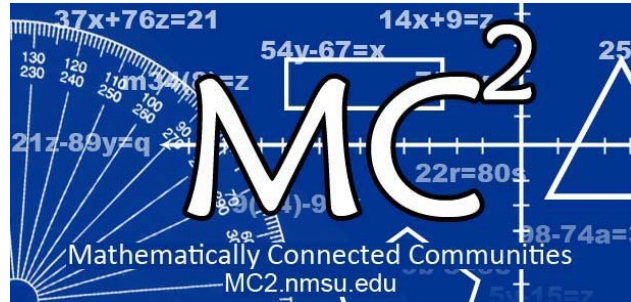


# Mathematically Connected Communities



## PARCC PBA Practice Test Items Algebra I - Mathematics

Excerpted 1/2015 from  
PARCC Online Practice Tests  
[www.parcconline.org](http://www.parcconline.org)

## Mathematical Practice Questions for MC<sup>2</sup> Thinking Protocol

Follow the process below in working with the PARCC practice items found in this packet:

1. Choose items from this packet that relate to math concepts studied in the current or previous curriculum units during your math instruction. Each item may be used as a practice item worksheet.
2. Choose a set of **Thinking/Writing Prompts** below based on the math practice the class is working to develop.
3. Add the prompts to the practice item worksheet or display the prompts for the students to respond to.
4. Continue using the same set of prompts for an extended period of time so children develop competence and confidence in describing their mathematical thinking related to the math practice.

The questions below were intentionally not included on each MC<sup>2</sup> PARCC practice item worksheet in this packet. These are intended to help students move beyond “answer getting” to fully making sense of test item questions and their own mathematical thinking.

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### Thinking/Writing Prompts to Promote Mathematical Practices

Math Practice 1: **Make sense of problems and persevere in solving them.**

1. What do you know about the problem?
2. What questions do you have?
3. Explain your reasoning or thinking in solving the problem.

Math Practice 3: **Construct viable arguments and critique the reasoning of others.**

1. What are the assumptions, definitions, and previous knowledge to help in thinking about this problem?
2. What are some possible conjectures that you have about the problem?
3. Explain your mathematical argument so that somebody else can make sense of your thinking.

Math Practice 4: **Model with mathematics.**

1. What are the important quantities in the problem that are needed to solve it?
2. What mathematical operation(s) or representation(s) will you use to solve the problem?
3. Explain how you know your answer makes sense in the context of the situation.

Math Practice 6: **Attend to precision.**

1. What are the important units in the problem? (What are we measuring or counting?)
2. What relationship between the units/quantities do you need to know in order to solve the problem?
3. Use appropriate and precise mathematical language, units, labels and computations to clearly describe your mathematical reasoning.

**Algebra I PARCC PBA Practice Assessment Item #1 (non-calculator): Standard A-APR.1-1**

1. Which expression is equivalent to  $(3x^5 + 8x^3) - (7x^2 - 6x^3)$ ?

A  $-4x^3 + 14$

B  $-4x^5 + 14x^3$

C  $3x^5 + 14x^3 - 7x^2$

D  $3x^5 + 2x^3 - 7x^2$

**Algebra I PARCC PBA Practice Assessment Item #2 (non-calculator): Standard A-REI.10**

2. Which points are on the graph of the equation  $-3x + 6y + 5 = -7$ ?

Select **all** that apply.

