

Review & Preview

3-4. For each $x \rightarrow y$ table given, copy the table, find the pattern and fill in the missing entries. Then write the rule for the pattern in words.

a.

IN (x)	OUT (y)
	23
2	8
-2	-4
8	26
0	
	302
1.5	

Rule:

b.

IN (x)	OUT (y)
2	5
9	
-2	-5
	-7.5
0	
	27.5
-4	-10

Rule:

c.

IN (x)	OUT (y)
1	
	4
4	3
-20	-9
-10	
0	1
	-2.5

Rule:

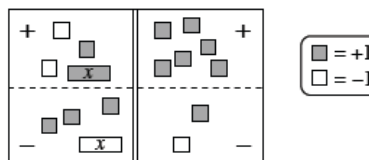
3-5. At the fair, Kate found a strange machine with a sign on it labeled, "Enter a number." When she pushed the number 15, the machine displayed 9. When she entered 23, the machine displayed 17. Perplexed, she tried 100, and the machine displayed 94.



- What is the machine doing?
- What would the machine display if she entered 77?

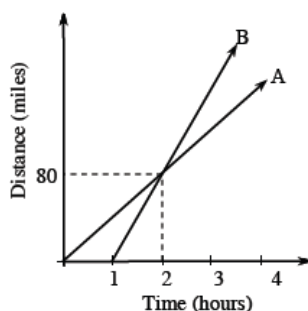
3-6. Ms. Nguyen needs to separate \$385 into three parts to pay some debts. The second part must be five times as large as the first part. The third part must be \$35 more than the first part. How much money must be in each part? Write and solve an equation.

3-7. On your paper, write the equation represented on the Equation Mat at right. Simplify as much as possible and then solve for x .



3-8. GO GOLDEN GOPHERS!

The graph below describes the distance two cars have traveled after leaving a football game at the University of Minnesota.



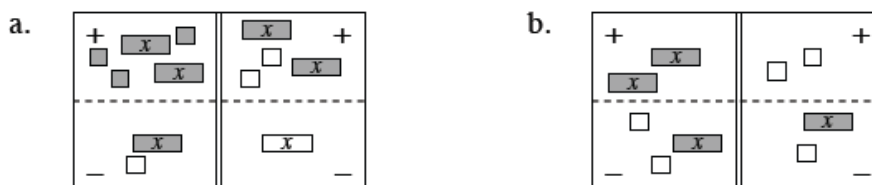
- Which car was traveling faster? How can you tell?
- The lines cross at (2, 80). What does this point represent?
- Assuming that Car A continued to travel at a constant rate, how far did Car A travel in the first 4 hours?

3-13. Copy and use your pattern skills to complete the table below.

IN (x)	2	10	6	7	-3		-10	100	x
OUT (y)	5	21	13			-15			

- Explain in words what is being done to the input value, x , to produce the output value, y .
- Write the process you described in part (a) in algebraic symbols.

3-14. Write the equation represented in each diagram below on your paper. For each part, simplify as much as possible and then solve for x . Be sure to record your work on your paper.



3-15. Evaluate the following expressions given the values below.

- $ab + bc + ac$ for $a = 2$, $b = 5$, and $c = 3$
- $\frac{20-x^2}{y-x}$ for $x = -2$ and $y = 6$

3-16. Use the order of operations to simplify the following expressions.

- $5 - 2 \cdot 3^2$
- $(-2)^2$
- $18 \div 3 \cdot 6$
- -2^2
- $(5 - 3)(5 + 3)$
- $24 \cdot \frac{1}{4} \div (-2)$
- Why are your answers for parts (b) and (d) different?

3-17. Mrs. Swanson gives out only one type of candy for Halloween. The local discount store sells six pounds of butterscotch candies for \$7.50. Use proportional reasoning to answer the questions below. Be sure to explain your answer and organize your reasoning.

