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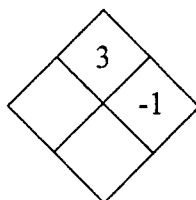
Date: _____

Commonwealth Academy
Algebra 1
Summer Math Packet

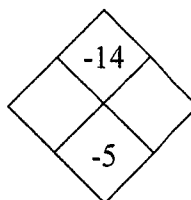
Chapter 1

1 Solve the diamond problems below.

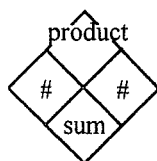
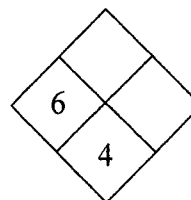
a.



b.

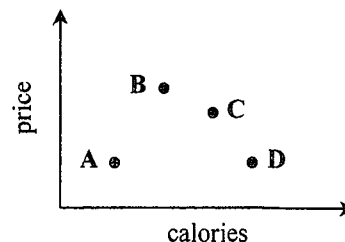


c.

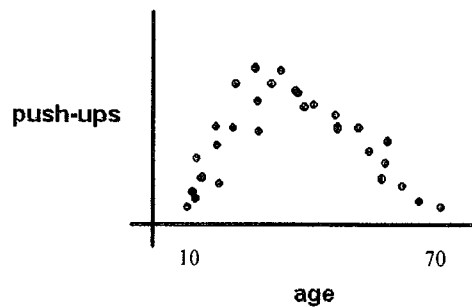


2 Chris had the following multiple-choice question on a recent test: Each point on the graph below represents a different kind of hamburger. Chris had to select the statement that most accurately described the graph. Chris picked choice (2). Was this a good choice? If not, which is the best choice? Explain your reasoning.

- (1) All burgers have different prices and different calorie counts.
- (2) As the calories increase, so does the price.
- (3) Burger D is high in calories and has the lowest price of all the burgers.
- (4) Burger A is low in calories and has a low price.



- 3 Analyze the graph below to answer the following questions.



- Describe the relationship between a person's age and the number of push-ups they can complete.
- In general, what age group seems to be able to do the most push ups?

- 4 Claudia has found a pattern for the sequence of numbers shown below:

1, 3, 6, 10, ____, ____, ____.

Which statement below could be her pattern? Justify your choice.

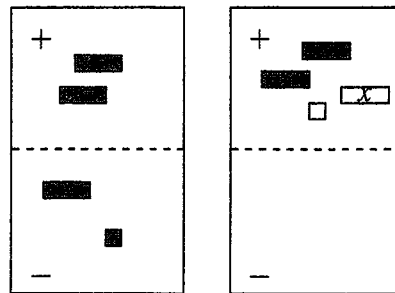
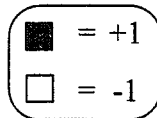
- Multiply each number by 4 and subtract 1 to get the next number.
- Double each number and add 1 to get the next number.
- Start with 1 and add the next bigger odd number to each number.
- Start by adding 2 to the first number. Then add 3 and then 4 and so on.

- 5 Leonard earned the following chapter test scores during the first semester of freshman year: 78, 65, 92, 90, 82, 75. He would like to have a test average of 90%. If he has one test left to take, can he earn an average of 90%? Explain your reasoning.

Chapter 2

- 6 Explain the difference between x^2 and $2x$.

- 7 Examine the two expression mats at right. Which expression is greater? Be sure to justify your answer.



A

8 Simplify the following expressions by combining like terms. Using algebra tiles or drawing diagrams may be helpful.

a. $3xy + 4 - x - y + 2 + y + 5$

b. $2y + 1 - xy - y + 2xy - 10 - x - 3x$

c. $4y^2 - 2y - x^2 - 7y + 2 + 5y^2$

d. $2xy + 5x - 3xy + 3y^2 - y^2 + 8 - 2x$

9 Mr. Betzler's Humanitarian Club is having a car wash. The students can wash 5 cars in 35 minutes. At this rate, how long will it take them to wash 45 cars? Be sure to show and explain your work.

10 Lois and her team used the number of red candies in a small 10 ounce bag to predict the number of red candies in a large 32 ounce bag. If Lois counted 11 red candies in the small bag, explain how she could use this information to predict the number of red candies in the large bag.

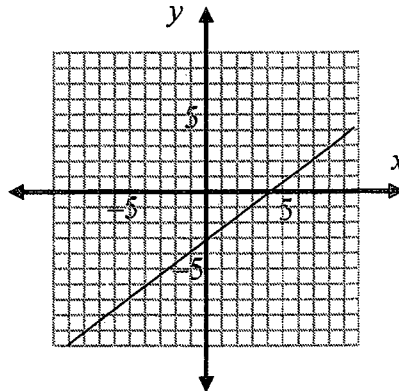
Chapter 3

- 11 Use your pattern-detection skills to find a rule for the table below. Assume that the graph of the rule should be a straight line.

