ACTAAP

Arkansas Comprehensive Testing, Assessment, and Accountability Program

RELEASED ITEM BOOKLET

Algebra I End-of-Course Examinations

2010–2011 Administrations

Arkansas Department of Education

1. At the U-Pick Apple Orchard, it costs a flat fee of $3 plus $1.50 per pound to pick apples. What is the total cost if a person picks 7 pounds of apples?

   A. $11.50
   *B. $13.50
   C. $22.50
   D. $31.50

2. Which shows the expression $\dfrac{4}{\sqrt{2}}$ in a **correctly** simplified form?

   *A. $2\sqrt{2}$
   B. 8
   C. $\sqrt{2}$
   D. 2

3. What value of x satisfies the equation $\dfrac{2}{3}x + 1 = 9$?

   A. $5\dfrac{1}{3}$
   B. $6\dfrac{2}{3}$
   *C. 12
   D. 15

4. A manager of a car dealership records the number of cars sold by each salesperson during each month of the year. In a graph showing the car sales made by Salesperson #1 over the course of a year, which would be the independent variable?

   *A. Months
   B. Car Types
   C. Salespeople
   D. Number of Cars Sold

5. Which expression is a factored form of $4x^2 - 9$?

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

6. The cumulative frequency histogram below shows the ages of students at a tennis camp.

Tennis Campers' Ages
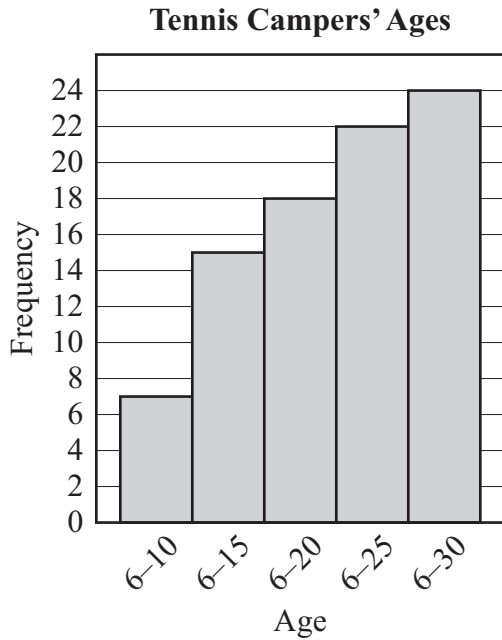
According to this cumulative frequency histogram, how many students from 16 to 20 years old are at this tennis camp?
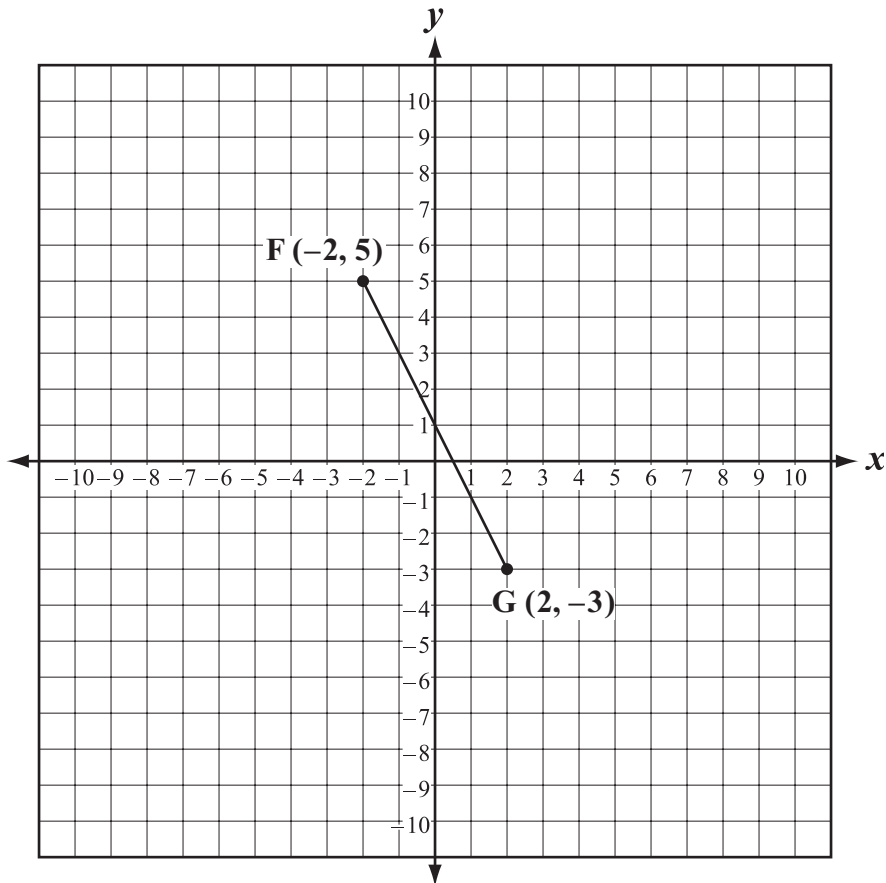
*A.   3

B.   8

C.   11

D.   18

7. The length of a painting is two less than three times the width. If the width of the painting is 15 inches, what is the length in inches?

A.   27

B.   39

*C.   43

D.   47

8. What is the slope of the graph of $y = -\dfrac{2}{5}x + 3$?

A. -2

*B. $-\dfrac{2}{5}$

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

D. 3

9. Use the diagram below to answer the question.

What are the coordinates of the midpoint of line segment FG?

A. $(-2, 5)$

B. $(2, -3)$

*C. $(0, 1)$

D. $(0, 2)$

10. Which is a solution to the equation
    $x^2 - 3x - 10 = 0$?

A. 2

B. 3

*C. 5

D. 10

11. The circumference of a circle with radius r can be found using the equation $C = 2\pi r$. Which equation **correctly** solves for r in terms of C?

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

B. $r = 2\pi C$

C. $r = C + 2\pi$

D. $r = C - 2\pi$

12. Which expression is undefined when $x = 0$?

A. x

B. x^2

C. $\dfrac{x}{2}$

*D. $\dfrac{1}{x}$

13. The height, h, of a soccer ball in feet after it is kicked is given by the equation $h = -8t^2 + 20t$, where t is the time in seconds after the ball has been kicked. According to this equation, how many seconds does it take for the ball to reach the ground ($h = 0$)?

*A.   2.5

B.   3.3

C.   8.0
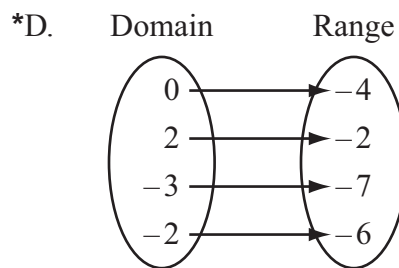
D.   20.0

14. Use the matrices below to answer the question.

$$A = \begin{bmatrix} 2 & 3 \\ 1 & 0 \\ 5 & 4 \end{bmatrix} \quad B = \begin{bmatrix} -1 & 0 \\ 2 & 1 \\ 3 & 4 \end{bmatrix}$$

Which matrix represents the expression $2B - A$?

A. $\begin{bmatrix} -4 & -6 \\ -2 & 0 \\ -10 & -8 \end{bmatrix}$

*B. $\begin{bmatrix} -4 & -3 \\ 3 & 2 \\ 1 & 4 \end{bmatrix}$

C. $\begin{bmatrix} -6 & -6 \\ 2 & 2 \\ -4 & 0 \end{bmatrix}$

D. $\begin{bmatrix} 5 & 6 \\ 0 & -1 \\ 7 & 4 \end{bmatrix}$

15. Which of the following represents the same function as $(0,-4)$, $(2,-2)$, $(-3,-7)$, $(-2,-6)$?

A.

Domain	Range
-4	0
-2	2
-7	-3
-6	-2

B.

Domain	Range
0	-4
2	-2
-3	-7
	-6

C.

Domain	Range
0	4
2	2
-3	7
-2	6

*D.

Domain	Range
0	-4
2	-2
-3	-7
-2	-6

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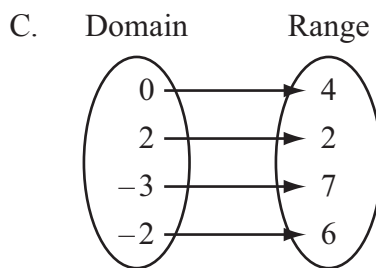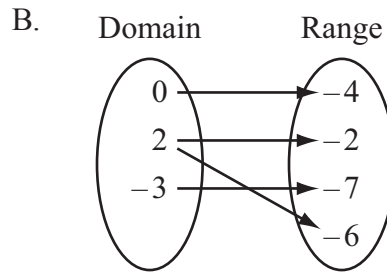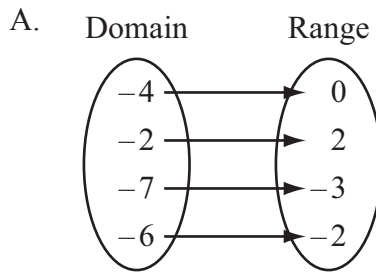
16. Susan found the mean of the salaries in the table listed below.

Weekly Salary	$278	$125	$110	$95	$80	$70	$54

What would be the effect on the mean if the highest salary were **not** included in her calculations?

A.   The mean would be lower by $278.

*B.   The mean would be lower by $27.

C.   The mean would be higher by $278.

D.   The mean would be higher by $27.

17. Rick rents a DVD from a store that charges a daily late fee for overdue DVDs. The graph shows the total cost of renting a DVD plus the late fee.

DVD Costs
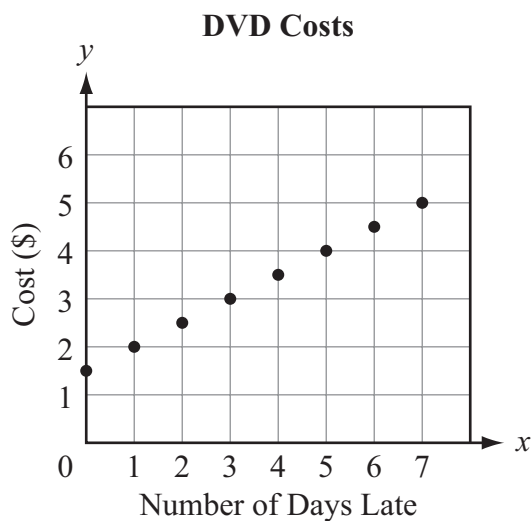
What is the amount of the daily late fee?

*A. $0.50

B. $1.50

C. $3.50

D. $5.00

18. What is the value of the expression $4(2y-5)^2$ when $y = -3$?

A.   4

B.   64

*C.   484

D.   842

19. What is the solution to $|x+8| = 9$?

*A. $x = 1$ or $x = -17$

B. $x = 1$ or $x = 17$

C. $x = \pm 17$

D. $x = \pm 1$

20. The speed of light is about 3.00×10^8 m/s. What is 45 times the speed of light in **correct** scientific notation?

A. 1.4×10^6 m/s

B. 14×10^8 m/s

C. 14×10^9 m/s

*D. 1.4×10^{10} m/s

21. A bag contains 2 red marbles, 3 green marbles, and 5 blue marbles. Sue randomly selects one marble and then another without replacement. What is the probability that Sue will select a green marble and then a blue marble?

