

Name: \_\_\_\_\_ Period: \_\_\_\_\_

**Final Review : CMP 0809**

B

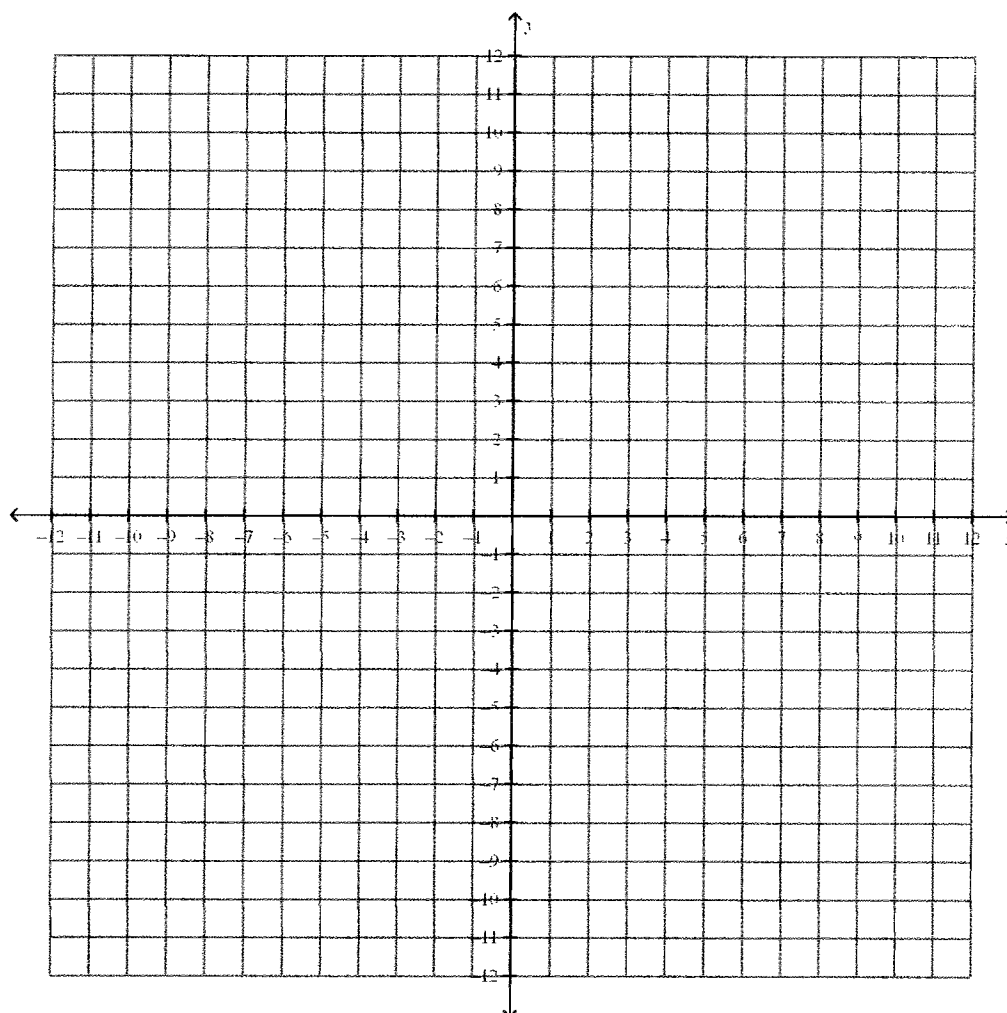
**Short Answer**

1. For the following quadratic equation:  $y = x^2 - 2x - 3$

a. Calculate the x and y intercepts.

b. Find the vertex of the parabola

c. Graph all the solutions below:



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2. A volunteer group unloads a truck full of pumpkins. The equation:  $p = -90h + 495$  represents the amount of pumpkins  $p$  that remain in the truck after  $h$  hours.

a. How long will it take the volunteers to completely unload the truck?

b. How many pumpkins were on the truck to start with?

c. Write the equation in factored form.

d. How many pumpkins are unloaded each hour?

