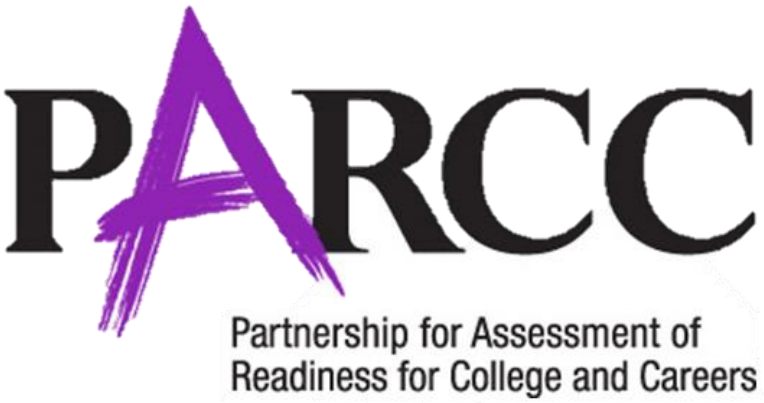



# Math

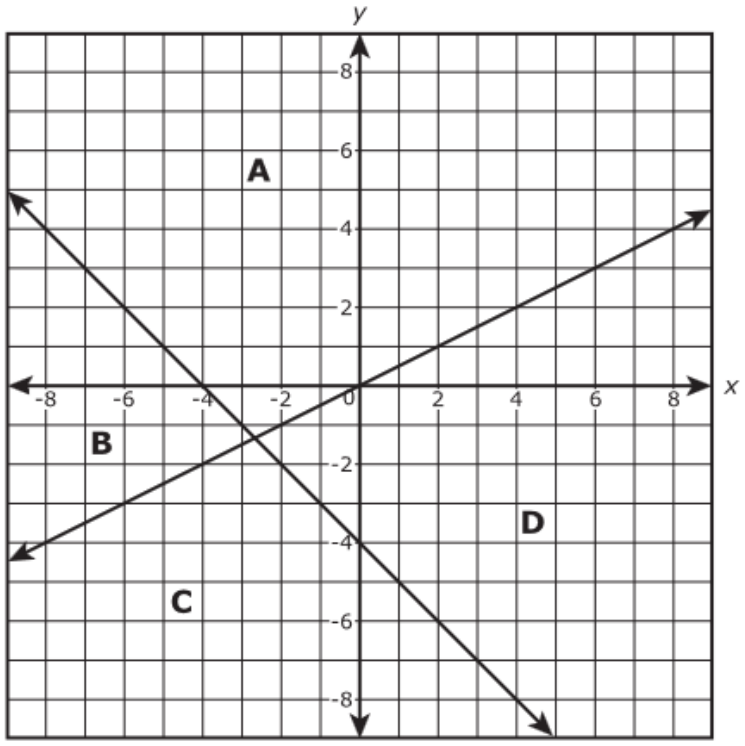
# Spring 2017

# Algebra I

# Released Items

**1.** **M41571P**

The system of inequalities $\begin{cases} x + y \leq -4 \\ 7x - 14y \leq 0 \end{cases}$ is graphed.




Which region in the graph represents the solution set of this system of inequalities?

- A. Region A
- B. Region B
- C. Region C
- D. Region D

**2.** **M40598**

The circumference $C$ of a circle with radius $r$ can be calculated using the formula $C = 2\pi r$. Which formula represents $r$ in terms of $C$?

- A. $r = 2\pi C$
- B. $r = C - 2\pi$
- C. $r = \frac{C\pi}{2}$
- D. $r = \frac{C}{2\pi}$

**3.** **M40100**

Match a correct description to each of the equations on the coordinate plane.

Drag and drop the correct description into each box.

| | |
|---|---|
| vertical line | horizontal line |
| line containing the origin | point |

| | |
|---|---|
| | $x = 2$ |
| | $y = 2$ |
| | $x + y = 0$ |

**4.** **M41582P**

A function $k$ whose domain is the set of positive integers is defined as $k(1) = 4$ and $k(n) = k(n-1) - 2$.

Function $k$ was evaluated for several numbers. Which of the following are true?

Select **each** correct answer.

- A. $k(-1) = -4$
- B. $k(0) = -2$
- C. $k(2) = 2$
- D. $k(3) = 0$
- E. $k(6) = 3$

**5.** **VH018053**

**Part A**

At a clothing store, Ted bought 4 shirts and 2 ties for a total price of $95. At the same store, Stephen bought 3 shirts and 3 ties for a total price of $84. Each shirt was the same price, and each tie was the same price. Which system of equations can be used to find $s$, the cost of each shirt in dollars, and $t$, the cost of each tie in dollars?