*A. $\dfrac{1}{6}$

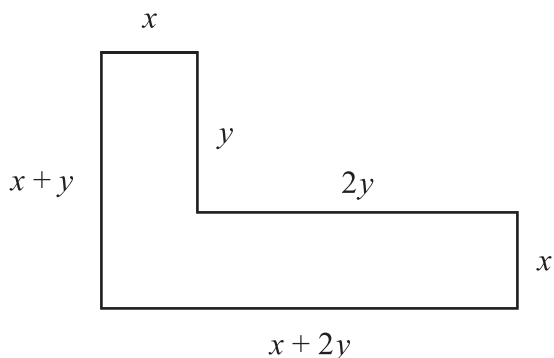B. $\dfrac{3}{10}$

C. $\dfrac{5}{9}$

D. $\dfrac{3}{20}$

22. Use the table below to answer the following question.

x	y
–2	11
–1	8
0	5
1	2
2	–1

Which function is represented by this table?

A. $y = 3x + 5$

B. $y = 3x - 5$

C. $y = -3x - 5$

*D. $y = -3x + 5$

23. Use the figure below to answer the following question.

What is the perimeter of the figure above?

A. $2x + 6y$

B. $4x + 2y$

*C. $4x + 6y$

D. $6x + 4y$

24. The vertex of the graph $f(x) = x^2$ is shifted down three units. What is the equation of this new graph?

A. $f(x) = x^2 + 3$

*B. $f(x) = x^2 - 3$

C. $f(x) = (x + 3)^2$

D. $f(x) = (x - 3)^2$

25. Kim bought a new bicycle on sale for $97. The original price of the bike was $120. Tom receives the same percent discount. Which is closest to the amount Tom will pay for a bicycle with an original price of $170?

A. $68.47

B. $127.94

C. $129.69

*D. $137.42

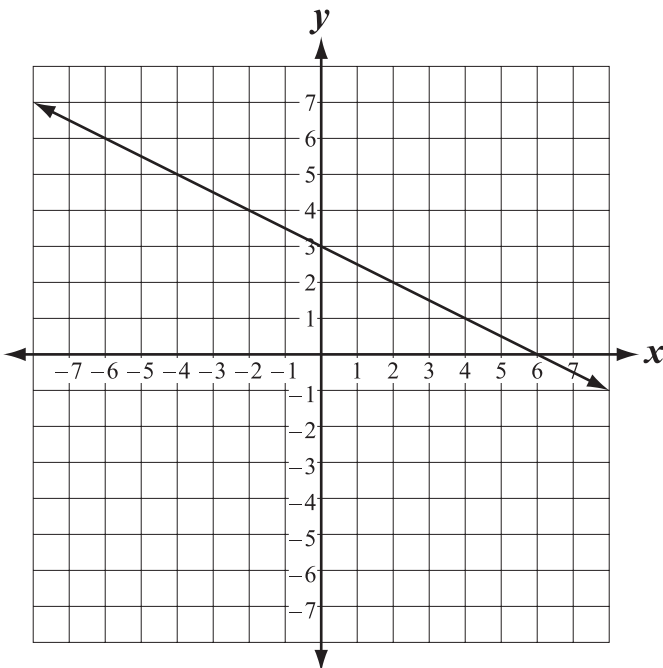**26.** Which pair of equations has graphs that are parallel lines?

*A. $y = 2x + 3$
      $y = 2x - 3$

B. $y = 2x + 3$
     $y = 4x + 3$

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

D. $y = 2x + 3$
     $y = -\dfrac{1}{2}x + 3$

27. What are the solutions of the equation $2x^2 + 3x - 20 = 0$?

   A. $x = -5, 3$

   B. $x = -3, 5$

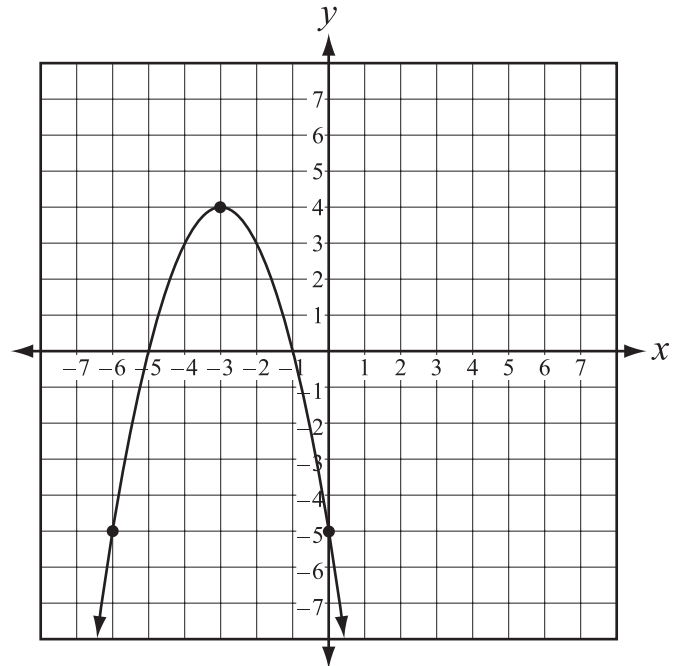   C. $x = 4, -\dfrac{5}{2}$

  *D. $x = -4, \dfrac{5}{2}$

28. The graph of $f(x)$ is shown below.

What type of graph is shown?

  *A.   linear

   B.   inverse

   C.   quadratic

   D.   exponential

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

What point is the vertex of this graph?

   A. $(-5, 0)$

  *B. $(-3, 4)$

   C. $(-1, 0)$

   D. $(0, 0)$

30. Michael wants to know which game sports fans prefer to watch, basketball or football. From which of the following groups should Michael sample to get the **best** results for his survey?

   A.   25 people attending a football game

   B.   25 people attending a basketball game

   C.   50 people who like to play board games

  *D.   50 people who are eating lunch in the cafeteria

A. The function $h = -16t^2 + 128t$ represents the relationship between the height of an object, h, and the time in the air, t.

1. Copy and complete the following table in your answer document.

t	h
0	
1	
4	
7	
8	

2. Sketch a graph of the function on the grid provided for the period $0 \leq t \leq 8$.

3. Label the coordinates of the zeros.

4. For this scenario, what do the x coordinates of the zeros represent?

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

Item A Scoring Rubric—2011 Algebra I

Score	Description
4	The student earns 4 points. No incorrect work is included
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" assigned for the item.)

B.   Ray charges $25 to mow a lawn plus $10 per hour to weed gardens.

1.   Mr. Ortega wants to have his lawn mowed and his garden weeded. Copy the table below in your answer document. Fill in the table and show the total cost that Mr. Ortega would have to pay Ray for each of the times listed.

Ray's Costs

Hours of Weeding	Total Cost in dollars (lawn and garden)
0	
1	
2	
3	

2.   Write an equation that represents how much it will cost, C, for Ray to mow a lawn and do h hours of weeding.

3.   Write an inequality that shows how many hours of weeding Mr. Ortega can receive if he wants to spend no more than $82.

4.   Solve the inequality you wrote in Part 3 to find how many full hours Mr. Ortega can receive. Show your work or explain your answer.

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

Item B Scoring Rubric—2011 Algebra I

Score	Description
4	The student earns 4 points. No incorrect work is included
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" assigned for the item.)

1. For which table is the relationship shown a function of y in terms of x?

A.

x	y
−4	11
−2	7
0	5
−2	−3

*B.

x	y
−3	5
−2	7
−1	9
0	11

C.

x	y
3	−7
3	−9
3	0
3	3

D.

x	y
4	5
3	−7
0	6
4	−3

2. Weight varies directly with gravity. An astronaut with all her gear would weigh only 55 pounds on the moon but 330 pounds on Earth. If another astronaut would weigh 62 pounds on the moon, what is his weight on Earth? Round your answer to the nearest tenth of a pound.

   A.   186.3 pounds
   B.   292.7 pounds
   C.   337.0 pounds
   *D.   372.0 pounds

3. If $g(x) = 5x - 4$, what is $g(-2)$?

   *A.   −14
   B.   −6
   C.   6
   D.   14

4. A student wants to design a survey that will help him decide whether the people in his neighborhood will participate in a newspaper recycling program. Which survey plan describes the **best** sampling method to use?

   A.   He should interview members of his family.

   B.   He should interview every student in his math class.

   C.   He should interview members of the local ecology club.

   *D.   He should interview three families on each street in his area.

5. Which graph shows the values of x in the inequality $|x| < 3$?

A.

*B.

C.

D.
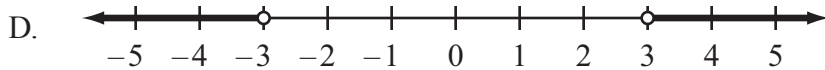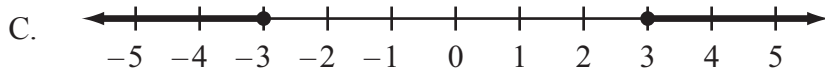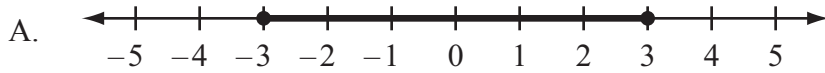
6. What is the greatest common factor of the polynomial $3x^3y + 15xy^2 - 6x^2y^2$?

