols, and operations.
2— Solving Equations and Inequalities (SEI)	2. Students will write, with and without appropriate technology, equivalent forms of equations, inequalities, and systems of equations, and solve with fluency.
3— Linear Functions (LF)	3. Students will analyze functions by investigating rates of change, intercepts, and zeros.
4— Non-linear Functions (NLF)	4. Students will compare the properties in the family of functions.
5— Data Interpretation and Probability (DIP)	5. Students will compare various methods of reporting data to make inferences or predictions.

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

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

Retest Released Algebra I Items*

Strands	Content Standards
1— Language of Algebra (LA)	1. Students will develop the language of algebra including specialized vocabulary, symbols, and operations.
2— Solving Equations and Inequalities (SEI)	2. Students will write, with and without appropriate technology, equivalent forms of equations, inequalities, and systems of equations, and solve with fluency.
3— Linear Functions (LF)	3. Students will analyze functions by investigating rates of change, intercepts, and zeros.
4— Non-linear Functions (NLF)	4. Students will compare the properties in the family of functions.
5— Data Interpretation and Probability (DIP)	5. Students will compare various methods of reporting data to make inferences or predictions.

Item	Strand	Content Standard	Student Learning Expectation
1	SEI	2	6
2	DIP	5	10
3	DIP	5	5
4	LA	1	6
5	DIP	5	9
6	LA	1	5
7	LA	1	2
8	NLF	4	4
9	NLF	4	2
10	DIP	5	4
11	LF	3	7
12	LF	3	6
13	LA	1	9
14	DIP	5	11
15	NLF	4	1
16	LF	3	5
17	SEI	2	5
18	NLF	4	2
19	SEI	2	3
20	NLF	4	3
21	LF	3	9
22	NLF	4	5
23	SEI	2	7
24	LA	1	8
25	SEI	2	8
26	LA	1	1
27	LF	3	4
28	SEI	2	4
29	DIP	5	6
30	LF	3	8

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

continued on next page

Retest Released Algebra I Items* (continued)

Strands	Content Standards
1— Language of Algebra (LA)	1. Students will develop the language of algebra including specialized vocabulary, symbols, and operations.
2— Solving Equations and Inequalities (SEI)	2. Students will write, with and without appropriate technology, equivalent forms of equations, inequalities, and systems of equations, and solve with fluency.
3— Linear Functions (LF)	3. Students will analyze functions by investigating rates of change, intercepts, and zeros.
4— Non-linear Functions (NLF)	4. Students will compare the properties in the family of functions.
5— Data Interpretation and Probability (DIP)	5. Students will compare various methods of reporting data to make inferences or predictions.

Item	Strand	Content Standard	Student Learning Expectation
31	LF	3	1
32	DIP	5	9
33	LA	1	3
34	DIP	5	12
35	NLF	4	1
36	NLF	4	4
37	SEI	2	6
38	DIP	5	3
39	LA	1	7
40	NLF	4	4
41	DIP	5	1
42	SEI	2	3
43	LF	3	2
44	NLF	4	3
45	SEI	2	8
46	LF	3	5
47	LA	1	6
48	SEI	2	2
49	SEI	2	1
50	NLF	4	5
51	DIP	5	7
52	LF	3	7
53	LA	1	5
54	LA	1	2
55	LF	3	8
56	SEI	2	5
57	DIP	5	2
58	NLF	4	2
59	LA	1	4
60	LF	3	3

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

continued on next page

Retest Released Algebra I Items* (continued)

Strands	Content Standards
1— Language of Algebra (LA)	1. Students will develop the language of algebra including specialized vocabulary, symbols, and operations.
2— Solving Equations and Inequalities (SEI)	2. Students will write, with and without appropriate technology, equivalent forms of equations, inequalities, and systems of equations, and solve with fluency.
3— Linear Functions (LF)	3. Students will analyze functions by investigating rates of change, intercepts, and zeros.
4— Non-linear Functions (NLF)	4. Students will compare the properties in the family of functions.
5— Data Interpretation and Probability (DIP)	5. Students will compare various methods of reporting data to make inferences or predictions.