3. Simplify  $5x^2 - 3x + 8 - (2x^2 - 4x + 9)$

4. Solve for  $x$  and graph the solutions below:

$$-20x - 11 \geq 14 + 15x$$

5. A woman takes a dose of medicine and after 1 hour there is 90 mg of active medicine in her bloodstream. Two hours after she has taken the initial dose there is 85mg of active medicine left. *The medicine decays exponentially.*
- a. What is the decay factor here? What is the decay rate? Write the equation that models the change.

6. a. Find the product:  $(-4x^3y)^2(2y^2)$

b. Find the quotient:  $\frac{16x^{-3}y^7}{32x^5y^3}$

c. Find the product:  $(2^{-3})(4^0)(2^4)$

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7. Solve the equation:  $2x^2 - x = 15$

8. Solve the equation below for  $w$  in terms of  $x$  and  $y$ :

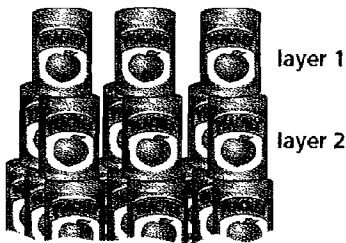
$$6y - 4w = 3x$$

9. Write  $4.67 \times 10^{-4}$  in standard form

Write 67,800,000 in scientific notation

10. At Metropolis Middle School, the number of cans,  $N$ , collected for recycling after a basketball game depends on the number of people,  $P$ , who attend the game. The approximate relationship is given by  $N = 2.5(P - 40) - 100$ .
- Is the relationship between the number of cans collected and the number of people attending linear or quadratic? Explain.
  - If 400 people attended the game for the semifinals of the district championship, how many cans would you expect to be collected?
  - If 300 cans were collected at a game, how many people would you expect to have attended the game?

11. Two students who work in a grocery store are making a display of canned goods. They build a tower of cans 12 layers deep. The first layer, at the top, contains three cans in a row. The second layer contains six cans, in two rows of three that support the first layer. The third layer has nine cans, in three rows of three that support the second layer.

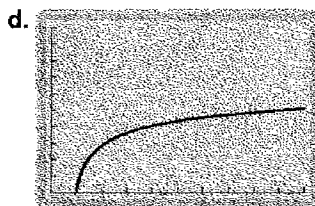
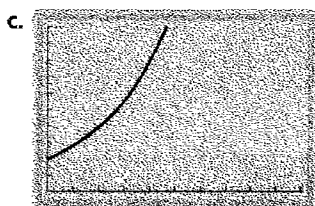
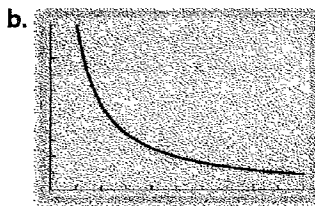
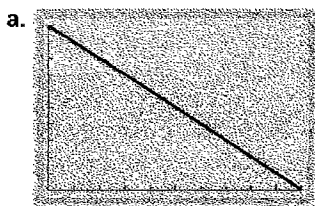


- How many cans are in layer 12, the bottom layer?
- Is the relationship described linear, exponential, or neither? Write an equation relating the variables.

Find equations of lines that are parallel and perpendicular to the line with the equation:

12.  $y = -5x + 6$

13. Which of the following graph patterns would you expect to see if you were told that variables  $x$  and  $y$  are related by inverse variation? Explain your reasoning.



14. a. A sheet of paper with an area of 1 square unit is folded into thirds, and then thirds again, and so on. In the table, record the area of a region after each fold.

Number of Folds	Area of a Region
0	1
1	
2	
3	
4	
5	

- b. Describe the pattern of change in the table.
- c. Write an equation for the area of a region  $A$  after  $n$  folds.

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**Evaluate the expression for the given value of  $x$ .**

15.  $6x^2 + 13$  when  $x = -10$

16.  $0.5x^2 + x - 20$  when  $x = 10$

Solve the following systems of equations.