*A. $3xy$

B. $3x^3y$

C. $3x^2y^2$

D. $6x^2y^2$

**7.** What is the value of $2(x + 4y) - 5y$ for $x = -1$ and $y = 2$?

A. -4

B. 1

*C. 4

D. 5

8. Which expression is equivalent to $4x^2(2x^3 - 5x + 6)$?

*A. $8x^5 - 20x^3 + 24x^2$

B. $8x^6 - 5x^2 + 24x^2$

C. $8x^5 - x^3 + 24x^2$

D. $6x^5 - x^3 + 10x^2$

9. Henry graphed a map of his backyard on a coordinate grid, with the origin representing the middle of the backyard. He plans to install two cement walkways from his patio, one going to the garden and one going to the shed.
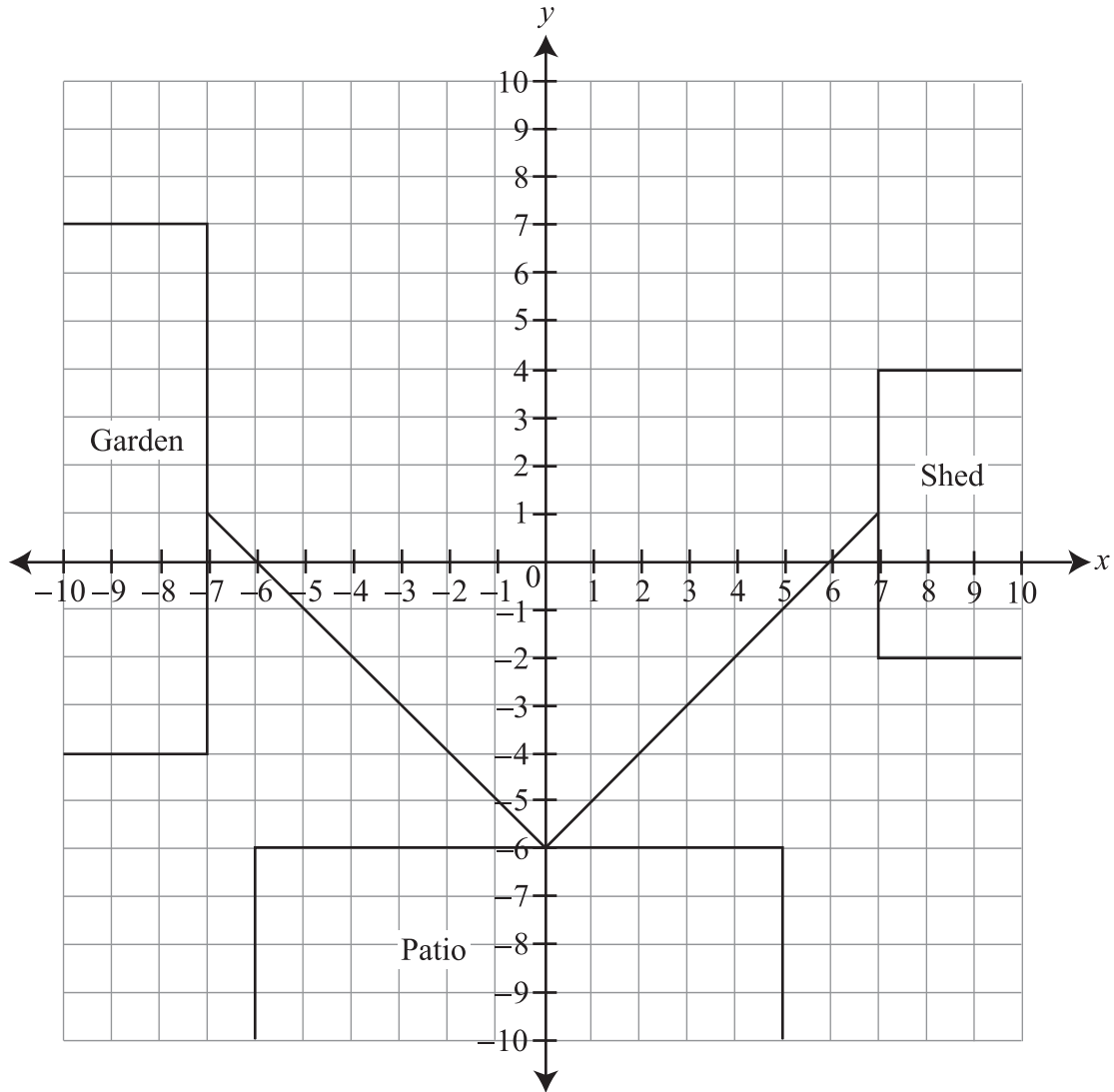
Which equation could represent the two walkways?

A. $y = x - 6$

B. $y = -x - 6$

C. $y = |x - 6|$

*D. $y = |x| - 6$

10. Jamal collects data about golfers. He records the number of years they have played and their **best** score. Jamal's data is graphed below.

Golf Scores

Jamal draws the line of **best** fit through the points to predict the trend. According to the line, which is a likely best score for a golfer who has played for 2 years?

  A.   80

  B.   85

*C.   91

  D.   95

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11. The equation $N = (1+i)B$ is used to calculate the balance of a savings account at the end of each month. Which of the following shows this equation solved for the variable i?

  A. $i = \dfrac{N}{B}$

  B. $i = \dfrac{N}{2B}$

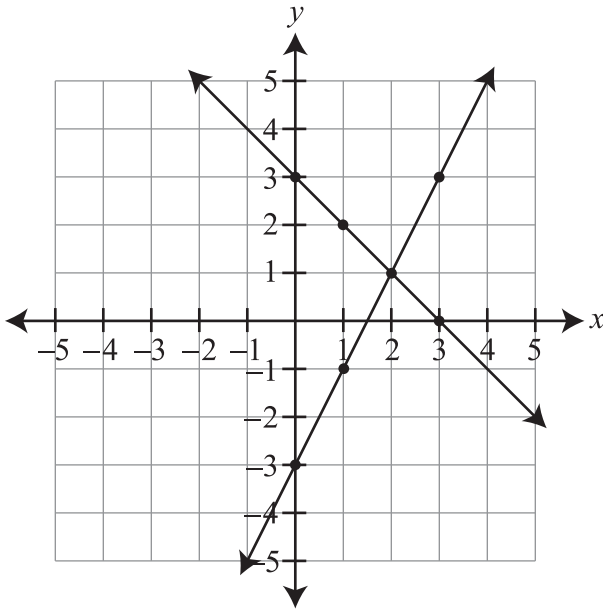 C. $i = \dfrac{N}{B} + 1$

*D. $i = \dfrac{N}{B} - 1$

12. Which graph shows two functions in the same family?

A.

B.

*C.

D.
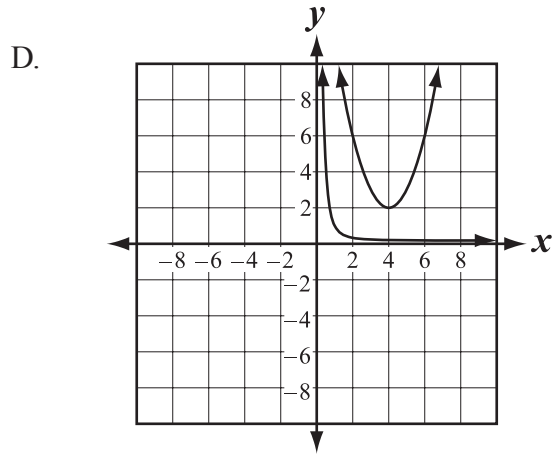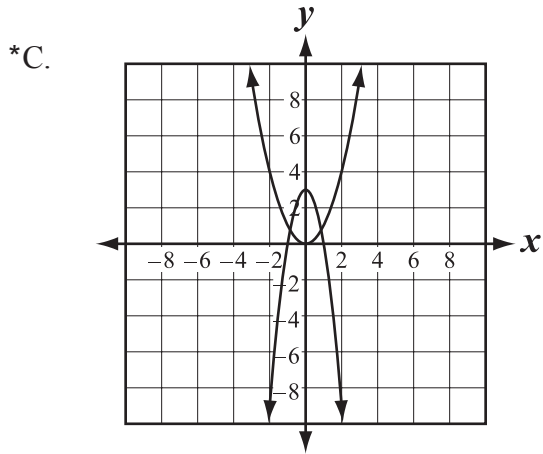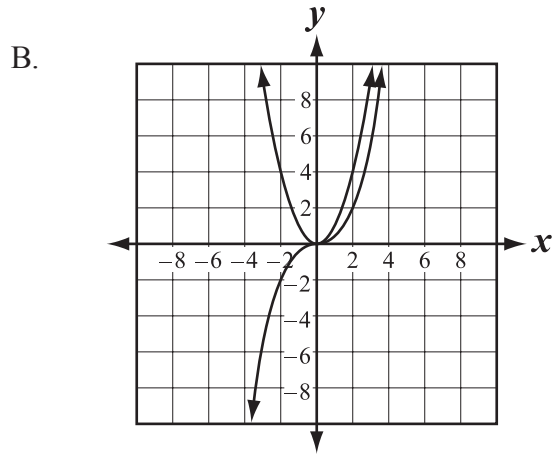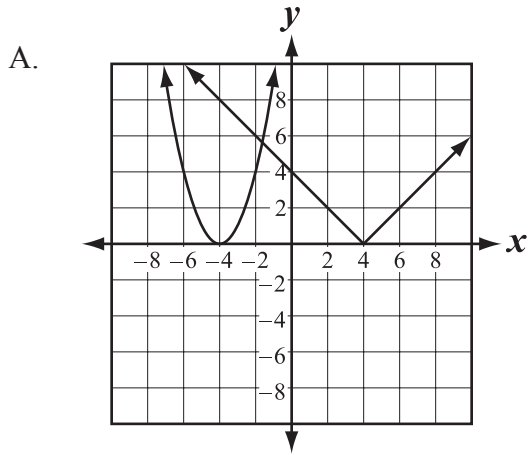
13. Equations $3 = y + x$ and $y = 2x - 3$ are graphed below.

Which ordered pair is the solution of this system of equations?

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

14. What is the value of $(3.5 \times 10^{18})(8.0 \times 10^{-7})$?

- A. 2.8×10^{11}
- *B. 2.8×10^{12}
- C. 2.8×10^{-124}
- D. 2.8×10^{-125}

15. Kelly plays a board game. Each time it is her turn she rolls a number cube numbered one through six. On her first turn she rolls a 4. What is the probability Kelly will roll a 3 on her second turn?

- A. $\dfrac{1}{36}$
- *B. $\dfrac{1}{6}$
- C. $\dfrac{1}{5}$
- D. $\dfrac{1}{2}$

16. What are the solutions to $x^2 + 3x - 10 = 0$?

- A. $x = 10$ or $x = -1$
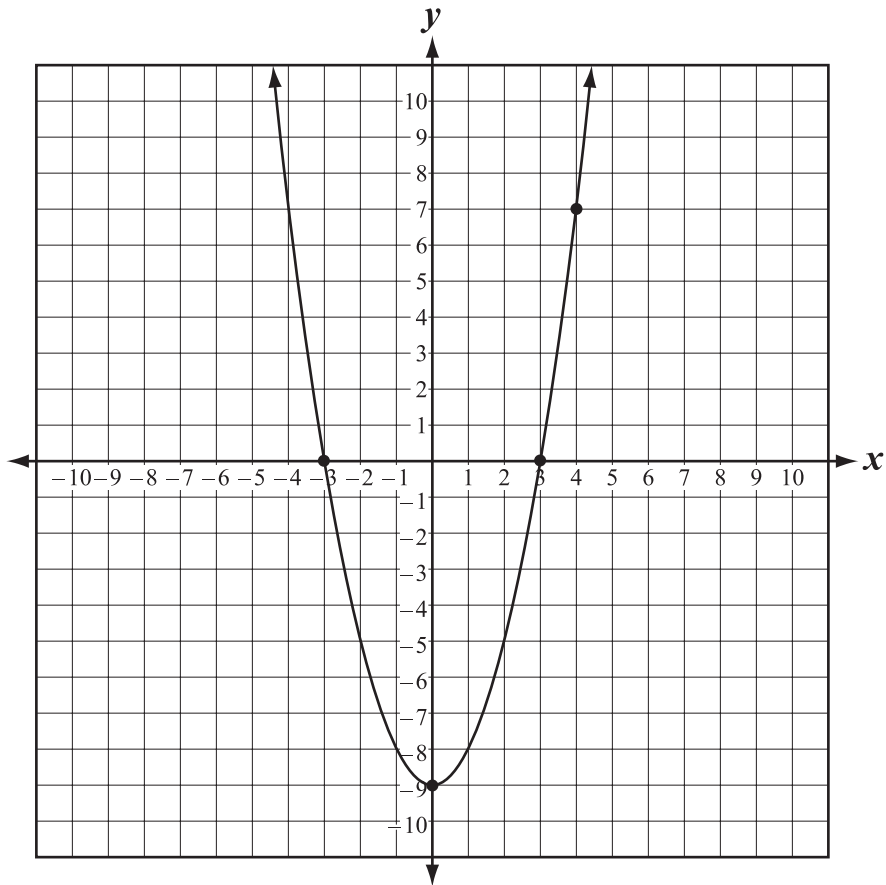- B. $x = 3$ or $x = -10$
- *C. $x = -5$ or $x = 2$
- D. $x = -7$ or $x = 7$

17. What is the slope of the line containing the points $(-1, 6)$ and $(3, -5)$?

- *A. $-\dfrac{11}{4}$
- B. $-\dfrac{4}{11}$
- C. $-\dfrac{7}{8}$
- D. $-\dfrac{8}{7}$

18.   The function $f(x)$ is graphed below.

What is the minimum of $f(x)$?