A  $(-3, 6)$

B  $(-2, 0)$

C  $(0, -2)$

D  $(6, -3)$

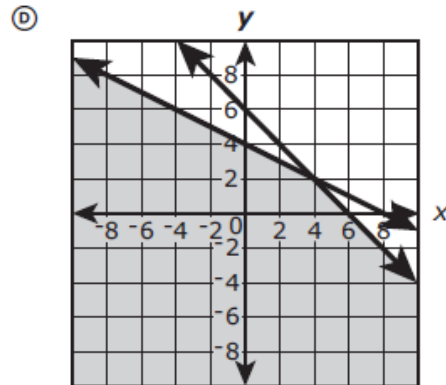
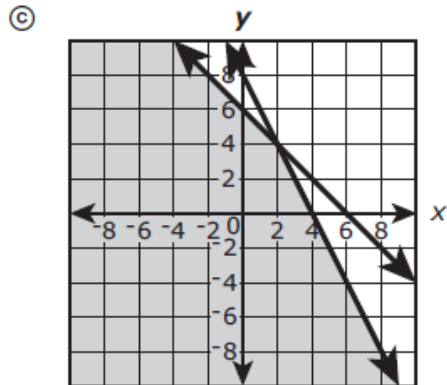
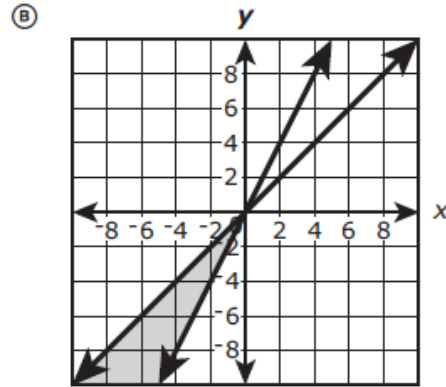
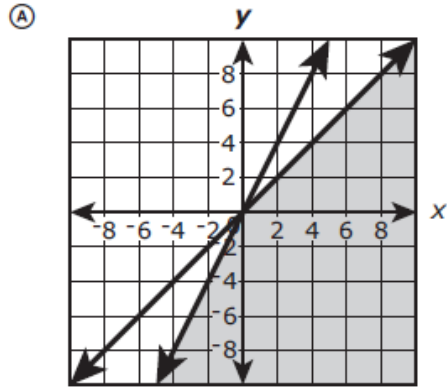
E  $(8, 2)$

Algebra I PARCC PBA Practice Assessment Item #3 (non-calculator): Standard A-REI.12

3. Which graph **best** represents the solution to this system of inequalities?

$$x + y \leq 6$$

$$x + 2y \leq 8$$



**Algebra I PARCC PBA Practice Assessment Item #4 (non-calculator): Standard A-SSE.3a**

4. Which factorization can be used to reveal the zeros of the function

$$f(n) = -12n^2 - 11n + 15?$$

A  $f(n) = -n(12n + 11) + 15$

B  $f(n) = (-4n + 3)(3n + 5)$

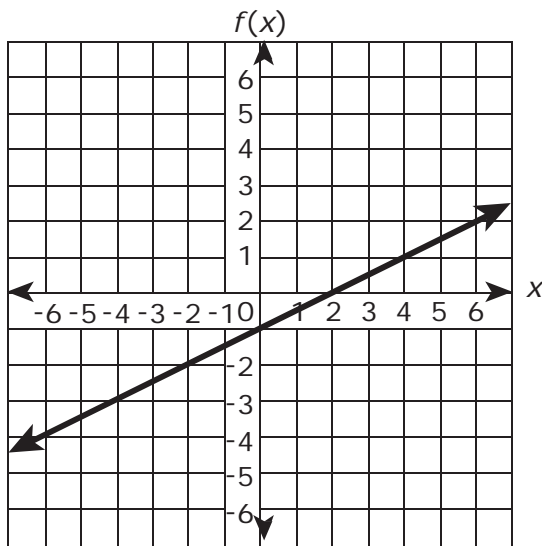
C  $f(n) = -(4n + 3)(3n + 5)$

D  $f(n) = (4n + 3)(-3n + 5)$

Algebra I PARCC PBA Practice Assessment Item #5 (non-calculator): Standard F-IF.1

5. The graph of the function  $f(x) = -1 + 0.5x$  is shown on the coordinate plane.

For what value of  $x$  does  $f(x) = 0$ ?