17. 
$$\begin{cases} x + y = 10 \\ 2x + y = 12 \end{cases}$$

Write two expressions that are equivalent to the given expression below.

18.  $x(5 - 6) + 13x - 10$

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19. The table below shows an exponential pattern.

$x$	0	1	2	3	4	■
$y$	1	1.2	1.44	1,728	■	■

- Continue the table by giving the values for the next column.
- Write an equation that represents the pattern in the table.
- What is the growth factor?
- What is the growth rate?



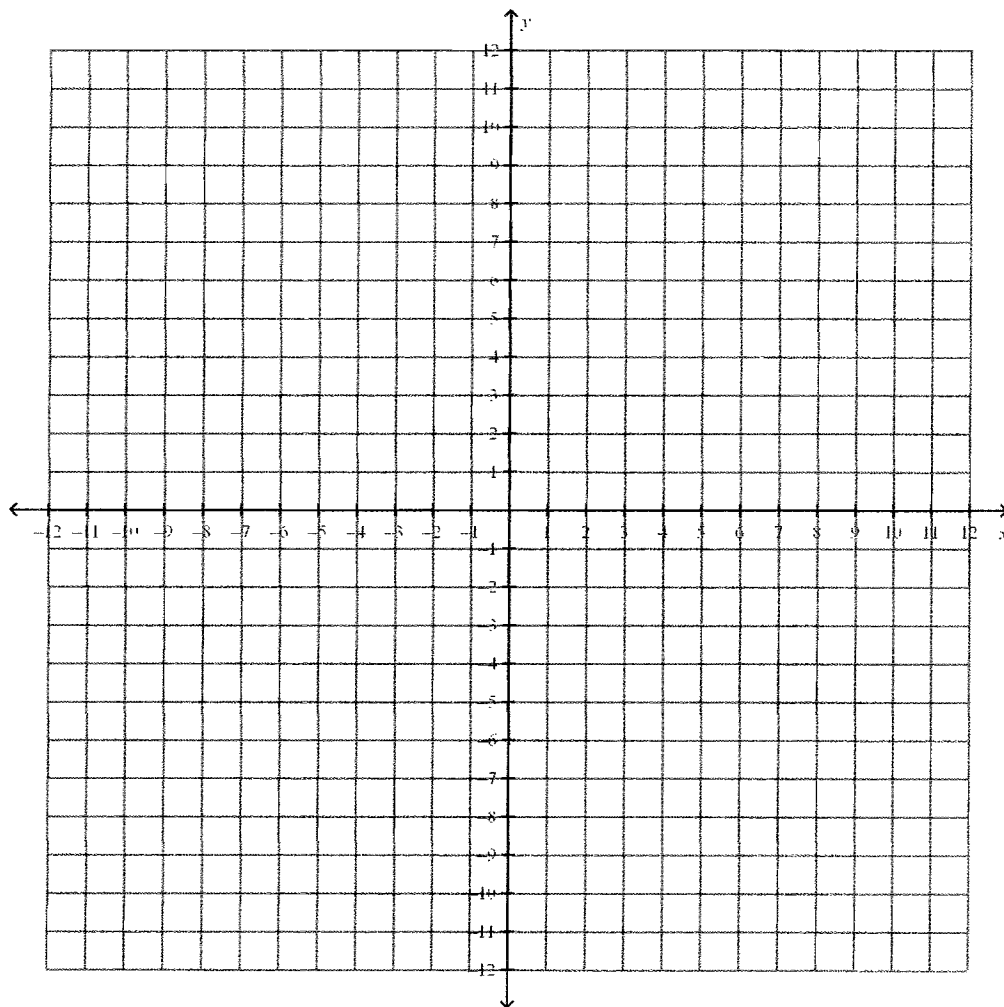
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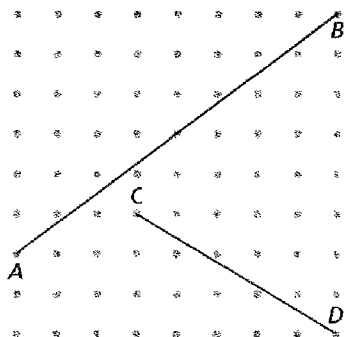
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For the following system of inequalities, graph the solutions to the system.