*A. -9

  B. -3

  C.   3

  D.   9

19. Use the table below to answer the following question.

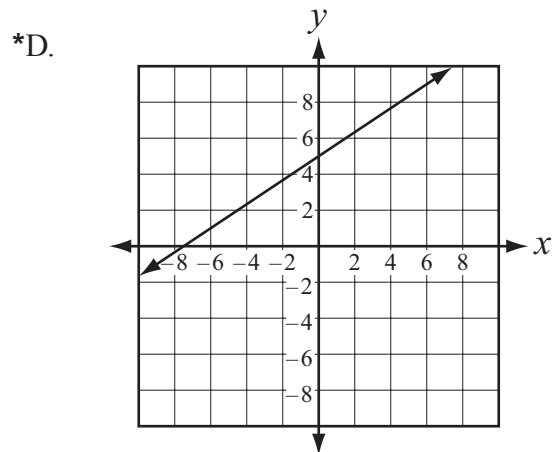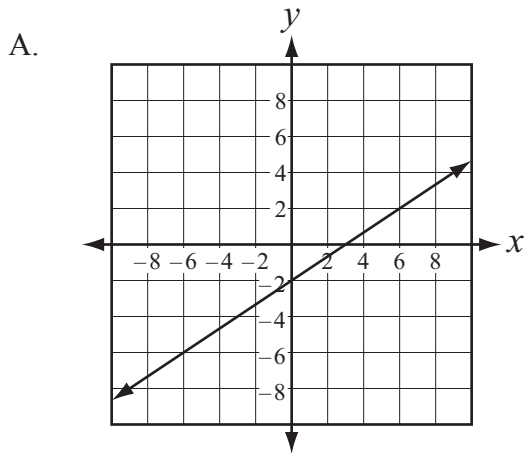| x	–2	–1	0	1	2	3
$f(x)$	–10	–7	–4	–1	2	5

Which equation is represented by the data in this table?

A. $f(x) = x + 3$

B. $f(x) = x - 8$

*C. $f(x) = 3x - 4$

D. $f(x) = 6x + 2$

20.   Use the graph below to answer the following question.
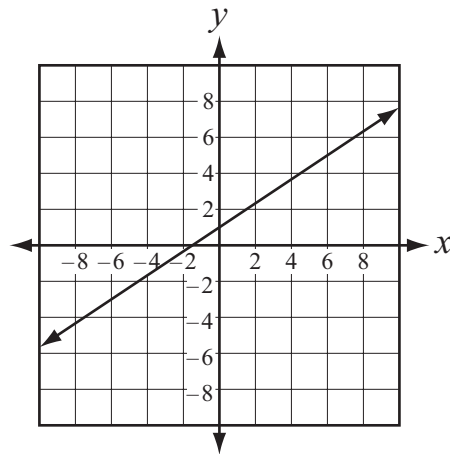
Which of the following has a greater *y*-intercept than the graph shown above?

A.

B.

C.

*D.
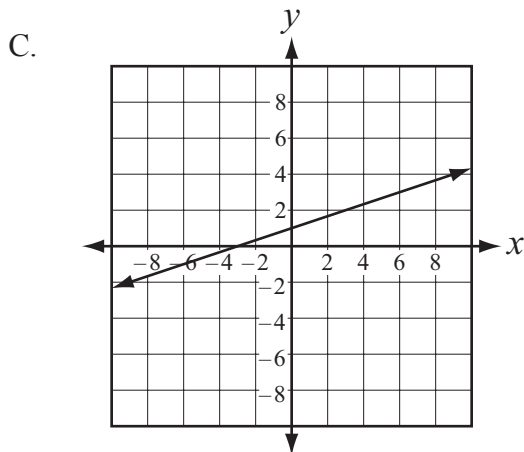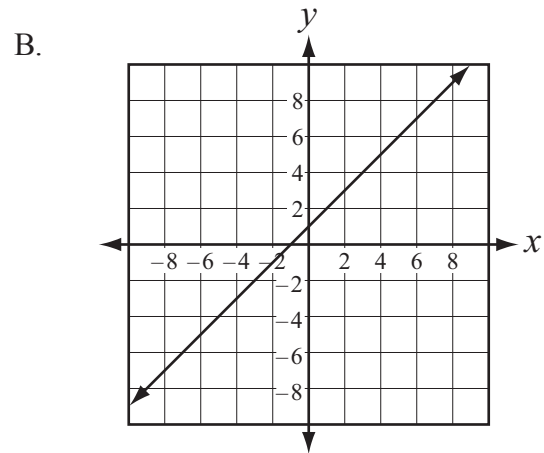
21. The number of homework assignments completed by students in two classes is represented in the plot below.

Number of Completed Homework Assignments
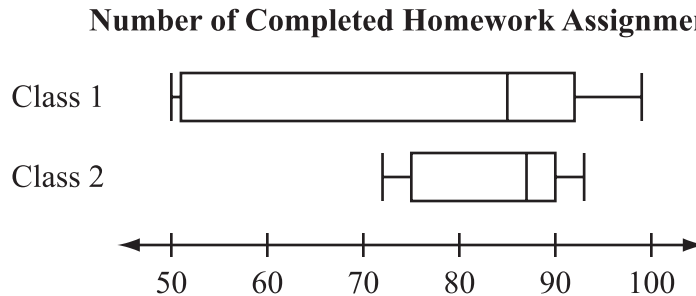
Which statement **correctly** compares the data from Class 1 and Class 2?

   *A.   The range for Class 2 is less than the range for Class 1.
   B.   The mean for Class 1 is less than the mean for Class 2.
   C.   The mode for Class 1 is greater than the mode for Class 2.
   D.   The median for Class 1 is greater than the median for Class 2.

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22. Two less than 4 times a number is 22. Which equation represents this situation, where n is the number?

   A. $2 - 4n = 22$
   B. $(2 - 4)n = 22$
   C. $4(n - 2) = 22$
   *D. $4n - 2 = 22$

23. The total number of boxes packed (t) can be found using the equation $t = 25x + 30$ where x is the number of workers packing boxes. What is the independent variable in this equation?

   A. t
   *B. x
   C.   25
   D.   30

24. The graph of a function is shown below.
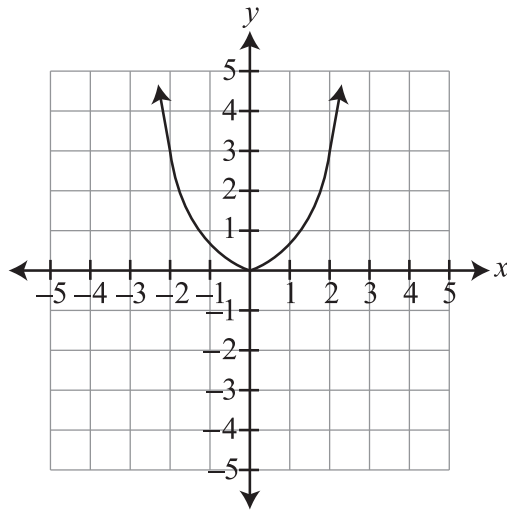
Which is the image of the graph after a vertical shift of −3?

A.

B.

C.

*D.
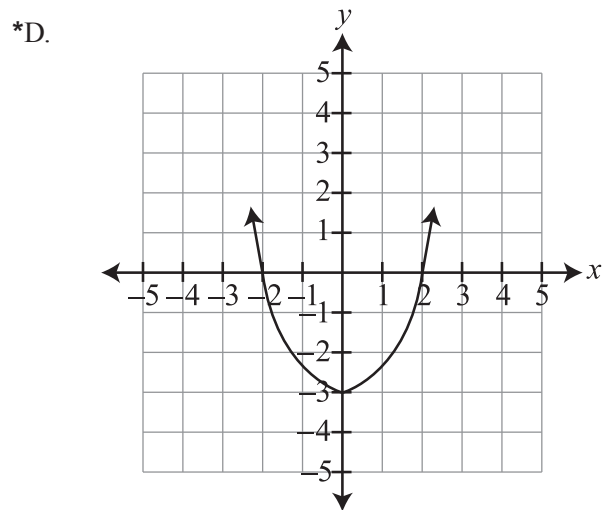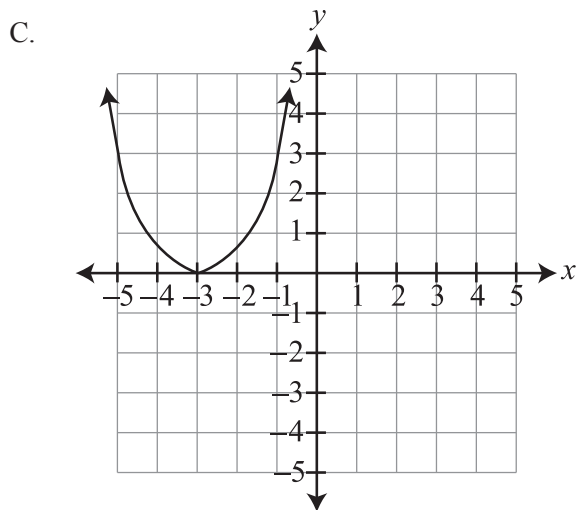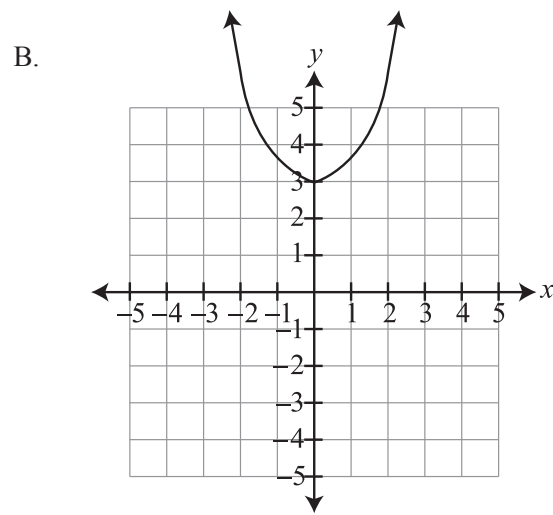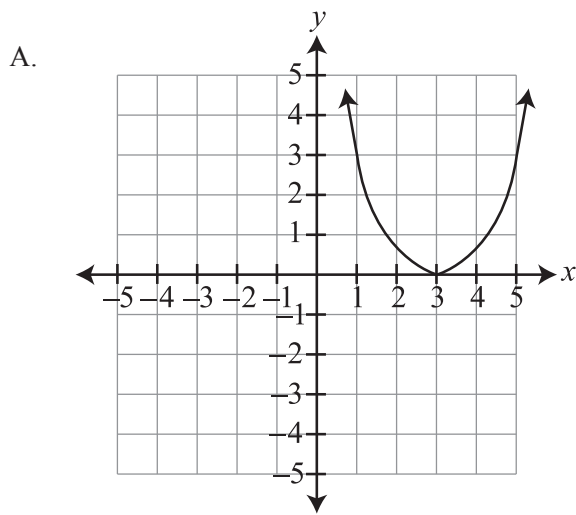
25. Jeanette's Drive-In sells soft drinks and coffee in three sizes: regular, large, and jumbo. The table below shows how many of each beverage and size were sold last night.