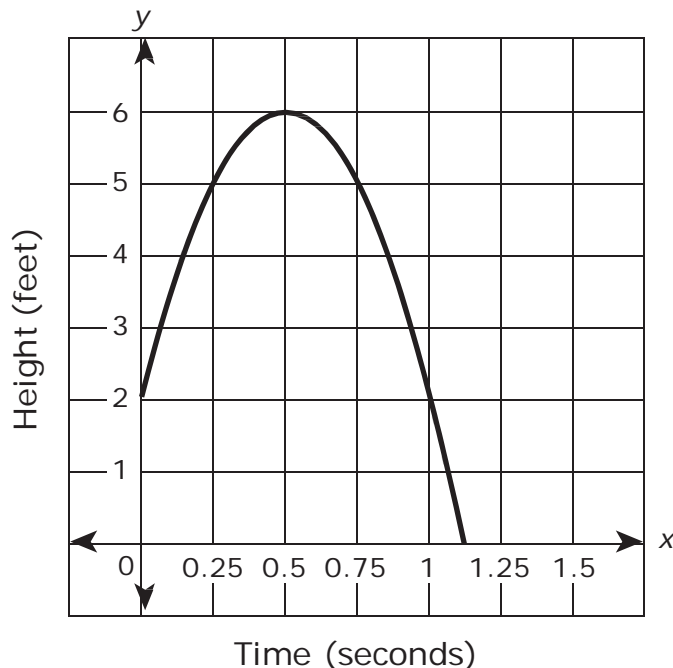


Enter your answer in the box.

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0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

**Algebra I PARCC PBA Practice Assessment Item #6 (non-calculator): Standard F-IF.6-6a**

6. A tennis ball was 2 feet off the ground when a tennis player hit it so that the ball traveled up in the air before coming back to the ground. The height of the tennis ball is described by the graph shown. Numbers along the x-axis represent the time, in seconds, after the ball was hit, and the numbers along the y-axis represent the height, in feet, of the ball at time  $x$ .

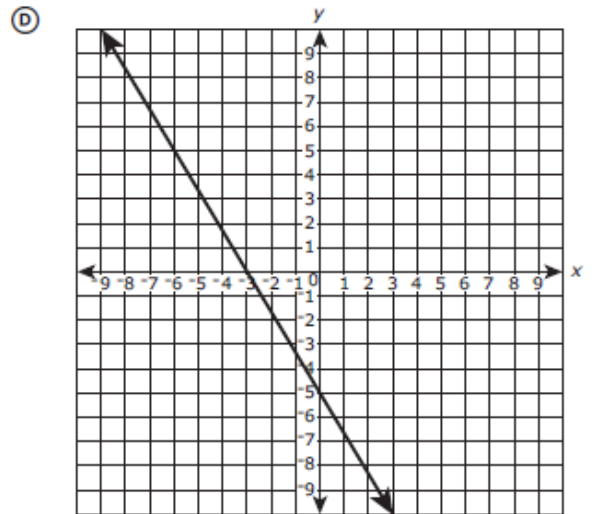
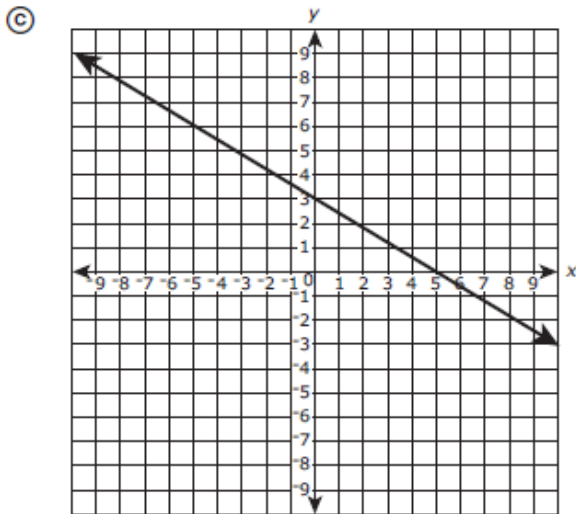
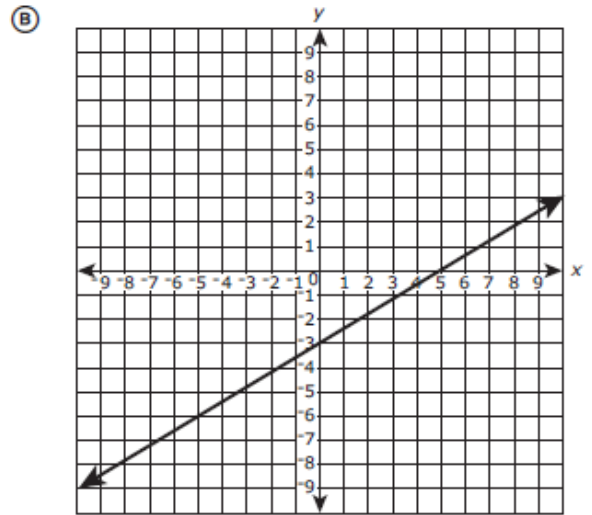
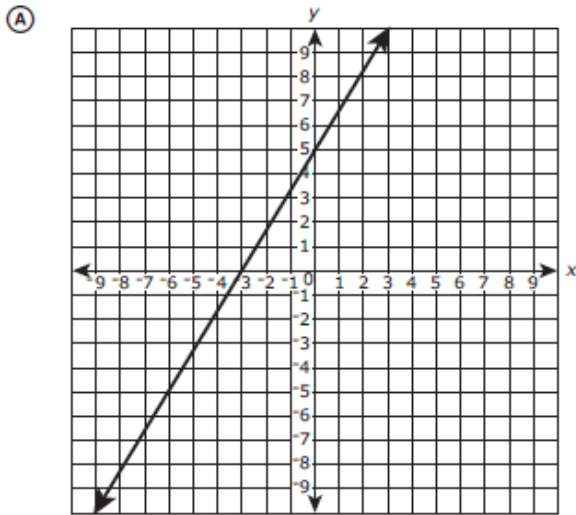