20.  $5x + y \leq 10$   
 $12x - y \leq 10$



21. Use the Pythagorean Theorem to find the length of each line segment. Show all work you do to find your solutions.



- What is the length of segment  $AB$ ?
- What is the length of segment  $CD$ ?

Use the tables to answer parts a and b.

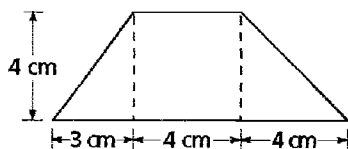
- Describe the pattern in the table, and use the pattern to predict the missing  $y$  values.
- Tell whether the relationship between  $x$  and  $y$  is linear, exponential, quadratic or none of these. Explain how you know.

22.

$x$	-1	0	1	2	3	4	5
$y$	-5	0	3	4	3		

Find the perimeter of the figure to the nearest tenth of a centimeter.

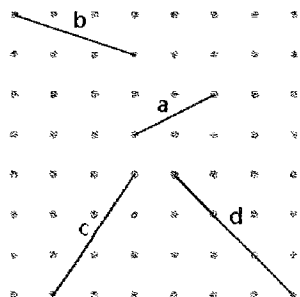
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24. Find the slopes of all the line segments on the grid.



slope of line a:

slope of line b:

slope of line c:

slope of line d:

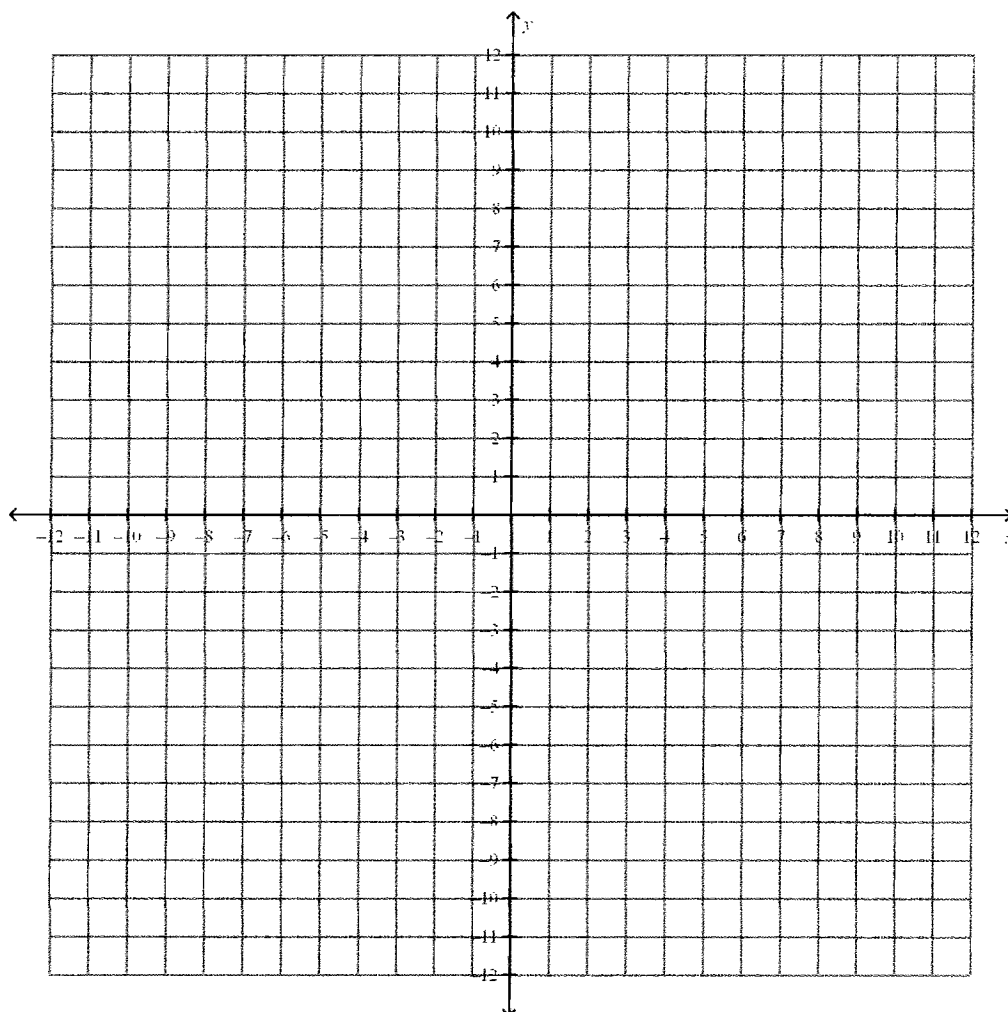
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Use graphing methods to find solutions for these systems of linear equations.