A. $\begin{cases} 6(s+t) = 95 \\ 3(s+t) = 84 \end{cases}$

B. $\begin{cases} 4s + 2t = 95 \\ 3s + 3t = 84 \end{cases}$

C. $\begin{cases} 7s + 5t = 179 \\ s + t = 12 \end{cases}$

D. $\begin{cases} 7s + 5t = 179 \\ 7s + 5t = 12(s+t) \end{cases}$

**Part B**

Linda bought 1 shirt and 2 ties at the same store. What is the total price, in dollars and cents, of Linda's purchase?

Enter your answer in the box.

**6.** **M43284**

A scientist began a study with a sample of 1,500 bacteria. He noticed that the number of bacteria in the sample after $t$ days can be modeled by the equation $P = 1,500 \cdot 5^t$. In this equation, what does $5^t$ represent?

A. The number of bacteria increases by 5 bacteria each day.

B. The number of bacteria increases by $t$ bacteria after 5 days.

C. The number of bacteria increases by a factor of 5 each day.

D. The number of bacteria increases by a factor of $t$ each day for 5 days.

Hayley bakes zucchini bread and banana bread. Some of the ingredients Hayley uses for each type of bread are shown in the tables.

| Zucchini Bread |
|---|
| 2 eggs |
| 2 cups of flour |
| 1.5 cups of sugar |
| 0.5 stick of butter |

| Banana Bread |
|---|
| 1 egg |
| 3 cups of flour |
| 2 cups of sugar |
| 0.25 stick of butter |

**Part A**

On Tuesday, Hayley only has 15 cups of flour and 9 eggs, but she has more than enough butter and sugar. Which system of linear inequalities can Hayley use to model this situation, where $b$ represents the number of loaves of banana bread and $z$ represents the number of loaves of zucchini bread?

A. $\begin{cases} 3b + z \leq 15 \\ 2b + 2z \leq 9 \end{cases}$

B. $\begin{cases} 5b + 3z \leq 15 \\ 3b + 5z \leq 9 \end{cases}$

C. $\begin{cases} 3b + 2z \leq 15 \\ b + 2z \leq 9 \end{cases}$

D. $\begin{cases} 2b + 2z \leq 15 \\ 3b + 5z \leq 9 \end{cases}$

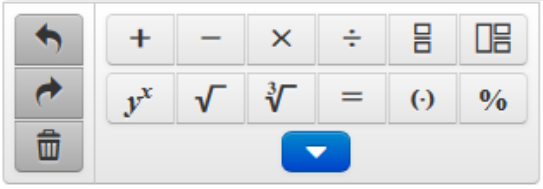
**Part B**

What is the number of whole loaves of each type of bread Hayley should make in order to have the least amount of the 15 cups of flour and 9 eggs left over?

Enter your answers in the boxes. Enter **only** your answers.

Loaves of zucchini bread: ☐

Loaves of banana bread: ☐




(continues on next page)

**7. (continued from previous page)** **2044-M40392**

**Part C**

On Friday, Hayley has purchased more flour and eggs, but only has 22 cups of sugar and 4 sticks of butter. Which combination of loaves of zucchini bread and banana bread can Hayley make?

- A. 8 loaves of zucchini bread and 4 loaves of banana bread
- B. 6 loaves of zucchini bread and 8 loaves of banana bread
- C. 2 loaves of zucchini bread and 12 loaves of banana bread
- D. 4 loaves of zucchini bread and 6 loaves of banana bread

**Part D**

She can sell zucchini bread for $4 and banana bread for $3. What is the **greatest** amount of money Hayley can collect by selling the bread made with 22 cups of sugar and 4 sticks of butter?

Enter your answer in the box.

$ [ ]

**8.** **VH024513**

Which statements regarding the function $f(x) = -3x^2 + 18x - 21$ are true?

Select **all** that apply.

- A. When written in vertex form, $f(x) = -3(x-3)^2 + 6$.
- B. When written in vertex form, $f(x) = -3(x-3)^2 - 2$.
- C. When written in vertex form, $f(x) = (x-3)^2 + 6$.
- D. When written in vertex form, $f(x) = (x-3)^2 - 2$.
- E. The vertex of $f(x)$ is located at $(3,6)$.

**9.** **VF646542**

The graphs of the functions $f(x) = 2x + 7$ and $g(x) = x^2 - 1$ intersect in the *xy*-coordinate plane. What are the points of intersection?

Enter your answers in the boxes.