	Regular	Large	Jumbo
Soft Drinks	20	23	18
Coffee	5	13	4

Which matrix represents this information?

A. $\begin{matrix} S \\ C \end{matrix} \begin{bmatrix} 61 \\ 22 \end{bmatrix}$

B. $\begin{matrix} R & L & J \end{matrix}$
$\begin{bmatrix} 25 & 36 & 22 \end{bmatrix}$

C. $\begin{matrix} & R & L & J \end{matrix}$
$\begin{matrix} S \\ C \end{matrix} \begin{bmatrix} 20 & 5 & 23 \\ 13 & 18 & 4 \end{bmatrix}$

*D. $\begin{matrix} & R & L & J \end{matrix}$
$\begin{matrix} S \\ C \end{matrix} \begin{bmatrix} 20 & 23 & 18 \\ 5 & 13 & 4 \end{bmatrix}$

26. An art teacher uses 18% of his yearly budget on supplies for the first project. If he spends $216 on supplies for the first project, what is the teacher's yearly budget?

*A. $1200

B. $1800

C. $2592

D. $3888

27. Assuming no denominator equals 0, which shows the expression below in completely simplified form?

$$\frac{18x^2z^5 + 30x^3z^4}{2xz^4}$$

A. $9z + 15x^2$

*B. $9xz + 15x^2$

C. $12xz + 20x^2$

D. $\dfrac{6xz^2(3xz^3 + 5x^2z^2)}{2xz^4}$

28. What value of x satisfies the equation $\dfrac{2}{3}x + \dfrac{1}{4} = 6$?

A. $x = \dfrac{3}{8}$

B. $x = \dfrac{17}{2}$

*C. $x = \dfrac{69}{8}$

D. $x = \dfrac{71}{2}$

29. Which expression is equivalent to $4\sqrt{10} \cdot 3\sqrt{7}$?

  A. $12 + 3\sqrt{10} + 4\sqrt{7} + \sqrt{70}$

  *B. $12\sqrt{70}$

  C. $60\sqrt{7}$

  D.   840

30. How are the slopes of parallel lines related?

  *A.   They are equal.

  B.   They are opposites of each other.

  C.   They are reciprocals of each other.

  D.   They are opposite reciprocals of each other.

A. Use the rectangle below to answer the following questions.

$$x + 3$$

$$2x + 4$$
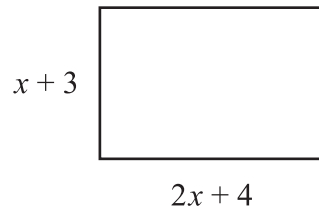
1. Find the perimeter of the rectangle shown above in terms of x. Simplify your answer. Show your work.

2. If each side is doubled, what is the new perimeter of this rectangle in terms of x? Simplify your answer. Show your work.

3. Find the area of the original rectangle shown above in terms of x. Simplify your answer. Show your work.

4. If each side is doubled, what is the new area of this rectangle in terms of x? Simplify your answer. Show your work.

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

Item A Scoring Rubric—2011 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" assigned for the item.)

B. The table below shows the number of flowers that a store has in stock and the number of flowers that have been ordered by customers.

Flowers in Stock and Ordered

Flower	In Stock (dozens)	Customer Orders (dozens)
Red rose	45	30
Yellow rose	20	16
Red carnation	23	25
Yellow carnation	12	8

1. Create two matrices, one representing the flowers in stock and one representing the flowers that customers have ordered. Be sure to use all correct labels.

2. Create a new matrix representing the difference between the flowers in stock and the flowers that customers have ordered. Show your work.

3. Using the matrix created in Part 2, determine whether or not all the orders can be filled. List which, if any, orders that cannot be filled. Explain your answer.

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

Item B Scoring Rubric—2011 Algebra I

Score	Description
4	The student earns 4 points. No incorrect work is included
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" assigned for the item.)

C. A tiling contractor charges a $150.00 set-up fee and $20.00 per square foot of tile installation.

1. Write an equation that he could use to determine the price to charge his customers if *a* is the number of square feet to be tiled and *C* is the cost.

2. Copy the table below into your answer document. Complete the table.

Cost of Tiling

Square Footage (*a*)	Cost (*C*)
10	
20	
30	
40	
50	

3. On the grid provided in your answer document, graph the *y*-intercept and one other coordinate pair. Draw a straight line through the points. Be sure to label your axes and give a title to your graph.

4. Explain changes to the slope and *y*-intercept, if any, if the contractor raised the price per square foot to be tiled.

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

Item C Scoring Rubric—2011 Algebra I

Score	Description
4	The student earns 4 points. Graph in Part 3 is titled No incorrect work is included
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. Ex: Equation in Part 1 which would be correct if different variables were defined
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

1. The city of Mumbai, India, had the largest urban population in the world in 2001. The estimated population was 11,900,000. What is this population expressed in scientific notation?

   A. 1.19×10^{-7}

   *B. 1.19×10^{7}

   C. 119×10^{2}

   D. $11,900 \times 10^{2}$

2. Jack's Ticket Booth sells tickets for various sporting events. The number of tickets Jack sells varies indirectly with the price at which he sells them. He sells 2,000 tickets when he charges $20.00 per ticket. How many tickets will Jack sell when he charges $10.00 per ticket?

   A.   1,000

   B.   2,010

   C.   3,000

   *D.   4,000

3. The graph of a function is shown below.
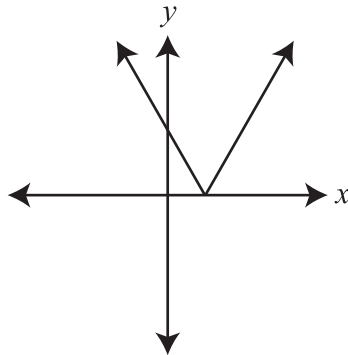
Which is the image of the graph after a reflection over the *x*-axis?

A.

B.

*C.

D.
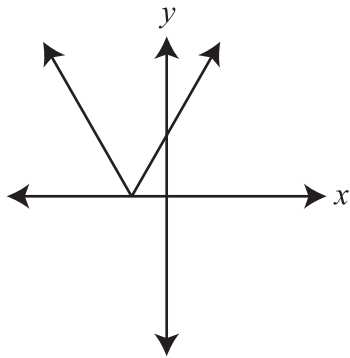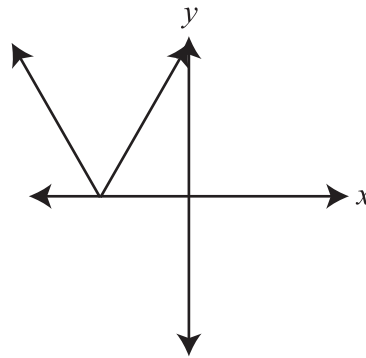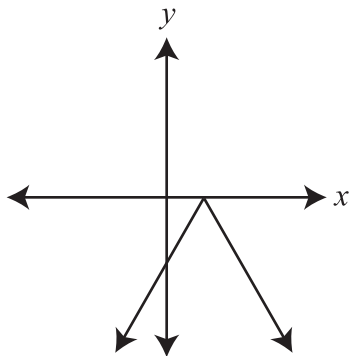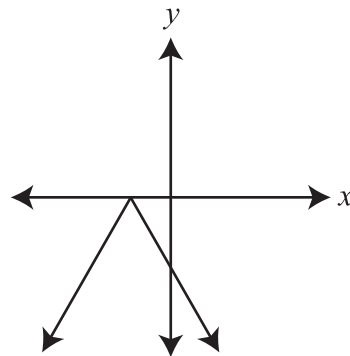
4. What ordered pair is the solution to the system of equations graphed below?
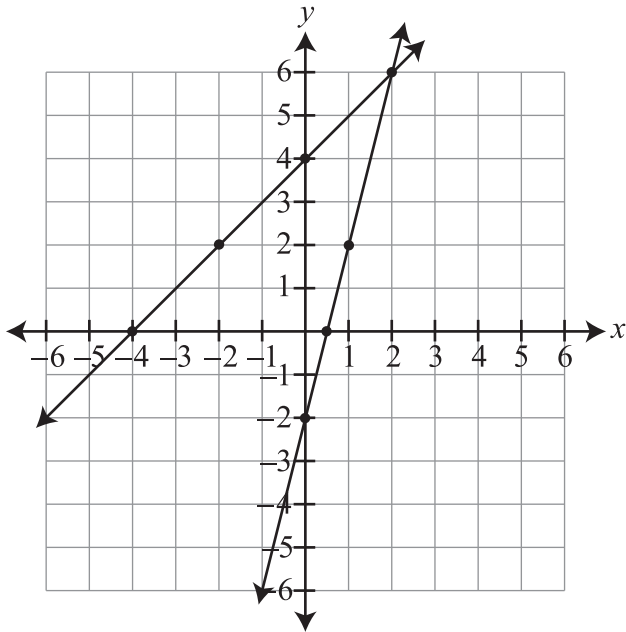
A. (0, –2)

B. (–4, 0)

*C. (2, 6)

D. (1, 2)

5. Which describes the effect on a graph when the equation $y = -\frac{1}{2}x - 2$ is changed to $y = -\frac{1}{2}x + 2$?

*A. The line moves upward on the y-axis.