IN (x)	-2	-1	0	1	2	3
OUT (y)	-5		1			10

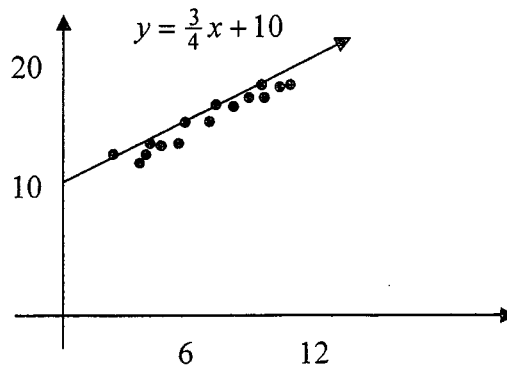
- Complete the table.
- Describe any patterns you notice for x and y .
- Find a rule that relates the input value, x , to the output value, y . Write your rule using words and numbers.
- How can you tell your rule is correct?

- 12 Use the graph below to answer the following questions.



- For a point on the line, if the x -coordinate is -4 , what is the y -coordinate?
- For a point on the line, if the y -coordinate is 3 , what is the x -coordinate?
- What are the coordinates where the line crosses the x -axis?
- What are the coordinates where the line crosses the y -axis?

- 13 Sae Jin made a trend line and a rule for this scatter plot. DeLong added the point $(3, 6)$ to the graph. Give as many reasons as you can why the point $(3, 6)$ does not belong with the other data points.



- 14 Make a table for the rule $y = \frac{1}{2}x + 2$. Then use the table to graph the rule neatly. Be sure to include scales and labels for the axes and the graph.

- 15 Solve each equation.

a. $9x + 6 - 4x = 2x + 1 - 16$

b. $5x + 1 = -(2x + 13)$

c. $2x^2 - 2x + 5 = 2x^2 - 7x - 15$

d. $5x + 5 = 5(x - 1)$

Chapter 4

16 Draw Figures 0 and 4 for the pattern below.

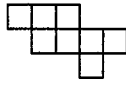


Figure 1

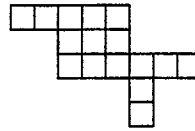


Figure 2

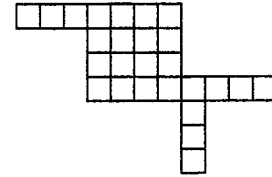


Figure 3

- Describe how the pattern grows using colors, arrows, labels, and other math tools to help you show and explain your thinking.
- Explain how the number of tiles is related to the figure number.
- Find the number of tiles for the 100th figure.
- Write a rule for the number of tiles in any figure in the pattern.

- 17 Create the first three figures (Figure 0, Figure 1, and Figure 2) of a tile pattern that follows the rule $y = 2x + 3$. Draw each figure so that the 2, x and 3 are easy to see.

- 18 Complete the table at right. Using what you know about m and b , fill in the missing entries, and write an equation (rule) for the table. Write a summary statement explaining how you used your knowledge about m and b to write a rule quickly.

x	y
0	10
1	12
2	14
3	16
4	
100	
	310
x	

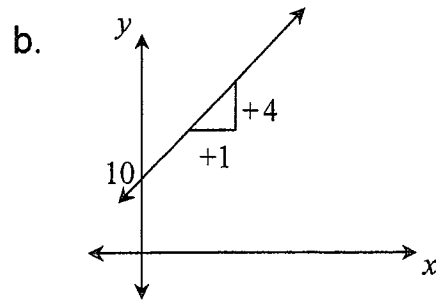
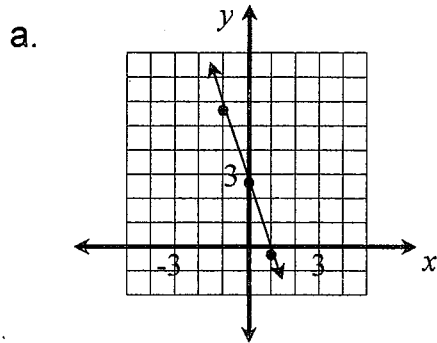
- 19 Graph the following rules on one set of axes. Label each line with its equation, the y -intercept, and a growth triangle.

a. $y = 4x - 3$

b. $y = -2x + 5$

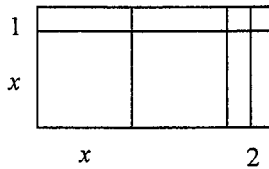
c. $y = -5x - 1$

20 Write a rule for each graph below.



Chapter 5

21 Write the area of the rectangle below as a product and as a sum.



22 Rewrite each of the following expressions using either a generic rectangle or the Distributive Property.

a. $(3+x)(2x+1)$

b. $(2x-y)(x+2y)$

c. $-4y(2x+5)$

d. $(3e+2)(-2x-y-4)$

23 Solve each of the equations below for y . For each equation, state the growth and the y -intercept.

a. $y + 3x = 8x - 7$

b. $-6x + 5y = -3(2 - y)$

c. $x(x + 5) + y = (x + 2)(x - 2)$

d. $-2x - 3y + 1 = -x - 4y + 4$

Chapter 6

24 Eratosthenes solved the system of equations below. His solution was $(3, -4)$. Without solving the system yourself, can you tell him whether the solution is correct? Prove whether or not the system is correct and explain your reasoning.

