



Math  
Spring Operational 2015

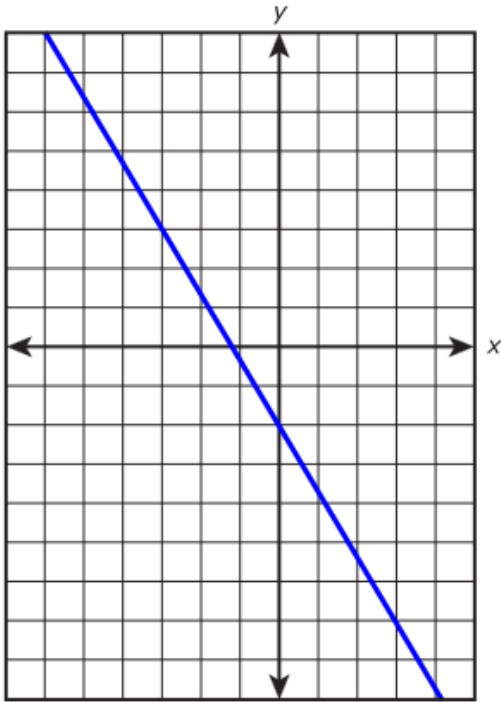
Algebra 1  
Performance Based Assessment  
Released Items

1. Which of these represent a linear function?

Select **all** that apply.

A.  $(3, 6), (0, 2), (3, 5)$

B.



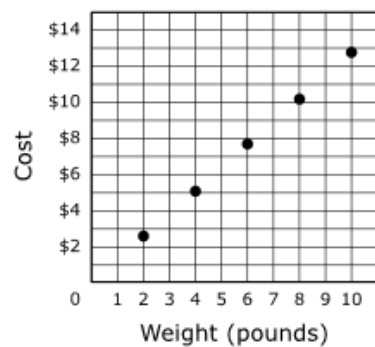
C.

x	y
2	4
2	2
2	0
2	-2

D. For each square whose sides have length  $s$ , the perimeter is  $4s$ .

E.  $y = |x|$

2. The graph shows the relationship between the weight, in pounds, of Vidalia onions and their cost.



Which best estimates the cost per pound?

- A. \$0.78
- B. \$1.29
- C. \$2.58
- D. \$10.32

3. What are the solutions to the equation  $(2x + 1)^2 - (x + 13) = 3x^2 - 2x + 2$ ?

Enter your answers in the spaces provided. Enter **only** your answers.

$x =$

$x =$

	$+$	$-$	$\times$	$\div$	$\frac{\square}{\square}$	$\frac{\square}{\square}$
	$y^x$	$\sqrt{\square}$	$\sqrt[3]{\square}$	$=$	$(-)$	$\%$

4. Graph lines  $m$  and  $t$  on the  $xy$ -coordinate plane shown. Then plot the point of intersection  $P$ .

- Line  $m : y = -\frac{2}{3}x - 4$
- Line  $t : y = x + 6$

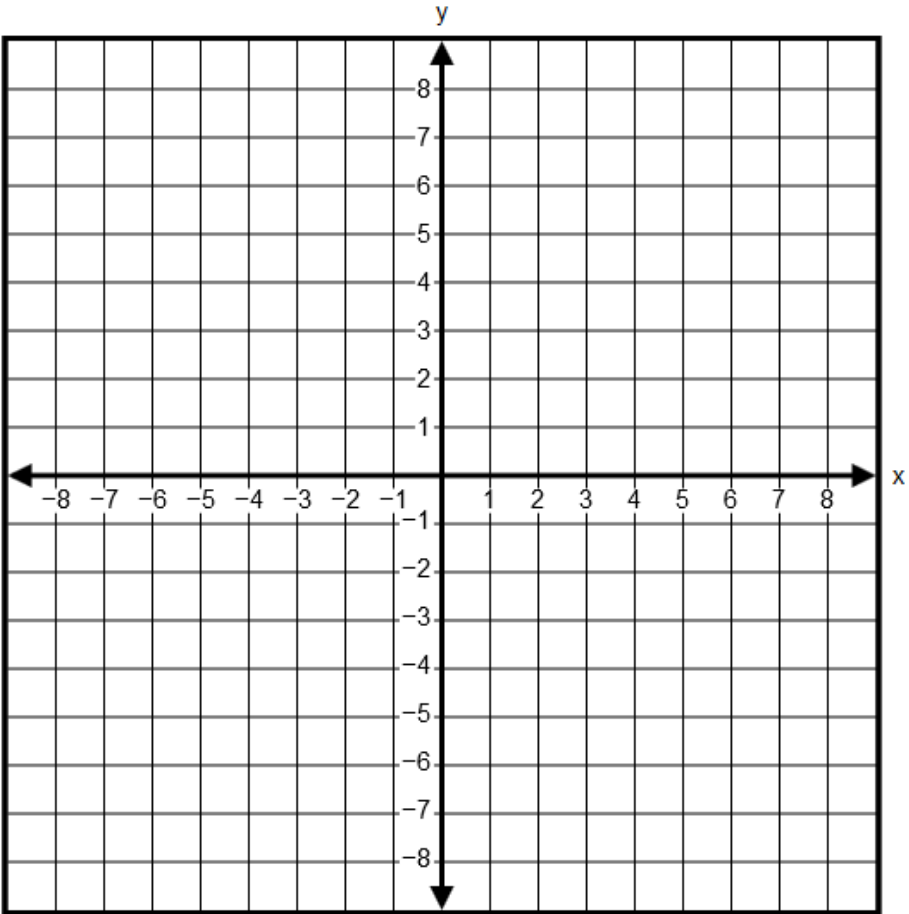
To graph a line, select two points on the coordinate plane. A line will be drawn through the points.