( ☐ , ☐ ) and ( ☐ , ☐ )

**10.** **VH046614**

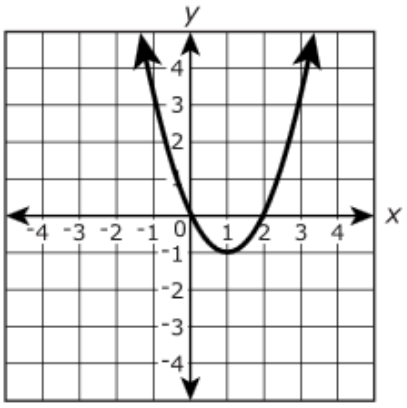
Solve the equation $2x^2 + 18 = 12x$ algebraically. Show all your steps and include the solution. Describe an alternate method that can be used to solve the equation.

Enter your answer and your work in the space provided.

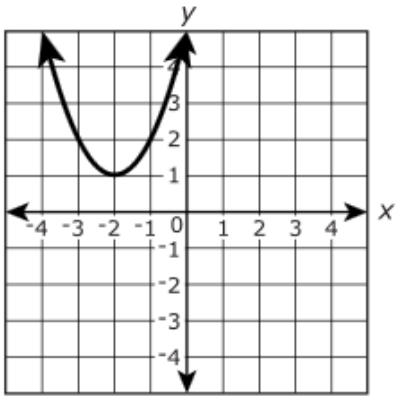
- Math symbols
- Relations
- Geometry
- Groups
- Trigonometry
- Statistics
- Greek

**11.** **VH120060**

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




The graph of $g(x)$ is shown, where $g(x) = f(x + a) + b$, and $a$ and $b$ are constants.



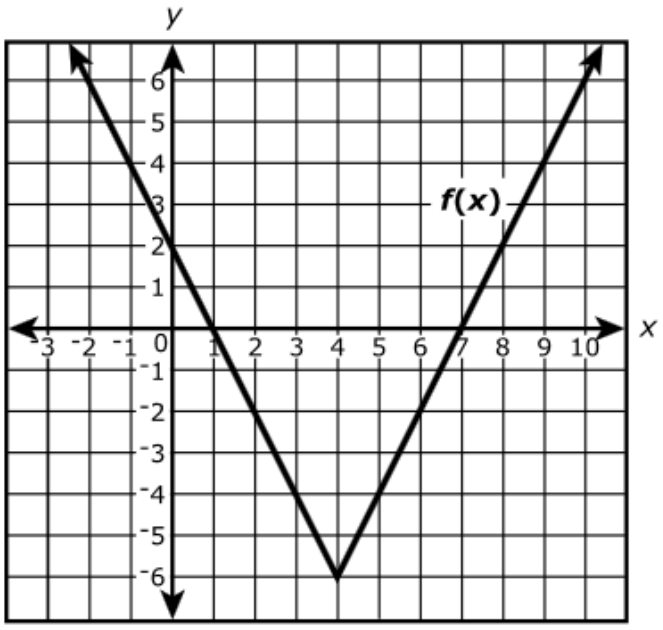

What are the values of $a$ and $b$ ?

Enter your answers in the boxes.

$a =$ ☐ and $b =$ ☐

**12.** **M43413**

The graph of the function $y = f(x)$ is shown.



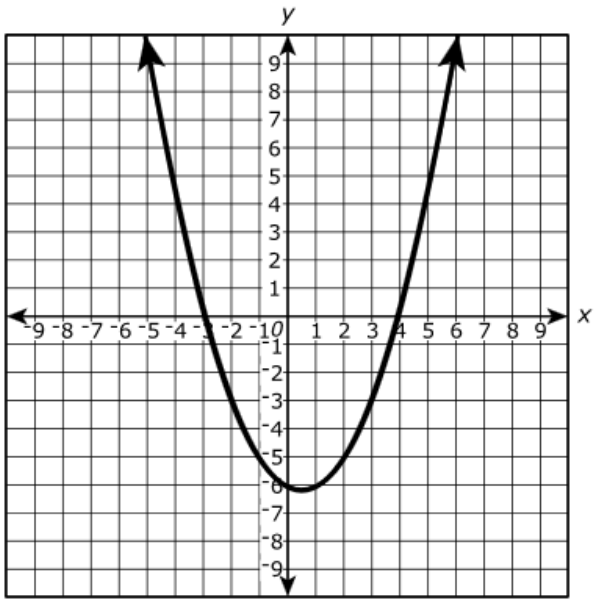

Which input value corresponds to $f(x) = 4$?

Select **all** that apply.

- A. $-6$
- B. $-1$
- C. 1
- D. 2
- E. 4
- F. 7
- G. 9

**13.** **VF821138**

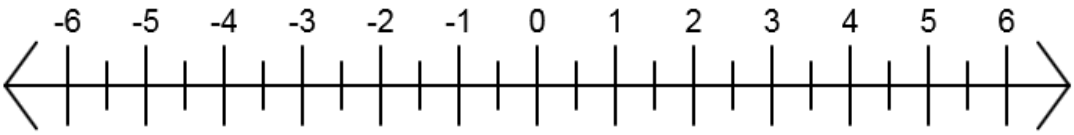
The graph of the function $f(x) = \frac{1}{2}(x^2 - x - 12)$ is shown on the *xy*-coordinate plane.