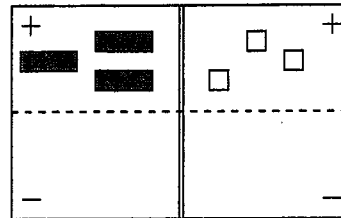
$$x + y = -1$$

$$\frac{1}{3}x + \frac{1}{4}y = 0$$

25

Florence and Sam merged and simplified the tiles for a system of equations onto one equation mat, as shown below. Have they merged and simplified correctly? How can you tell?

$$\begin{aligned}x - y &= 7 \\ 2x + y &= -10\end{aligned}$$



26

Solve the following system of equations algebraically and by graphing. Show that your two solutions agree.

$$y = x^2 + 4x$$

$$y = x^2 - 2x + 12$$

Chapter 7

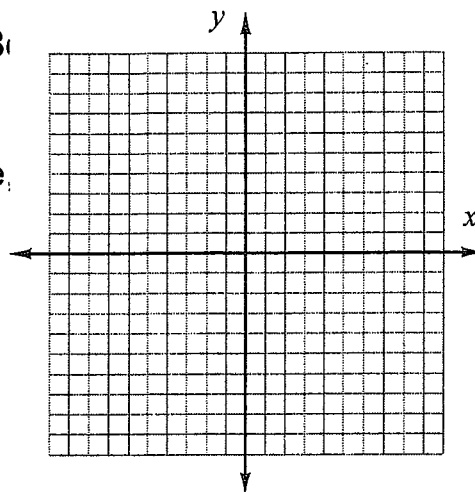
- 27 Draw and label graphs for the four equations listed below and explain how the slope affects the graph of a line. Be sure that you explain what happens to a line when the slope is large, small, positive, negative, and zero.

a. $y = 4x$

b. $y = \frac{1}{2}x$

c. $y = -2x$

d. $y = 0x$

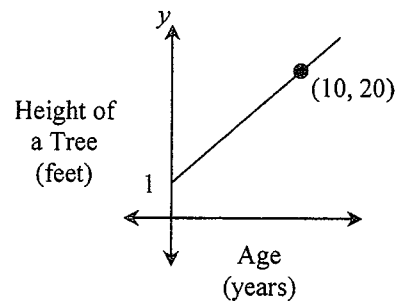


- 28 Write a letter to a new student explaining how to find the slope of the line passing through the points (5, 7) and (2, 1). Be detailed and explain yourself clearly.

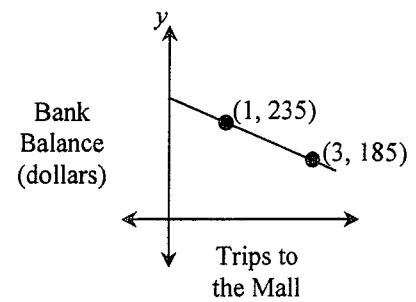
29

Examine the graphs below and explain what real-world quantities the slope and y -intercepts represent. Then find the equation for each.

a.



b.



Chapter 8

30 Factor $8x^2 + 28x + 12$ completely.

31 Factor each of the following expressions completely.

a. $-6x^2 - 36x$

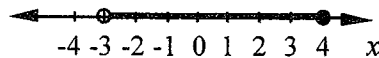
b. $18ac^2 - 24ac + 8a$

- 32 Make a table and graph the parabola $y = -x^2 + 2x + 8$. Be sure to label all special points. Describe every connection you can between the rule, the table, and the graph. Be sure to consider symmetry, the vertex, intercepts, and the overall shape.

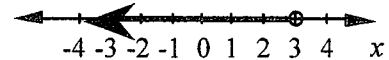
Chapter 9

- 33 Write an inequality that represents the solutions on the number lines below.

a.



b.



- 34 Graph the following inequalities on separate axes.

a. $y \geq x^2 - 1$

b. $y < 1$

- 35 Make a table and graph the inequality $y \leq |x + 2|$.

Chapter 10

- 36 Simplify the expressions below. Show all of your work.

a. $\frac{x^3}{x^2} \cdot \frac{x^2}{x^3}$

b. $\frac{2(k-4)}{2(k-4)(k+4)}$

c. $\frac{3}{x} \cdot \frac{x^2}{1+x} \cdot \frac{x^3(x+1)}{12}$

- 37 Expand and/or simplify the expressions below. Show all of your work.

a. $-2(4m)^3$

b. $\frac{p^5 \cdot p^4 \cdot p^3}{p^2 \cdot p^1}$

c. $\frac{(3x^2y)^2}{4x}$

- 38 Simplify each expression.

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

b. $\frac{6m^2+12m}{3m+6}$