B. The line moves downward on the y-axis.

C. The line moves to the right on the x-axis.

D. The line slants upward, from left to right, instead of downward.

6. What value(s) of x would make the expression below undefined?

$$\frac{x^2 - 3x - 10}{x^2 - 10x + 25}$$

*A. $x = 5$

B. $x = -5$

C. $x = -2$ and $x = 5$

D. $x = 13$ and $x = 12$

7. Suzan recorded the windchill for a week in January, as shown in the graph below.

Weekly Windchill

Day of the Week
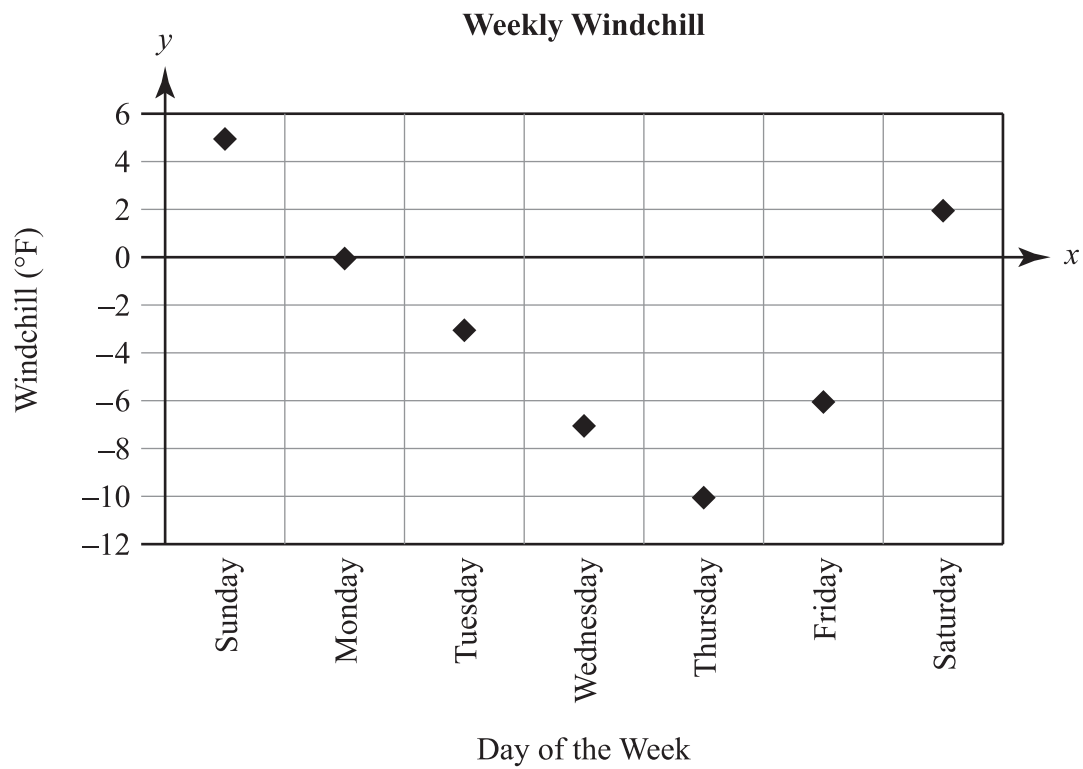
What day shows the zero of the graph?

A.   Sunday
*B.   Monday
C.   Thursday
D.   Saturday

8. A line has an *x*-intercept of 2 and a *y*-intercept of −4. What is the equation of the line, in standard form?

*A. $2x - y = 4$

B. $4x - y = 2$

C. $2x - 2y = 4$

D. $-2x + y = 2$

9. Matrices *A* and *B* are shown below.

$$A = \begin{bmatrix} 5 & 0 & 11 \\ -2 & 3 & 2\frac{1}{2} \\ 0 & 5\frac{1}{2} & 7 \end{bmatrix} \quad B = \begin{bmatrix} 3 & 2 & 7 \\ -5 & -2\frac{1}{2} & 0 \\ 4\frac{1}{3} & -5\frac{1}{2} & -7 \end{bmatrix}$$

Which matrix represents $A + B$?

A. $\begin{bmatrix} 15 & 0 & 77 \\ 10 & -7\frac{1}{2} & 0 \\ 0 & 30\frac{1}{4} & -49 \end{bmatrix}$

*B. $\begin{bmatrix} 8 & 2 & 18 \\ -7 & \frac{1}{2} & 2\frac{1}{2} \\ 4\frac{1}{3} & 0 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 8 & 2 & 18 \\ 7 & -5\frac{1}{2} & 2\frac{1}{2} \\ 4\frac{1}{2} & -11 & -14 \end{bmatrix}$

D. $\begin{bmatrix} 8 & 2 & 18 \\ 7 & -5\frac{1}{2} & 2\frac{1}{2} \\ 4\frac{1}{2} & 0 & 0 \end{bmatrix}$

10. Which is equivalent to the expression
$3\sqrt{5} + 2\sqrt{20}$?

  *A. $7\sqrt{5}$

  B. $7\sqrt{10}$

  C. $11\sqrt{5}$

  D.   25

11. Which is a completely factored form of the
expression $x^2 + 21x + 20$?

  A. $(x + 5)(x + 4)$

  B. $(x + 10)(x + 2)$

  *C. $(x + 20)(x + 1)$

  D. $(x + 21)(x - 1)$

12. Maria manages a paddleboat rental shop. She
recorded the number of hours that each of
30 customers rented paddleboats. The
frequency of the customers' hourly usage is
recorded below.

Paddleboat Rentals
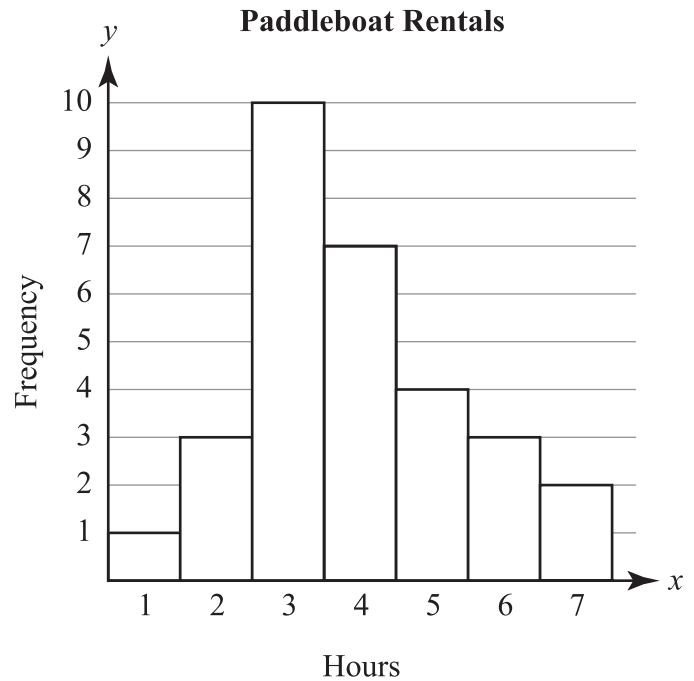
Which statement **best** describes the data?

  *A.   The mode of the data is 3 hours.

  B.   The range of the data is 10 hours.

  C.   Seven customers rented paddleboats for
2 hours each.

  D.   Fewer customers rented a paddleboat for
5 hours than for 6 hours.

49

13. Which is the simplest form of the expression

$$\sqrt{\frac{48}{12}}?$$

   A. $\dfrac{4\sqrt{2}}{2\sqrt{2}}$

   B. $4\sqrt{12}$

   C.   4

 *D.   2

14. Francisco has test scores of 82, 92, 89, and 93. He has one test left, and his goal is to have a test score mean of 90. What is the minimum score he must achieve on the final test in order to meet his goal?

   A.   98

 *B.   94

   C.   90

   D.   89

15. If $8 = \dfrac{5}{4}x - 2$, what is the value of x?

   A.   4.8

 *B.   8

   C.   12

   D.   12.5

16. A function is completely defined by the table below.

x	y
1	3
0	6
−1	2
10	−1

What are the domain and the range of the function?

   A.   Domain = {10}; Range = {6}

   B.   Domain = {11}; Range = {7}

   C.   Domain = {−1, 10}; Range = {−1, 6}

 *D.   Domain = {−1, 0, 1, 10}; Range = {−1, 2, 3, 6}

17. Julio's Rental Cars charges $100 plus an additional $0.20 per mile traveled. What is the rate of change of this linear cost function?

   A.   0.002 dollars per mile

 *B.   0.20 dollars per mile

   C.   100 dollars per mile

   D.   500 dollars per mile

18. Which points represent the zeros of the function graphed below?
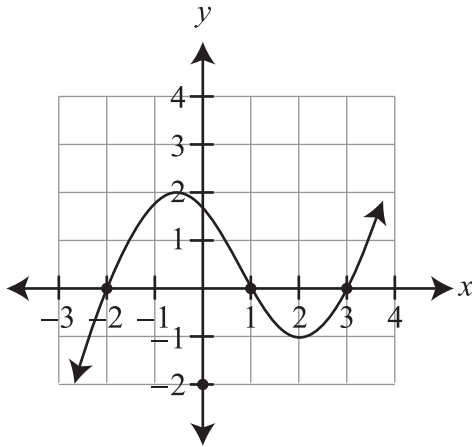
A. $(-1, 0), (-2, 0), (3, 0)$

B. $(-1, 0), (2, 0), (3, 0)$

*C. $(1, 0), (-2, 0), (3, 0)$

D. $(1, 0), (2, 0), (-3, 0)$

19. What are the solutions to $-36 = -16x^2$?

A. $x = -16$, or $x = -36$

B. $x = -8$, or $x = -16$

*C. $x = \dfrac{3}{2}$, or $x = -\dfrac{3}{2}$

D. $x = 4$, or $x = 6$

20. Which table represents y as a function of x?

*A.

Weight (x)	Cost (y)
0–15	$ 6.95
16–30	$ 9.95
31–60	$13.95

B.

Weight (x)	Cost (y)
0–10	$ 6.95
5–12	$ 9.95
7–15	$13.95

C.

Weight (x)	Cost (y)
0–10	$ 6.95
5–20	$13.95
3–60	$16.95

D.

Weight (x)	Cost (y)
0–20	$ 6.95
10–35	$ 9.95
15–31	$24.95

21. John is selling pizzas to earn money to go on a band trip. Each pizza costs $10. He sold pizzas to 5 of his friends. The table below shows his sales.

Friend	Number of Pizzas Sold	Cost of Pizzas
1	1	$ 10
2	2	$ 20
3	3	$ 30
4	4	$ 40
5	5	$ 50
Total	15	$150

Which would be the recursive formula for the cost of the pizza?

*A. $a_x = a_{x-1} + 10$

B. $a_x = a_{x-1} - 10$

C. $a_x = a_{x-1} + 1$

D. $a_x = a_{x-1} - 1$

22. What is the simplest form of the expression $\dfrac{12b^5}{4b^4}$?

A. $3b^9$

B. $8b$

*C. $3b$

D. 3

23. Mark charges x dollars per hour to mow lawns. He mowed for 7 hours on Saturday and 4 hours on Sunday. Mrs. Hughes gave Mark a $10 tip for doing a great job. Which expression represents the amount of money Mark earned?

A.   11

B. $4x + 10$

*C. $11x + 10$

D. $11(x + 10)$

24. Ms. Allen gives out prizes in her third-grade class every week. She has 26 tiles in a bag, one for each letter of the alphabet. She draws a tile, and everyone whose name begins with that letter gets a prize. Timmy is a student in Ms. Allen's class. What is the probability that Timmy wins a prize during the next drawing?

*A. $\dfrac{1}{26}$

B. $\dfrac{2}{13}$

C. $\dfrac{2}{11}$

D. $\dfrac{5}{26}$

25. Which inequality has a solution set represented by the graph below?
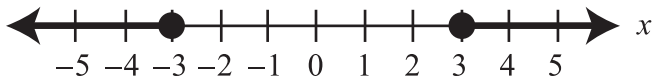
A. $|x| > 3$

*B. $|x| \geq 3$

C. $|x| \leq 3$

D. $|x| < 3$

26. Simplify the expression below.

$$\frac{24m^2}{34mw}$$

A. $\dfrac{24m}{34w}$

*B. $\dfrac{12m}{17w}$

C. $\dfrac{12m^3}{17w}$

D. $\dfrac{2m}{3w}$

27. If $f(x) = -\dfrac{2}{3}x + 10$, what is the value of $f(6)$?

A. −2

B. 4

*C. 6

D. 14

28. The owner's manual for a pool states that the number of hours (h) to fill the pool depends on the diameter (d) of the pipe filling the pool. Bradley can determine the time it will take to fill his pool using the equation below.

$$h(d) = \frac{64}{d^2}$$

Which statement correctly describes this equation?