*CHECK YOUR SOLUTION!!*

25.  $6x + y = 9$  and  $4x - y = 11$



26. Match each inequality a-i with its graph.

a.  $x - 2y \geq 4$

b.  $y - 2x \geq 4$

c.  $2x + y \leq 4$

d.  $x + 2y \leq 4$

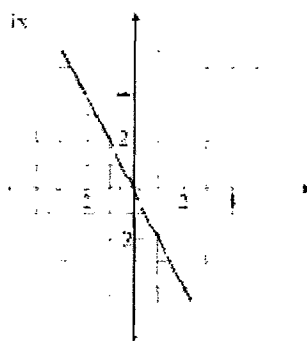
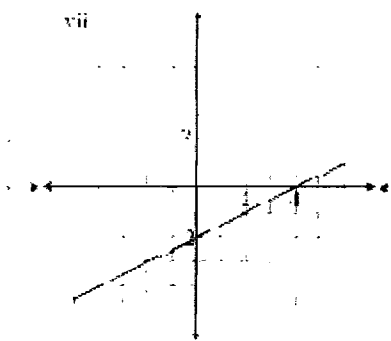
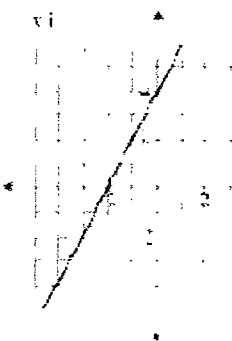
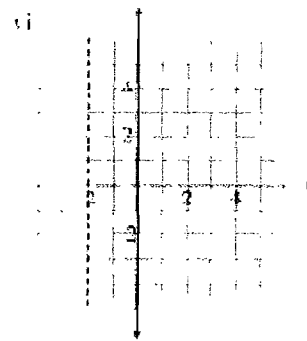
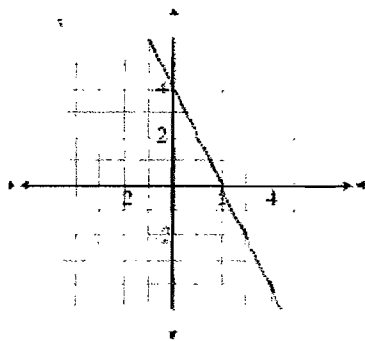
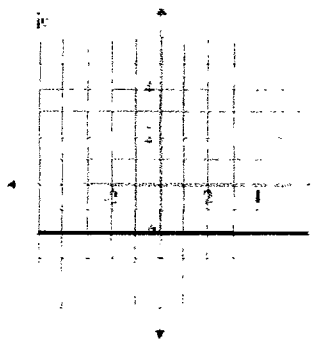
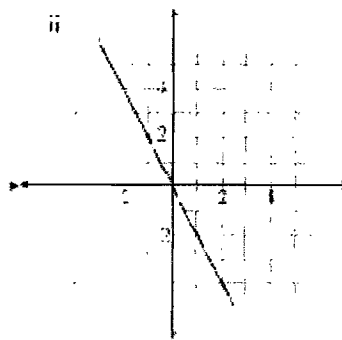
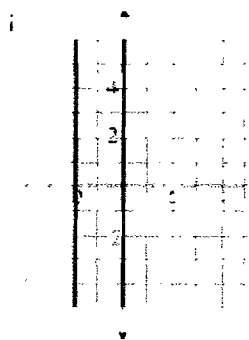
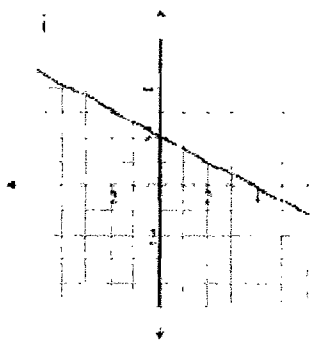
e.  $y \geq -2x$