Use the graph to estimate the average rate of change of the height of the ball for the first 0.25 second after being hit.

- A 0.75 feet per second
- B 3.0 feet per second
- C 12 feet per second
- D 20 feet per second



7. Which graph represents the equation  $5y - 3x = -15$ ?





Algebra I PARCC PBA Practice Assessment Item #8 (Calculator Part): Standard A-CED.4-1

8. The formula for finding the perimeter,  $P$ , of a rectangle with length  $l$  and width  $w$  is given.

$$P = 2l + 2w$$

Which formula shows how the length of a rectangle can be determined from the perimeter and the width?

A  $l = \frac{P}{2} - 2w$

B  $l = \frac{P-2w}{2}$

C  $l = \frac{P}{2} + w$

D  $l = \frac{P-2}{2w}$



9. At the beginning of an experiment, the number of bacteria in a colony was counted at time  $t = 0$ . The number of bacteria in the colony  $t$  minutes after the initial count is modeled by the function  $b(t) = 4(2)^t$ . Which **value** and **unit** represent the average rate of change in the number of bacteria for the first 5 minutes of the experiment?

Select **all** that apply.

**value**

- A 24.0
- B 24.8
- C 25.4
- D 25.6

**unit**

- E bacteria
- F minutes
- G bacteria per minute
- H minutes per bacteria



Use the information provided to answer Part A through Part C for question 10.

Consider the three points  $(-4, -3)$ ,  $(20, 15)$ , and  $(48, 36)$ .

**10. Part A**

Which points are on the same line that passes through  $(-4, -3)$ ,  $(20, 15)$ , and  $(48, 36)$ ?

Select **all** that apply.

A  $(-8, -6)$

B  $(-2, -1)$

C  $(0, 0)$

D  $(4, 3)$

E  $(6, 8)$

**10. Part B**

Use the information from Part A to explain why the ratio of the  $y$ -coordinate to the  $x$ -coordinate is the same for any point on the line except the  $y$ -intercept.

Explain why this is not true for the  $y$ -intercept.

Enter your explanations in the space provided.



### 10. Part C

Do the points on the line  $y = 3x - 2$  have a constant ratio of the  $y$ -coordinate to the  $x$ -coordinate for any point on the line except the  $y$ -intercept? Explain your answer.

Enter your answer and your explanation in the space provided.



**Algebra I PARCC PBA Practice Assessment Item #11 (Calculator Part): Standard HS.D.1-1**

Use the information provided to answer Part A through Part C for question 11.