*A. As the diameter of the pipe increases, the time to fill the pool decreases.

B. As the diameter of the pipe increases, the time to fill the pool increases.

C. The minimal time to fill the pool is 64 hours.

D. The maximum time to fill the pool is 64 hours.

29. What is the length of a line segment with end points located at (−3, −5) and (3, 3)?

A. 2

*B. 10

C. 14

D. 100

30. The scatterplot below shows the average heights of Egyptian children with respect to their ages.

Heights of Egyptian Children
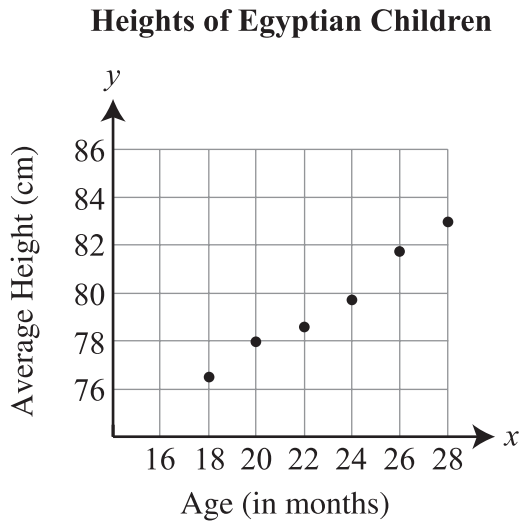
Which statement is true based on the data?

  A. Height and age are not correlated.

  B. Height is the independent variable.

 *C. Height and age have a positive correlation.

  D. Height and age have a negative correlation.

31. Which pair of functions, when graphed, are parallel lines?

  A. $f(x) = 3x + 1$
      $g(x) = -3x - 1$

 *B. $f(x) = 3x + 1$
      $g(x) = 3x - 1$

  C. $f(x) = 3x + 1$
      $g(x) = \dfrac{1}{3}x - 1$

  D. $f(x) = 3x + 1$
      $g(x) = -\dfrac{1}{3}x - 1$

32. Which is a completely factored form of the expression $4x^2 - 49$?

 *A. $(2x + 7)(2x - 7)$

  B. $(2x - 7)(2x - 7)$

  C. $2(x + 7)(x - 7)$

  D. $2(x - 7)(x - 7)$

33. Gravity and weight vary directly. The United States is in a very early stage of planning a manned mission to Mars. An astronaut with all her equipment weighs 260 pounds on Earth but only 100 pounds on Mars. Another astronaut and his equipment weigh 300 pounds on Earth. What would his weight be on Mars? Round your answer to the nearest tenth of a pound.

   A.   86.7 pounds
  *B.   115.4 pounds
   C.   230.8 pounds
   D.   780.0 pounds

34. Doug mows lawns and trims bushes. He charges $25 per lawn, plus $5 per bush. Which expression can be used to find the total amount Doug will charge to mow a lawn and trim b bushes?

  *A. $5b + 25$
   B. $25b + 5$
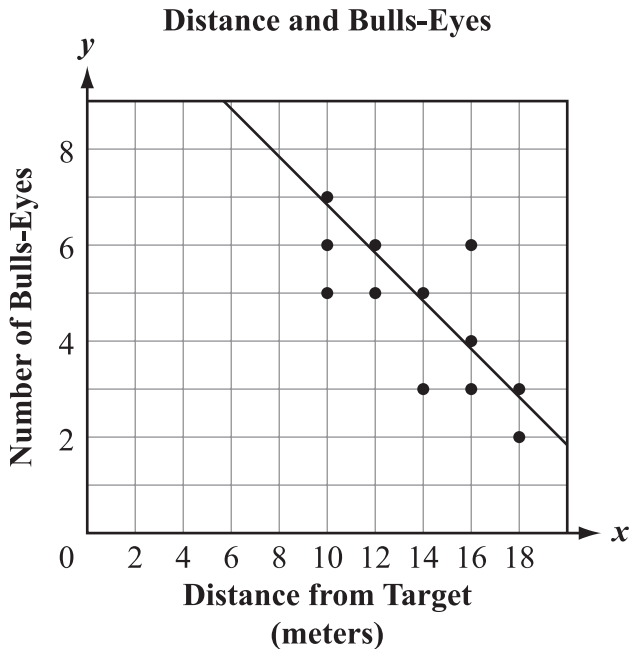   C. $5(b + 25)$
   D. $b(5 + 25)$

35. Justin's age is 3 years less than 2 times Mark's age.

Which equation shows the relationship between Justin's age, j, and Mark's age, m?

  *A. $j = 2m - 3$

   B. $j = 3m - 2$

   C. $j = \dfrac{m + 3}{2}$

   D. $j = \dfrac{m + 2}{3}$

36. The scatter plot below shows the number of bulls-eyes made during archery practice.

Distance and Bulls-Eyes

Based on the line of best fit, which is the **best** prediction of the number of bulls-eyes made when standing 8 meters from the target?

   A.   4

   B.   6

*C.   8

   D.   10

37. People leaving an apple stand were asked how many apples they had purchased and how much money they had spent. The following function was generated from the data collected.

$$f(x) = 25x$$

The cost of an apple is 25 cents. What is the independent variable, x, and the dependent variable, $f(x)$, in this function?

   A.   independent variable: number of people asked, dependent variable: number of apples purchased

   B.   independent variable: number of people asked, dependent variable: total money spent on apples

   C.   independent variable: total money spent on apples, dependent variable: number of apples purchased

*D.   independent variable: number of apples purchased, dependent variable: total money spent on apples

38. What is the sum of $(3x - 2)$ and $(5x^2 + 3x)$?

   A. $5x^2 - 2$

*B. $5x^2 + 6x - 2$

   C. $8x^2 + 3x - 2$

   D. $15x^3 - 10x^2 + 3x$

39. Which relationship is an example of causation?

   *A.   As rainfall increases, river levels rise.

   B.   As leaves change color, more people wear jackets.

   C.   As corn ripens, students spend less time doing homework.

   D.   As daytime temperatures drop, lights are turned on earlier in the day.

40. Which expression is equivalent to $\dfrac{8xy^2}{24x^2y}$ for $x \neq 0,\ y \neq 0$?

   A. $\dfrac{1}{3}$

   *B. $\dfrac{y}{3x}$

   C. $\dfrac{y^2}{3x}$

   D. $\dfrac{x}{3y}$

41. The blackboard in Mrs. Gonzalez's classroom has an area represented by the expression $x^2 - 5x - 24$. The product of which binomials represents the area of the blackboard?

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

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

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

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

42. Which ordered pair is the solution to the system of equations below?

$$\begin{cases} 3x - 7y = -10 \\ 5x - y = -6 \end{cases}$$

   A. $\left(-1, -\dfrac{13}{7}\right)$

   B. $\left(0, \dfrac{10}{7}\right)$

   *C. $(-1, 1)$

   D. $(1, -1)$

43. For $f(x) = -2x + 7$, what is $f(-1)$?

    A.   −9

    B.   −5

    C.   6

  *D.   9

44. If a car is traveling at a rate of r miles per hour, the distance, in feet, that a car takes to stop after the brakes are applied is given by the expression $r + \dfrac{r^2}{20}$. If a car is traveling 40 miles per hour, what is the distance, in feet, that it will take to stop after the brakes are applied?

    A.   44 feet

    B.   80 feet

  *C.   120 feet

    D.   1,764 feet

45. What are the coordinates of the midpoint of the line segment with endpoints $(0, 2)$ and $(4, 6)$?

    A. $(1, 1)$

    B. $(1, 5)$

    C. $(2, 2)$

  *D. $(2, 4)$
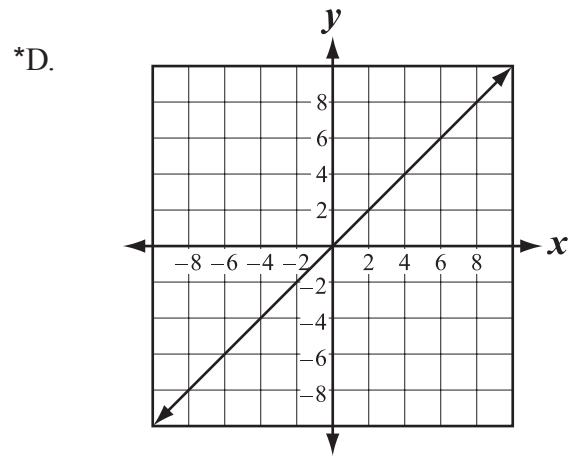
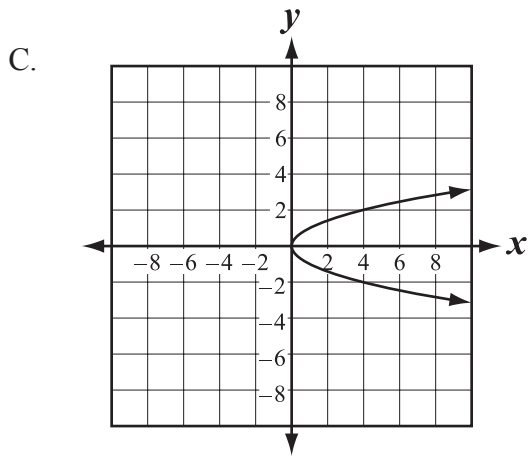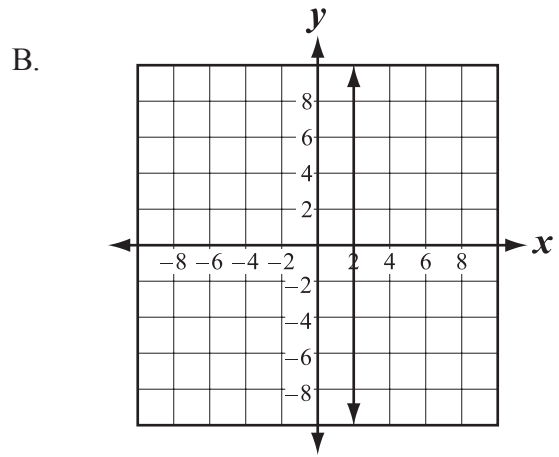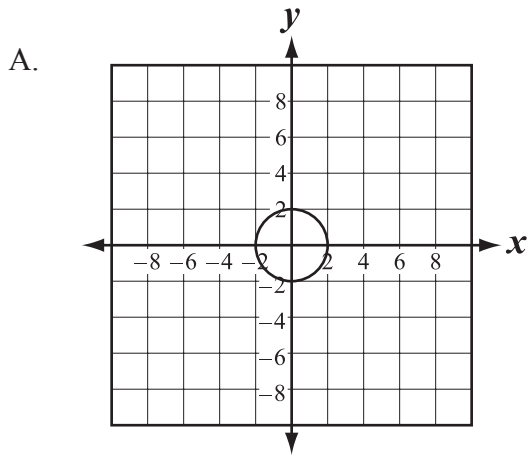**46.** What are the solutions of $x^2 - 2x - 8 = 0$?