f.  $y \leq -2x$

g.  $x \geq -2$

h.  $y \geq -2$

i.  $-2 < x$



27. For each number sentence below, decide if it is true (T) or false (F):

a.  $7 = \sqrt{49}$

b.  $7 = -\sqrt{49}$

c.  $-7 = \sqrt{49}$

d.  $-7 = -\sqrt{49}$

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28. While graphing data at the center, the students found many linear relationships. They wanted to write equations for some of the lines. Find equations for lines that meet these conditions:

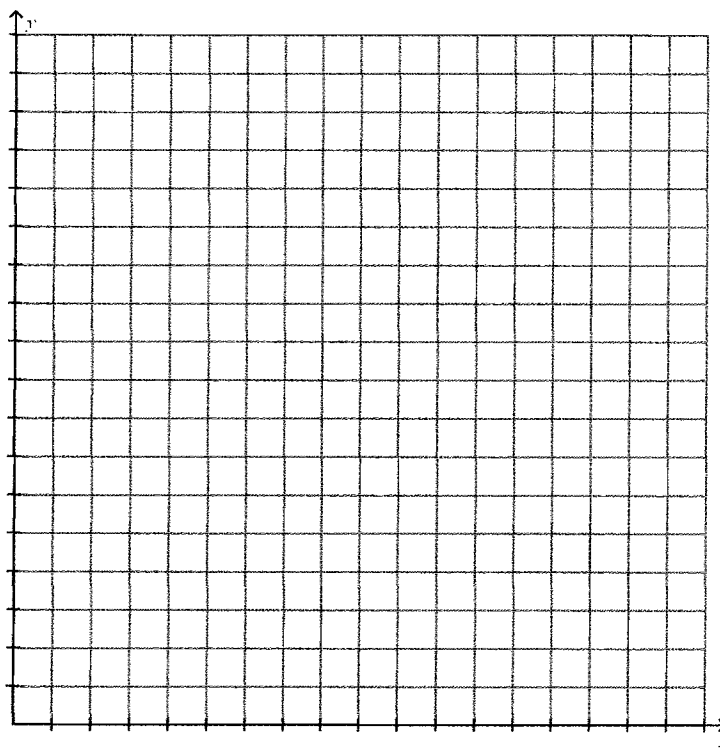
a. Pass through the points  $(0, 8)$  and  $(4, 13)$ .

b. Slope  $-3$  and passing through the point  $(1, 4)$ .

c. Pass through points  $(1, 1)$  and  $(3, 9)$ .

29. The Rivers have an SUV and a motorcycle. They want to limit the combined use of the two vehicles to a total of at most 500 miles per month.

- Write an inequality to model the situation.
- Draw a graph to display the possibilities for the number of miles they can drive their car and the number of miles they can drive their motorcycle.