Phil and Matt made cookies for a fundraiser at their high school.

- Phil made 25% more cookies than Matt.
- The cookies sold for \$0.25 each.
- After the sale, 20% of the combined total of their cookies remained.

**11. Part A**

Create an equation to represent the total amount of money Matt and Phil earned at the fundraiser based on the number of cookies Matt made. Explain how you determined your equation.

Enter your equation and your explanation in the space provided.



### 11. Part B

Phil and Matt made a total of \$72.00 selling the cookies. How many cookies did Phil make and how many cookies did Matt make? Show your work.

Enter your answers and your work in the space provided.

### 11. Part C

Next year Phil and Matt may sell the cookies for \$.50 each. They plan to make the same total number of cookies, but they predict that they will only sell 70% of them given the price increase. Based on their prediction, should Phil and Matt raise the price of the cookies? Justify your answer.

Enter your answer and your justification in the space provided.



12. Let  $|x| + |y| = c$ , where  $c$  is a real number.

Determine the number of points that would be on the graph of the equation for **each** given case:

Case 1:  $c < 0$

Case 2:  $c = 0$

Case 3:  $c > 0$

Justify your answers.

Enter your answers and justifications in the space provided.





Algebra I PARCC PBA Practice Assessment Item #13 (Calculator Part): Standard A-REI.4b-1

13. What is one solution of the equation  $x^2 - 21.75x = -15.75$ ?

Enter your answer in the box.

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0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9



**Algebra I PARCC PBA Practice Assessment Item #14 (Calculator Part): Standard HS.C.16.2**

14. If  $a$  is a non-zero, real number and  $a(x - 3)^2 - b = c$ ,

- Prove that  $x = 3 \pm \sqrt{\frac{b+c}{a}}$ . Show your work.
- If  $a = 2$  and  $b = 5$ , determine what condition(s) on  $c$  will restrict the solutions for  $x$  to real numbers.

Explain your reasoning.

Enter your proof, your answer, and your explanation in the space provided.



**Algebra I PARCC PBA Practice Assessment Item #15 (Calculator Part): Standard HS.C.12.1**

**15.** Consider the following claim: If the point  $(2 + d, y)$  is on the graph of the function  $f(x) = x(x - 4)$ , then the point  $(2 - d, y)$  is also on the graph.

- Use algebra to show that the claim is true.
- What is the relationship between the line  $x = 2$  and the graph of  $f(x)$ ? Justify your reasoning.

Enter your work, your answer, and your justification in the space provided.



**Algebra I PARCC PBA Practice Assessment Item #16 (Calculator Part): Standard HS.D.2-9**

Use the information provided to answer Part A and Part B for question 16.

The Water Watch program is encouraging customers to reduce the amount of water they use each day. The program is selling low-flow showerheads, which use 2 gallons of water per minute, for \$54.00 each.

A family currently has a showerhead that uses 5 gallons of water per minute and is considering replacing it with one of the low-flow showerheads. The family uses the shower an average of 20 minutes per day and pays \$0.002 per gallon of water.

**16. Part A**

Create a model that can be used to determine the cost savings, in dollars, for the family to purchase and use a low-flow showerhead in terms of the number of days.

Then determine the number of days at which the family will start saving money. Justify your answer in terms of the context.

Enter your model, answer, and justification in the space provided.



### 16. Part B

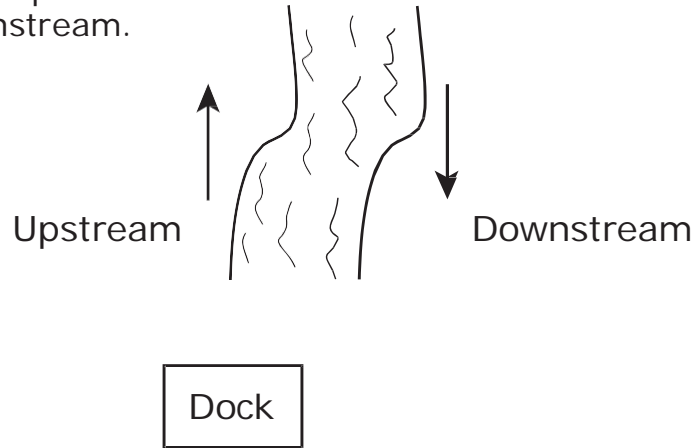
One year after the low-flow showerhead is purchased, the cost of water increases by 5%. Create a new model to determine the cost savings, in dollars, with the increase in the cost of water.