    A. $x = -8, 0$

    B. $x = -4, 2$

  *C. $x = -2, 4$

    D. $x = 0, 8$

47. In a certain city, the tax on a $25,000 car is $400. At this rate, what is the tax on a $35,000 car?

  *A. $ 560

    B. $ 685

    C. $1,000

    D. $1,400

48. Which graph represents a function?

A.

B.

C.

*D.

49. Consider the expression below.

$$\left(\frac{-1}{3x^4y^7}\right)^3$$

Which is an equivalent form of this expression?

*A. $\dfrac{-1}{27x^{12}y^{21}}$

B. $\dfrac{1}{27x^{12}y^{21}}$

C. $\dfrac{-1}{9x^7y^{10}}$

D. $\dfrac{1}{9x^7y^{10}}$

50. Which function has a graph that is a translation of $f(x) = x^2$ three units up?

A. $f(x) = x^2 - 3$

*B. $f(x) = x^2 + 3$

C. $f(x) = 3x^2$

D. $f(x) = \dfrac{1}{3}x^2$

51. Use the graph below to answer the question.
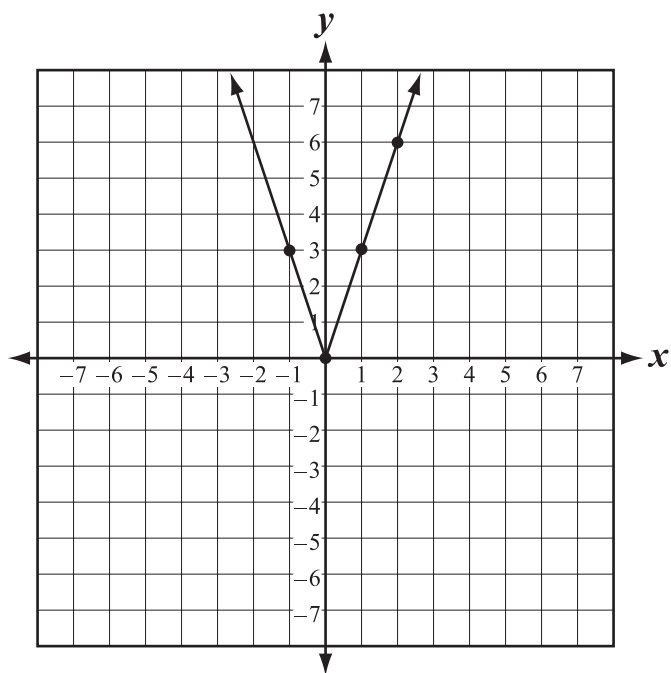
Which set includes numbers that are in the range of this relation?

*A.   {0, 3, 6}

B.   {0, −3, 6}

C.   {−3, 3, 6}

D.   {−6, −3, 3}

52. Andrew starts a savings account by depositing $100. Beginning with the first week, each week he adds $10 to his account. Not counting any interest earned, how much money will Andrew have saved at the end of one year?

   A. $ 152

   B. $ 220

   *C. $ 620

   D. $5,720

53. The graph of which equation passes through the points $(2, 3)$ and $(-4, 0)$?

   A. $y = \dfrac{1}{2}x$

   B. $y = 2x$

   *C. $y = \dfrac{1}{2}x + 2$

   D. $y = 2x - 1$

54.   Use the following scatter plots to answer the question.
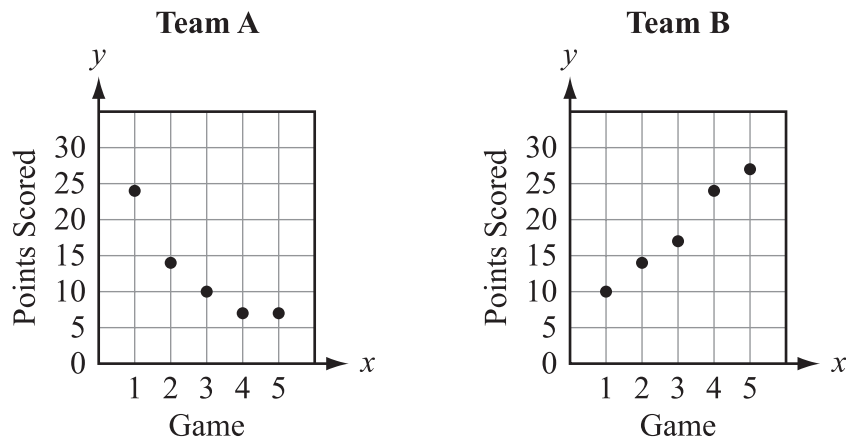
Team A

Team B

Which comparison is supported by the data shown in the graphs?

A.   Both Team A and Team B increased the number of points scored over time.

B.   Both Team A and Team B failed to increase the number of points scored over time.

C.   Team A improved the points scored over time and Team B did not improve the points scored over time.

*D.   Team B improved the points scored over time and Team A did not improve the points scored over time.

55. The function $f(x)$ is graphed below.
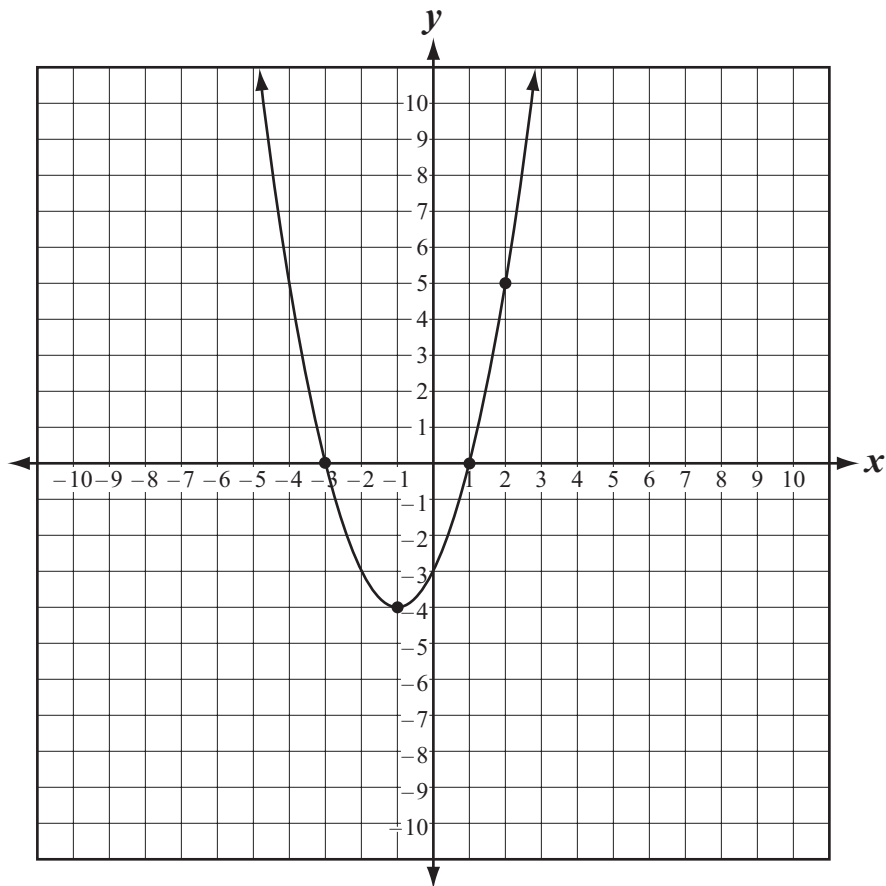
What are the coordinates of the vertex of $f(x)$?

A. $(-3,0)$

*B. $(-1,-4)$

C. $(0,-3)$

D. $(1,0)$

56. The kinetic energy (K) of a moving object can be found using the equation below, where m is the object's mass and v is the object's speed.

$$K = \frac{mv^2}{2}$$

Which shows this equation solved for m in terms of K and v?

A. $m = \dfrac{K}{2v^2}$

B. $m = \dfrac{v^2}{2K}$

*C. $m = \dfrac{2K}{v^2}$

D. $m = \dfrac{2v^2}{K}$

57. What is the value of the expression $(\sqrt{3})(\sqrt{12})$?

A. $\sqrt{6}$

B. $2\sqrt{3}$

*C.   6

D.   18

58. Which of the following is the factored form of the expression $3x^2 - 4x$?

*A. $x(3x - 4)$

B. $x(3 - 4x)$

C. $(3x - 1)(x - 1)$

D. $(3x + 1)(x - 1)$

59. Chad needs to make a triangular pennant that has a total area of 14 square inches. He has a piece of felt that is 7 inches long. If the 7-inch side is used as the base of the triangle, what will be the height in inches?

A. $\dfrac{1}{4}$

B.   1

C.   2

*D.   4

60. Use the data shown below to answer the following question.

Data Table

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

What type of relationship is represented in the table?

*A.   linear

B.   inverse

C.   quadratic

D.   exponential

A. A polynomial expression is given below.

$$2x^2 + 2x - 24$$

1. Factor out the greatest common factor (GCF) of the expression.

2. Continue factoring, and state the complete factorization of the expression.

3. Change the expression to $2x^2 - 2x - 24$. Showing all the steps, completely factor the new expression.

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

<table>
<tr><th colspan="2">Item A Scoring Rubric—2011 Algebra I</th></tr>
</table>

Score	Description
4	The student earns 4 points. 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 shown. Ex: Dividing by 2 in Part 1 and/or Part 3 with correct factoring of remaining trinomial. Ex: Correct but incomplete factorization in Part 2
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

PART II   Retest Released Algebra I Items

B.   At noon, a pump started emptying an oil storage tank at a constant rate. The tank started with 2,400 barrels of oil and emptied at a rate of 360 barrels per hour.

1. Write an equation that represents the relationship between *B*, the number of barrels of oil remaining in the tank and *t*, the number of hours that the pump has been emptying the tank.

2. How many barrels were in the tank at 5 P.M.? Show the work by which you determined your answer.

3. At what time will the tank be empty? Show how you determined your answer.

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

Item B Scoring Rubric—2011 Algebra I

Score	Description
4	The student earns 5 points. Response contains the correct label of "P.M." in Part 3. The response contains no incorrect work.
3	The student earns 3–4½ points.
2	The student earns 2–2½ points.
1	The student earns ½–1½ points or some minimal understanding 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" assigned for the item.)

C. A truck driver has a choice of two highways to use for his delivery route. The highway with the least slope will give him the best gas mileage, therefore spending less of his income on gas.

1.   The first highway, Highway A, rises 633.6 feet over 10,560 feet of length. What is the slope of Highway A in simplest fraction form?

2.   The second highway, Highway B, rises 475.2 feet over 5,280 feet of length. What is the slope of Highway B in simplest fraction form?

3.   Which highway should the truck driver use to save money on gas? Justify your answer.

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

Item C Scoring Rubric—2011 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 shown.

0	The student earns 0 points. No understanding is shown
	      Ex: Both slopes are correct, but neither is in simplest form
	      Ex: Procedure for finding both slopes is correct, but each contains a calculation error

B	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)