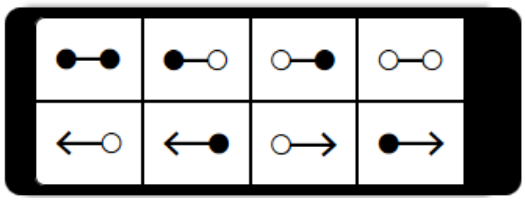



**Part A**

On the number line provided, represent the set of all values of *x* for which $f(x)$ is increasing.

Select a solution set indicator. Then select the number line and drag the point(s) to the appropriate location(s).

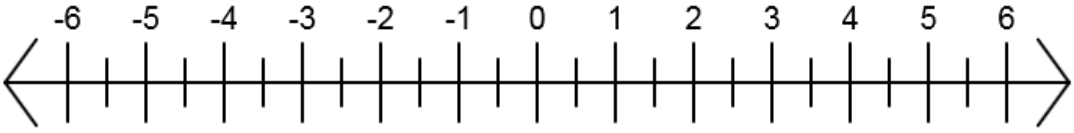


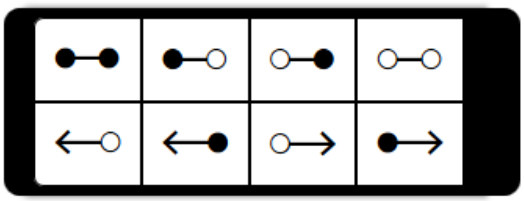



**Part B**

On the number line provided, represent the set of all values of *x* for which $f(x)$ is positive.

Select a solution set indicator. Then, select the number line and drag the point(s) to the appropriate location(s).



**14.** **M40424**

The table shows how the radioactivity in iodine-131 decreases over time. The initial amount is 2.00 grams.

**Radioactivity in Iodine-131**

| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Grams | 1.83 | 1.68 | 1.54 | 1.41 | 1.30 | 1.19 | 1.09 | 1.00 |

Calculate the average rate of change in grams per day from day 4 to day 7. Enter your answer as a decimal.

Enter your answer in the box.

**15.** **M40508**

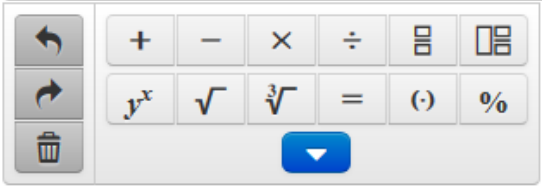
In a laboratory experiment, a certain plant grows at the rate shown in the table.

| Week Number | Height (cm) |
|---|---|
| 0 | 2 |
| 2 | 3.38 |
| 6 | 9.65 |

Write an exponential function, $h(x)$, that can be used to model the growth of the plant after $x$ weeks.

Enter your function in the space provided.

$h(x) =$ □



**16.** **VH031279**

A freight train traveling along a certain route uses 12 units of fuel per mile plus an additional 2.2 units of fuel per mile for each railcar on the train.

**Part A**

Let $N$ represent the number of railcars on the train. What is an expression for $f(N)$, the total number of units of fuel used per mile?

Enter your expression in the space provided.

**Part B**

Suppose each unit of fuel costs \$12.50. Which of the listed expressions gives the cost of fuel per mile for a train of 40 railcars?

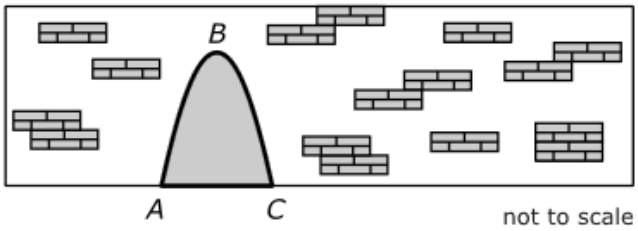
A. $40[f(12.5)]$

B. $f(12.5)+40$

C. $12.5[f(40)]$

D. $f(40)+12.5$

**17.** **VF906051**




The drawing shows an opening in a garden wall shaped as a parabola so that the height of the opening, $H$, is a function of distance, $d$, from the left end of the wall. Point $B$ is at the top of the opening and $H = -2d^2 + 12d - 10$.

What is the factored form of the function?

Enter your answers in the boxes.

$H = ($ [ ] $)(d - 1)(d -$ [ ] $)$

Select the phrases to complete the sentences.

The largest value of $d$ for which $H = 0$ is [ ].

0
1
3
5
8

This value is the [ ].

height of point B
distance from point A to point C
distance from the left end of the wall to point A
distance from the left end of the wall to point C