Use your model to determine the number of days at which the family will start saving money after the increase in the cost of water. Justify your answer.

Enter your model, answer, and justification in the space provided.



17. Gabriel operates a riverboat and frequently offers tours of the river. Typically, a tour lasts for 3.25 hours. The riverboat usually takes 2.00 hours to make the 25-mile trip upstream from the dock and 1.25 hours to make the 25-mile return trip downstream.



Gabriel is considering offering a shorter tour that will last 2.50 hours and travel only 20 miles upstream before returning. Will the shorter tour be possible if the riverboat travels at the same speed as it does in the 3.25-hour tour? Show your steps and justify your answer.

Enter your answer, your work, and your justification in the space provided.



**Algebra I PARCC PBA Practice Assessment Item #18 (Calculator Part): Standard HS.D.2-5**

Use the information provided to answer Part A and Part B for question 18.

A high school is having a talent contest and will give different prizes for the best 5 acts in the show. First place wins the most money, and each place after that wins \$50 less than the previous place.

**18. Part A**

Create a model that can be used to determine the total amount of prize money based on the value of the first place prize.

Enter your model in the space provided.



**18. Part B**

The talent contest has a total of \$1,000 in prize money. What is the amount of money for **each** of the five prizes? Show your work.

Enter your answers and your work in the space provided.



# **Additional Computer-Based Algebra I PBA Practice Items**

**COMPUTER-BASED PRACTICE TEST**

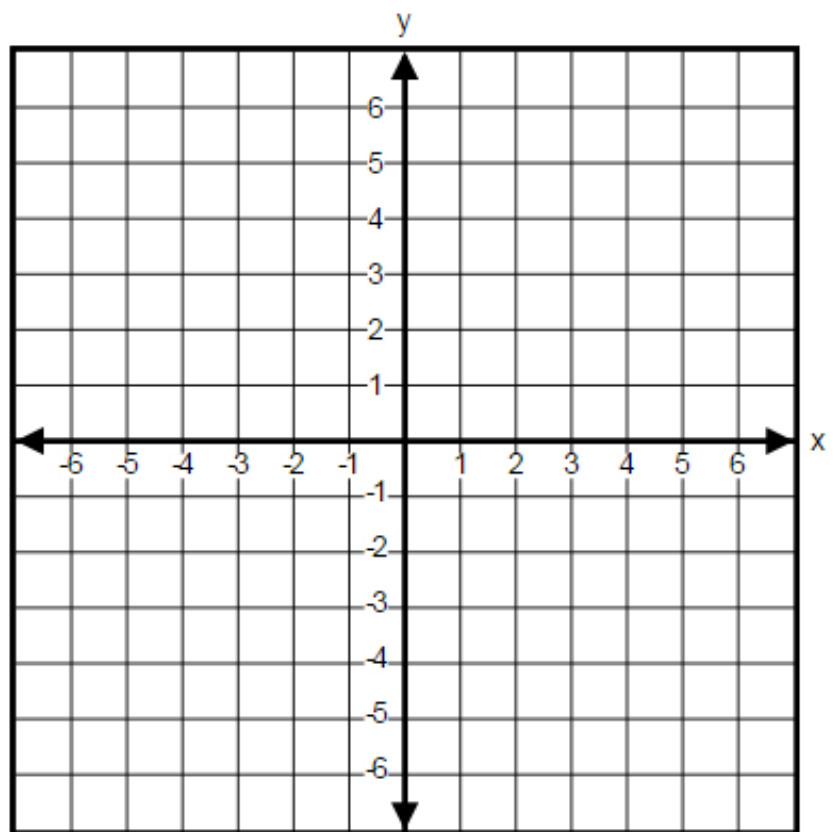
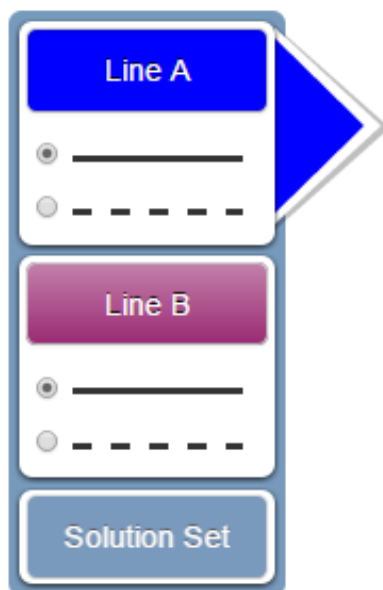
Algebra I PARCC PBA Practice Assessment Item #3 (non-calculator): Standard A-REI.12