Select the place on the coordinate plane to plot the point.

Line  $m$

Line  $t$

Point  $P$



5. Multiply the polynomials  $(x + 3)(2x - 4)$ . What is the product in the form  $ax^2 + bx + c$ ?

Enter your answers in the boxes.

$$a = \boxed{\phantom{000}}$$

$$b = \boxed{\phantom{000}}$$

$$c = \boxed{\phantom{000}}$$

6. A set production designer creates a right circular cylindrical pillar. The designer knows the amount of material used for the surface of the pillar and needs to find the height for a reinforcement rod.

Use  $A = (2\pi r)h + \pi r^2$ , where  $r$  represents the radius,  $h$  represents the height of the pillar, and  $A$  represents the surface area of the pillar. What is a formula for  $h$  in terms of the other variables that can be used to find the height?

- A.  $h = \frac{A - \pi r^2}{2\pi r}$
- B.  $h = \frac{A + \pi r^2}{2\pi r}$
- C.  $h = \frac{A}{3\pi r^2}$
- D.  $h = \frac{A}{2\pi r} - \frac{1}{2}$

7. Select the values and signs from the drop-down menus that correctly complete the solution by factoring.

$$x^2 - 4x + 3 = 0$$

$$(x \text{ Choose.. } \text{Choose..})(x \text{ Choose.. } \text{Choose..})$$

+
-

1
2
3
4

+
-

1
2
3
4

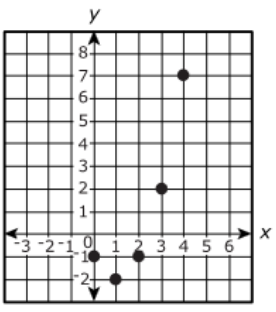
$$x = \text{Choose..} ; x = \text{Choose..}$$

-4
-3
1
2

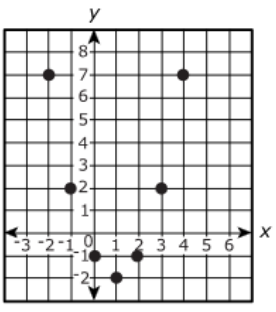
-2
-1
3
4

8. Which is the graph of the function  $y = (x - 1)^2 - 2$ ?

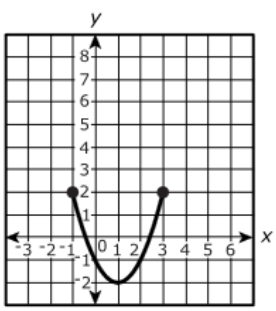
A.



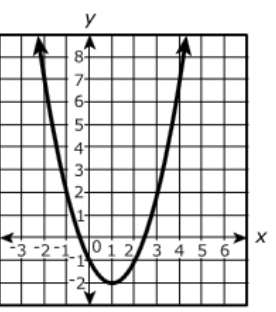
B.



C.



D.



9. Carrie wants to find out how the area of a circle will change as the radius increases in length. Carrie makes a table.

Area (square feet)	19.63	38.47	63.59	94.99	132.67
Radius (feet)	2.5	3.5	4.5	5.5	6.5

What is the average rate of change in the area as the radius changes from 2.5 to 5.5 feet?