30. Give the coordinates of a point that is a distance of  $\sqrt{17}$  from point  $(0, -5)$ .

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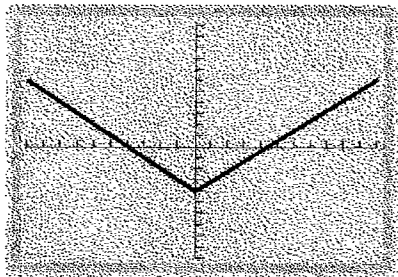
Write the expression in factored form. You may want to draw a rectangle to illustrate the area represented by the expression.

31.  $x^2 + 12x + 36$

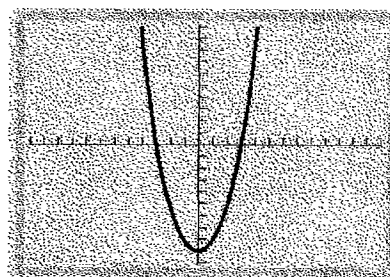
32. a. Which of the following (i, ii, iii, iv) could be graphs of quadratic relations? The scale on each axis is 1. Explain how you know.

- b. For graph ii, what do you know about the values of  $a$  and  $c$  in the equation  $y = ax^2 + bx + c$ ?

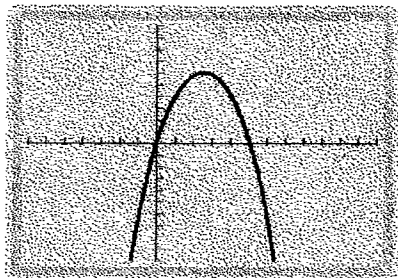
i.



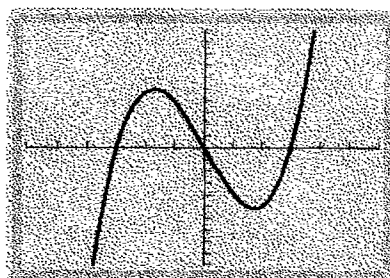
ii.



iii.



iv.

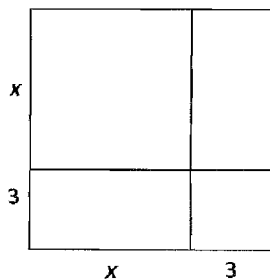


Write the quadratic equation in factored form.

33.  $q = 72r^2 - 24r$

Write two expressions, one in factored form and one in expanded form, for the area of the large rectangle.

34.





Solve the system of equations by combination. *check your solution!*

35. 
$$\begin{cases} 3x - 5y = 7 \\ 6x + 10y = 10 \end{cases}$$

Study the pattern in the table. Tell whether the relationship between  $x$  and  $y$  is linear, exponential, or neither, and explain your answer. If the relationship is linear or exponential, write an equation for it.

36.

$x$	0	1	2	3	4	5
$y$	$\frac{1}{16}$	$\frac{1}{4}$	1	4	16	64

37. The manager of the Pine Cone restaurant wants to encourage more customers to come to his Monday night buffet. Right now no one comes when the price of the buffet is \$15.00. He believes that if he lowers the price, more people will come. He estimates that he will attract 1 more customer for every \$0.10 he drops the price.

a. Make a table like the one below to calculate the income for certain numbers of customers.

Customers	Price per meal	Income
0	\$15.00	
1	\$14.90	
2	\$14.80	
3		
4		

b. Write an equation for the income,  $I$ , based on the number of customers,  $n$ .

38.

Several species of whale have been declared endangered. When the populations of a particular whale species fall dangerously low, biologists encourage governments to agree to a ban on hunting the species. Suppose that, in the year 2000, there were only 5,000 whales of a particular species and that the population was predicted to continue to decline as shown in the table.

Year ( $y$ )	Whales ( $w$ )
0 (2000)	5,000
1	4,500
2	4,050
3	3,645
4	3,281
5	2,952
6	2,657

- a. Which equation below models this population pattern?