3. A system of inequalities is given.

$$\begin{cases} x + y > 3 \\ 2x - y \geq 1 \end{cases}$$

Graph the solution set of the system of linear inequalities in the coordinate plane by

- selecting the "Line A" button to graph the line and choosing the line style,
- selecting the "Line B" button to graph the line and choosing the line style,
- selecting the "Solution Set" button to select the desired region.

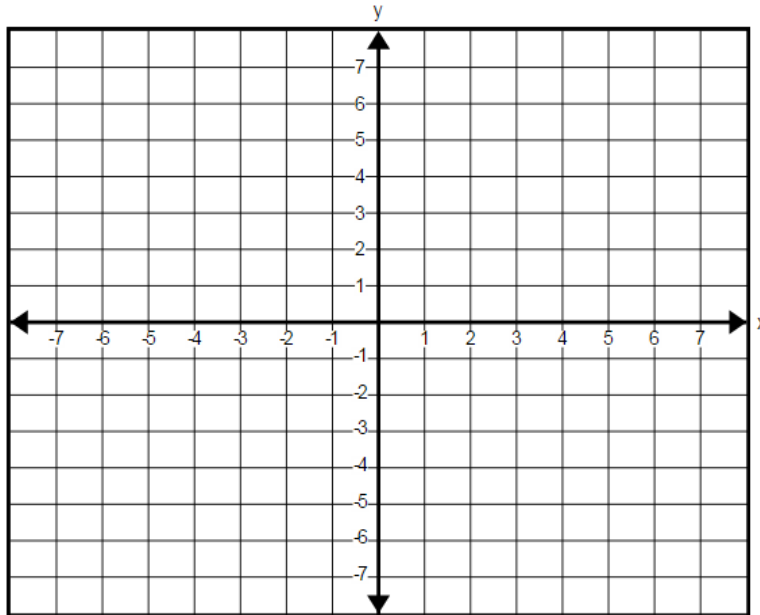
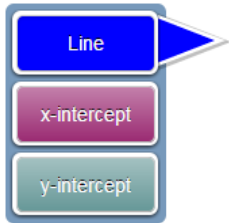


**COMPUTER-BASED PRACTICE TEST**

**Algebra I PARCC PBA Practice Assessment Item #7 (non-calculator): Standard F-IF.7a-1**

7. Graph the equation  $6x - 4y = 12$  on the  $xy$ -coordinate plane. Identify the  $x$ -intercept of the graph and the  $y$ -intercept of the graph.

Select the Line button. To graph a line, select two points on the coordinate plane and a line will be drawn through the points. Then select the  $x$ -intercept button to identify the  $x$ -intercept and select the  $y$ -intercept button to identify the  $y$ -intercept.





COMPUTER-BASED PRACTICE TEST

Algebra I PARCC PBA Sample Assessment Item #3 of 11 (Calculator Part): Standard HS.C.18.1

3. Consider the three points  $(-4, -3)$ ,  $(20, 15)$ , and  $(48, 36)$ .

**Part A**

Graph the line that passes through these three points on the coordinate plane.

To graph a line, select two points on the coordinate plane. A line will be drawn through the points.