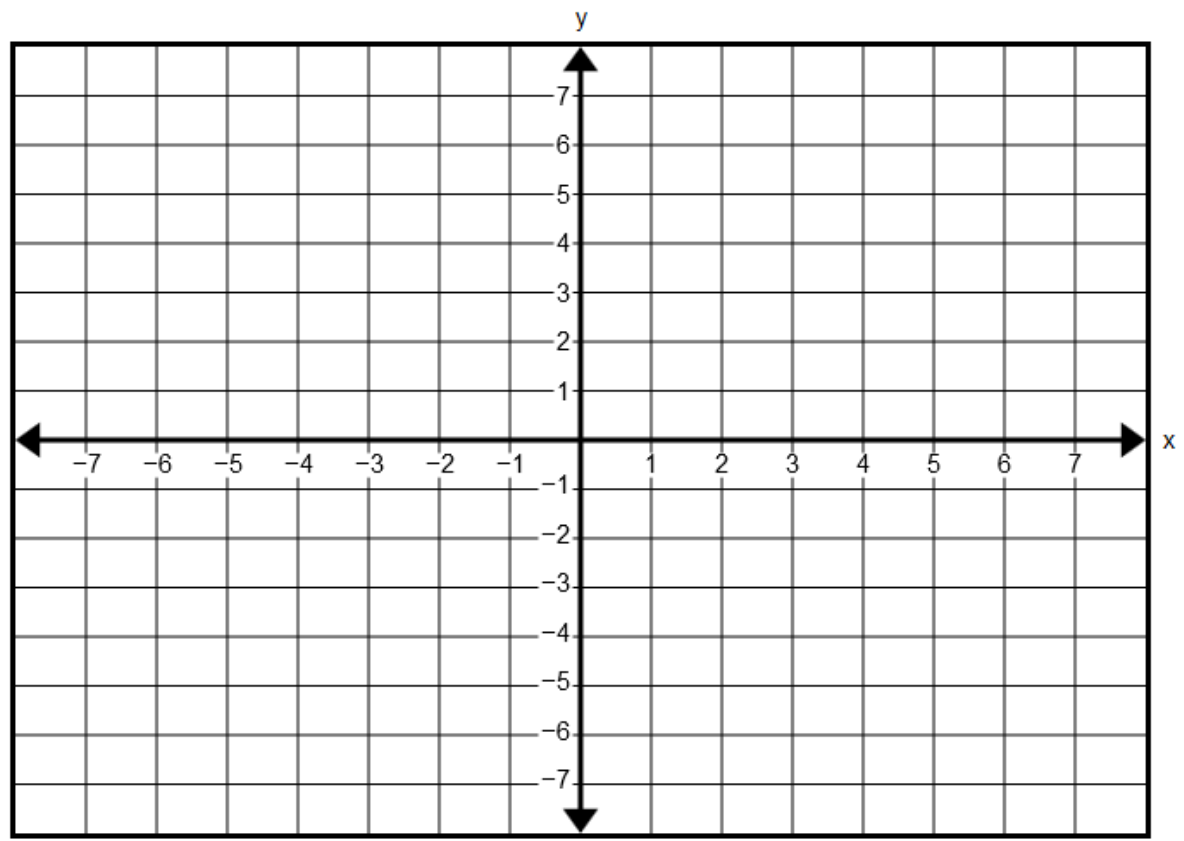
Enter your answer in the box.

square feet per foot



10. On the coordinate plane provided, graph the line with equation  $5y - 3x = -15$  by selecting the  $x$ - and  $y$ - intercepts. A correct response must have the points placed at the intercepts.

Select the places on the coordinate plane to plot the points.



11. Tonya has a rectangular rug with an area of 21 square feet. The rug is 4 feet longer than it is wide.

**Part A**

Create an equation that can be used to determine the length and the width of the rug. Justify your answer.

Enter your equation and your justification in the space provided.



- [▶ Math symbols](#)
- [▶ Relations](#)
- [▶ Geometry](#)
- [▶ Groups](#)
- [▶ Trigonometry](#)
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**Part B**

Tonya adds a 1.5-foot border all the way around the rug. What is the area of the enlarged rug? Show **all** your work.

Enter your answer and your work in the space provided.



- [▶ Math symbols](#)
- [▶ Relations](#)
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12. A school is holding a raffle to earn money. This list shows all the prizes in the school's raffle.

- A computer that costs \$349
- A book collection that costs \$42
- A gift certificate that costs \$25
- A pair of movie tickets that costs \$18
- A gift basket that costs \$16

The raffle ticket price is set so that 75 raffle tickets will pay for all of the prizes.

### Part A

Create a function that can be used to find the total amount of money the school earns by selling  $x$  tickets. Show your work used to create this function.

Enter your function and your work in the space provided.



- ▶ Math symbols
- ▶ Relations
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- ▶ Statistics
- ▶ Greek

### Part B

The school's goal is to raise at least \$850 more than the total cost of the prizes. What is the minimum number of raffle tickets that have to be sold in order for the school to reach its goal?

Enter your answer in the box.

 tickets

13. Two real numbers are defined as:

$$a = 0.444444444444 \dots$$

$$b = 0.354355435554 \dots$$

Determine whether each number is rational or irrational. Is the product of  $a$  and  $b$  rational or irrational?

Justify your answers.

Enter your answers and your justifications in the space provided.