A.  $W = 5,000(0.1)^y$  B.  $W = 5,000(0.9)^y$  C.  $W = 5,000 - 500^y$  D.  $W = 5,000^y$

- b. What is the decay factor for the relationship? Explain how you determined your answer.
- c. According to the prediction, what will the whale population be in 2007?
- d. Suppose the danger point for these whales comes when the population falls below 2,000 whales. When will this happen? Explain your answer.

**Solve the equation and check your answer.**

39.  $4x + 19 = 26 - 3x$

40. Which of these are quadratic functions?

a.  $x^2 + 7$

b.  $2(x + 7)$

c.  $x(x + 7)$

d.  $(x + 4)(x - 2)$

e.  $(6 + 5)(x + 2)$

f.  $(x - 3)(4)$

g.  $2x + 9$

h.  $x^2 + 9$

i.  $x + x + 9$

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A pair of lengths is given in problem 41. What third length could be used with the other two lengths to make a right triangle?

Try to solve each problem two ways:

- Let the missing value be the length of one of the legs of the triangle and
- Let the missing value be the length of the hypotenuse of the triangle. Sketch each triangle you find, and label the side lengths.

41.  $\sqrt{50}$ , 5, and ?

42. The table below shows an exponential pattern.

<b>x</b>	0	1	2	3	4	■
<b>y</b>	1	6	36	216	1,296	■

- Continue the table by giving the values for the next column.
- Write an equation that represents the pattern in the table.
- What is the growth factor? Explain how you determined the growth factor.

Solve the systems of equations by substitution. Check your answer.

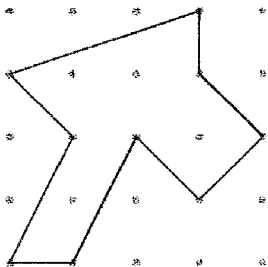
43. 
$$\begin{cases} 2x + 10y = 36 \\ y = x + 12 \end{cases}$$

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Find the area of the figure. Describe the method you use.

44.



45. The budget for the Grant Center assumes a linear relationship between the number of student visitors and daily operating cost. Some sample (*number of students, operating cost*) values are given in the next table.

<b>Number of Students</b>	0	10	20	40
<b>Daily Operating Cost (\$)</b>	450	600	750	1050

- a. Use the given data to write an equation showing how operating cost,  $C$ , depends on number of students,  $x$ . Explain or show how you arrived at the equation.

Write equations or inequalities that match each of the following questions. Then do the required calculation or solve the equation to find each answer.

- b. For what number of student visitors will daily operating cost be \$690?
- c. What will be the operating cost on a day with 12 student visitors?
- d. How many students can visit the center if the operating cost is to be **at most** \$1,000?

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47. The height in meters of a model rocket  $t$  seconds after it is launched is approximated by the equation  $h = t(50 - 3t)$ .

a. How high is the rocket 5 seconds after being launched?

b. What is the time when the rocket reaches 200 meters?

48. A television video-game company has the following total expenses,  $E$ , and total incomes,  $I$ , for producing  $x$  number of videos.

$$E = 200 + 11x$$

$$I = 120 + x^2$$

- a. Write an equation to represent the profit,  $P$ , for selling  $x$  videos.
- b. How many videos must be sold to “break even?”
- c. How many videos must be sold to make a profit of \$100?

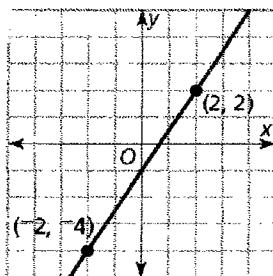
49. The number sequence 2, 6, 12, 20, 30, ..., follows a pattern.

- a. Describe the pattern of change between the numbers in the sequence.
- b. Use the pattern you have described to predict the next three numbers in the sequence.
- c. Write an equation for calculating the  $n$ th number in the sequence.



Write an equation for the line shown. Identify the slope and  $y$ -intercept.

50.



51.

There are 20 students in the checkers club. How many different ways can they play against each other? Show or explain your work.

52. Identify the slope and  $y$ -intercept for each of the linear equations.

a.  $2x + 4y = 14$

b.  $x - 15y = 45$