Item	Strand	Content Standard	Student Learning Expectation
61	DIP	5	10
62	LF	3	3
63	NLF	4	1
64	NLF	4	2
65	SEI	2	2
66	SEI	2	1
67	LF	3	1
68	LA	1	8
69	LA	1	3
70	LA	1	1
71	NLF	4	5
72	SEI	2	7
73	NLF	4	3
74	LF	3	9
75	DIP	5	2
76	DIP	5	4
77	DIP	5	6
78	LA	1	7
79	SEI	2	1
80	LF	3	4
81	LF	3	2
82	NLF	4	3
83	SEI	2	4
84	LF	3	6
85	LA	1	9
86	DIP	5	8
87	DIP	5	1
88	LA	1	4
89	NLF	4	4
90	SEI	2	6
A	SEI	2	6
B	NLF	4	3

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

PART IV Item Correlation with Curriculum Framework

Mid-Year Non-Released Algebra I Items*

Strands	Content Standards
1— Language of Algebra (LA)	1. Students will develop the language of algebra including specialized vocabulary, symbols, and operations.
2— Solving Equations and Inequalities (SEI)	2. Students will write, with and without appropriate technology, equivalent forms of equations, inequalities, and systems of equations, and solve with fluency.
3— Linear Functions (LF)	3. Students will analyze functions by investigating rates of change, intercepts, and zeros.
4— Non-linear Functions (NLF)	4. Students will compare the properties in the family of functions.
5— Data Interpretation and Probability (DIP)	5. Students will compare various methods of reporting data to make inferences or predictions.

Strand	Content Standard	Student Learning Expectation
LA	1	5
NLF	4	3
SEI	2	1
LF	3	5
DIP	5	9
NLF	4	4
DIP	5	4
LA	1	2
LF	3	3
SEI	2	4
LF	3	7
NLF	4	2
LA	1	4
DIP	5	3
DIP	5	11
LF	3	8
LA	1	9
NLF	4	1
LF	3	6
LA	1	6
SEI	2	5
LA	1	1
LF	3	1
NLF	4	5
SEI	2	8
LA	1	1
SEI	2	2
DIP	5	8
NLF	4	4
SEI	2	3
DIP	5	7
NLF	4	5

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

Spring Non-Released Algebra I Items*

Strands	Content Standards
1— Language of Algebra (LA)	1. Students will develop the language of algebra including specialized vocabulary, symbols, and operations.
2— Solving Equations and Inequalities (SEI)	2. Students will write, with and without appropriate technology, equivalent forms of equations, inequalities, and systems of equations, and solve with fluency.
3— Linear Functions (LF)	3. Students will analyze functions by investigating rates of change, intercepts, and zeros.
4— Non-linear Functions (NLF)	4. Students will compare the properties in the family of functions.
5— Data Interpretation and Probability (DIP)	5. Students will compare various methods of reporting data to make inferences or predictions.

Strand	Content Standard	Student Learning Expectation
LF	3	9
LA	1	7
DIP	5	12
LA	1	1
DIP	5	1
DIP	5	10
SEI	2	3
NLF	4	2
NLF	4	3
SEI	2	5
LF	3	2
SEI	2	6
LA	1	8
NLF	4	1
SEI	2	7
LA	1	3
LF	3	3
SEI	2	4
SEI	2	7
LA	1	2
LF	3	8
DIP	5	6
DIP	5	2
NLF	4	4
NLF	4	1
SEI	2	1
DIP	5	5
LF	3	6
NLF	4	5
LF	3	4
LA	1	5
DIP	5	8

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

PART IV ITEM CORRELATION WITH CURRICULUM FRAMEWORK

Retest Non-Released Algebra I Items*

Strands	Content Standards
1— LANGUAGE OF ALGEBRA (LA)	1. Students will develop the language of algebra including specialized vocabulary, symbols, and operations.
2— SOLVING EQUATIONS AND INEQUALITIES (SEI)	2. Students will write, with and without appropriate technology, equivalent forms of equations, inequalities, and systems of equations, and solve with fluency.
3— LINEAR FUNCTIONS (LF)	3. Students will analyze functions by investigating rates of change, intercepts, and zeros.
4— NON-LINEAR FUNCTIONS (NLF)	4. Students will compare the properties in the family of functions.
5— DATA INTERPRETATION AND PROBABILITY (DIP)	5. Students will compare various methods of reporting data to make inferences or predictions.