- ▶ Math symbols
- ▶ Relations
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- ▶ Statistics
- ▶ Greek

14. **Part A**

Marcella wants a job as a sales representative. She receives two job offers from companies that sell office machines to businesses.

- *Office Essentials* offers Marcella a salary of \$2,500 per month, plus a commission of \$125 for every office machine she sells.
- *Everything Office* offers her a salary of \$2,000 per month, plus a commission of \$150 for every office machine she sells.

Let  $M$  represent the total monthly earnings, in dollars, and let  $n$  represent the number of office machines sold in a month. For **each** company, write an equation that represents the relationship between  $M$  and  $n$ .

Enter your equations in the space provided.

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

**Part B**

Marcella wants to earn a total of at least \$4,000 per month. For each company, find the least number of office machines she would need to sell each month in order to meet this goal. Show your work.

Enter your answers and your work in the space provided.

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

**Part C**

Compare Marcella's possible earnings at *Office Essentials* to her possible earnings at *Everything Office*. How many machines would Marcella have to sell for the earnings at both companies to be the same? Find the interval of machines sold for which the total earnings at *Everything Office* are greater than the total earnings at *Office Essentials*. Show your work.

Enter your answers and your work in the space provided.

- ▶ Math symbols
- ▶ Relations
- ▶ Geometry
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- ▶ Greek

15. Two Web sites launched on the same day. At the end of the first week, the number of visitors to each Web site was 25. For the first eight weeks, the number of visitors to each Web site increased according to the corresponding rules.

Web site A: The number of visitors doubled each week.

Web site B: The number of visitors increased by 150 each week.

### Part A

Complete the table to show the number of visitors to **each** Web site for the first eight weeks.

Enter your answers in the table.

	Web Site A	Web Site B
Week 1:	25	25
Week 2:	<input type="text"/>	<input type="text"/>
Week 3:	<input type="text"/>	<input type="text"/>
Week 4:	<input type="text"/>	<input type="text"/>
Week 5:	<input type="text"/>	<input type="text"/>
Week 6:	<input type="text"/>	<input type="text"/>
Week 7:	<input type="text"/>	<input type="text"/>
Week 8:	<input type="text"/>	<input type="text"/>

Calculator interface showing basic arithmetic and algebraic symbols: +, -, ×, ÷,  $\frac{\square}{\square}$ ,  $\frac{\square}{\square}$ ,  $y^x$ ,  $\sqrt{\square}$ ,  $\sqrt[3]{\square}$ , =, (-), %.

### Part B

Based on the data for the first eight weeks, Jose claims that the number of visitors to each Web site can be modeled as a linear function of the number of weeks online. For **each** Web site, decide if Jose's claim is correct. If it is correct, explain why. If it is not correct, explain why and describe a more appropriate model.

Enter your answers and your explanations in the space provided.

Input area with navigation and editing icons: back, forward, delete, [A], [ $\pi$ ].

- [▶ Math symbols](#)
- [▶ Relations](#)
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16. **Part A**

Suppose that  $y = 2x - 3$ . The following points lie on the graph of this equation:

$$A(a, 2a - 3) \quad B(b, 2b - 3) \quad C(c, 2c - 3)$$

Amy claims that the slopes of  $\overline{AB}$ ,  $\overline{BC}$  and  $\overline{AC}$  are equal. Prove that Amy's claim is correct. Show your work and explain your reasoning.

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



- ▶ Math symbols
- ▶ Relations
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- ▶ Trigonometry
- ▶ Statistics
- ▶ Greek

**Part B**

Are the points  $(-1, 1)$  and  $(1, -1)$  on the graph of  $y = 2x - 3$ ?

Show your work and explain your reasoning.

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



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

17. **Part A**

List the steps to solve the equation  $x^2 + 12x - 28 = 0$  by completing the square, and give the solution or solutions.

Enter your work and your answers in the space provided.



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

**Part B**

Explain what value or values of  $c$  make the equation  $x^2 + 12x + c = 0$  have one and only one solution. Justify your answer.

Enter your answer and your justification in the space provided.



- ▶ Math symbols
- ▶ Relations
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- ▶ Statistics
- ▶ Greek



18. A quality-control technician at a candle factory tested eight 16-ounce candles, each 3 inches in diameter. These candles came from the same production run. The table shows the decrease in weight of each candle after burning for 3 hours. Candle makers believe that the rate at which the candles burn is constant.

Candle	1	2	3	4	5	6	7	8
Weight Loss (ounces)	0.5	0.6	0.5	0.7	0.7	0.5	0.5	0.6

Write an equation that can be used to model the weight,  $w$ , of such a candle as a function of the number,  $h$ , of hours burning. Then, explain how the equation can be used to predict the weight of a candle that has burned for 5 hours.

Enter your equation and your explanation in the space provided.



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