Strand	Content Standard	Student Learning Expectation
SEI	2	8
NLF	4	3
NLF	4	5
SEI	2	2
LF	3	8
SEI	2	1
DIP	5	3
SEI	2	4
LF	3	3
NLF	4	1
LF	3	5
LA	1	1
SEI	2	5
LF	3	2
LA	1	3
DIP	5	2
LA	1	4
DIP	5	2
NLF	4	4
NLF	4	1
LA	1	4
LA	1	2
DIP	5	7
LF	3	6
LA	1	7
DIP	5	12
SEI	2	1
NLF	4	2
LA	1	5
DIP	5	8
LF	3	1
DIP	5	1
LF	3	5

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

continued on next page

Retest Non-Released Algebra I Items* (continued)

Strands	Content Standards
1— Language of Algebra (LA)	1. Students will develop the language of algebra including specialized vocabulary, symbols, and operations.
2— Solving Equations and Inequalities (SEI)	2. Students will write, with and without appropriate technology, equivalent forms of equations, inequalities, and systems of equations, and solve with fluency.
3— Linear Functions (LF)	3. Students will analyze functions by investigating rates of change, intercepts, and zeros.
4— Non-linear Functions (NLF)	4. Students will compare the properties in the family of functions.
5— Data Interpretation and Probability (DIP)	5. Students will compare various methods of reporting data to make inferences or predictions.

Strand	Content Standard	Student Learning Expectation
NLF	4	5
LA	1	2
SEI	2	1
LA	1	5
LF	3	4
LA	1	1
LF	3	6
NLF	4	2
DIP	5	10
LF	3	3
SEI	2	7
DIP	5	6
LA	1	9
SEI	2	4
LF	3	8
SEI	2	5
LA	1	1
NLF	4	1
SEI	2	4
NLF	4	1
DIP	5	11
LF	3	9
DIP	5	4
NLF	4	3
NLF	4	4
SEI	2	3
LA	1	8
DIP	5	5
LF	3	6
DIP	5	8

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

continued on next page

PART IV Item Correlation with Curriculum Framework

Retest Non-Released Algebra I Items* (continued)

Strands	Content Standards
1— Language of Algebra (LA)	1. Students will develop the language of algebra including specialized vocabulary, symbols, and operations.
2— Solving Equations and Inequalities (SEI)	2. Students will write, with and without appropriate technology, equivalent forms of equations, inequalities, and systems of equations, and solve with fluency.
3— Linear Functions (LF)	3. Students will analyze functions by investigating rates of change, intercepts, and zeros.
4— Non-linear Functions (NLF)	4. Students will compare the properties in the family of functions.
5— Data Interpretation and Probability (DIP)	5. Students will compare various methods of reporting data to make inferences or predictions.

Strand	Content Standard	Student Learning Expectation
LA	1	2
LF	3	5
DIP	5	5
LA	1	5
SEI	2	4
SEI	2	5
NLF	4	1
DIP	5	9
NLF	4	4
LF	3	7
LA	1	6
DIP	5	7
SEI	2	3
LF	3	8
DIP	5	11
LF	3	6
DIP	5	3
LF	3	8
LF	3	3
NLF	4	5
NLF	4	2
LA	1	5
DIP	5	12
SEI	2	3
SEI	2	5
NLF	4	4
SEI	2	8
NLF	4	1
LA	1	1
LA	1	2

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

ACTAAP

Arkansas Comprehensive Testing, Assessment, and Accountability Program

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

QAI-11635 Alg-RIB AR1304

QAI11635