- What is the cost of 18 pounds of butterscotch candies?
- What is the cost of 10 pounds of butterscotch candies?
- What is the unit rate for butterscotch candies?



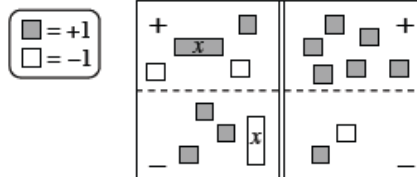
3-23. Find the value of x that makes each equation below true.

- a. $x + 7 = 2$
- b. $-5 = \frac{1}{2}x$
- c. $3x = -45$
- d. $2 = -x$
- e. $-5 = \frac{x}{2}$
- f. $x^2 = 9$ (all possible values for x)

3-24. For the following equations, draw a picture of the tiles on an Equation Mat, simplify, and solve for the variable. Record your work.

- a. $3c - 7 = -c + 1$
- b. $-2 + 3x = 2x + 6 + x$

3-25. On your paper, write the equation represented at right. Simplify as much as possible and then solve for x .



3-26. Solve this problem by defining a variable and solving an equation. Write your solution in a sentence.

West High School's population is 250 students fewer than twice the population of East High School. The two schools have a total of 2858 students. How many students attend East High School?

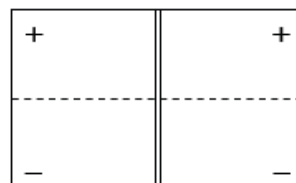
3-27. Calculate the following values using the Order of Operations. Show your steps. Verify your answers with your calculator.

- a. $(-4)(-2) - 6(2 - 5)$
- b. $23 - (17 - 3 \cdot 4)^2 + 6$
- c. $14(2 + 3 - 2 \cdot 2) \div (4^2 - 3^2)$
- d. $12.7 - 18.5 + 15 + 6.3 - 1 + 28.5$



3-37. Complete a table like the one provided in problem 3-34 for the rule $y = x + 2$. Plot and connect the points on graph paper. Be sure to label the axes and include the scale.

3-38. For the following equations, draw a picture of the tiles on an Equation Mat like the one shown at right. Then use “legal” moves to simplify and solve for the variable. Record your work.



a. $-2 + x = -x + 2$

b. $2 + 3x = x + 7$

3-39. Evaluate each equation below.

a. For $y = 5 + 8x$ when $x = 4$, what does y equal?

b. For $a = 3 - 5c$ when $c = -0.5$, what does a equal?

c. For $n = 2d^2 - 5$ when $d = -2$, what does n equal?

d. For $v = -3(r - 3)$ when $r = -1$, what does v equal?

3-40. Peggy Sue decided to enter her famous “Five-Alarm Chili” at her local chili-cooking contest. Normally, she needs five tomatoes to make enough chili for her family of seven.

a. How many tomatoes should she expect to use to make her famous recipe for 100 people?

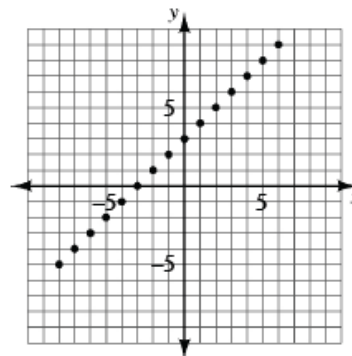
b. When she gets to the contest, she realizes that she only packed 58 tomatoes. How many people can she expect to feed?

3-41. At the annual dog show, Chantel noticed that there were three more Scotties than Schnauzers. She also realized that the number of Wirehaired Terriers was five less than twice the number of Schnauzers. If there were 78 dogs in all (counting Schnauzers, Scotties, and Wirehaired Terriers), how many Schnauzers were there? Write and solve an equation.



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3-46. Create an $x \rightarrow y$ table using at least eight points from the graph at right. Write the rule for the pattern in the table.



3-47. For each rule below, make a table of x - and y -values. Then graph and connect the points from your table on graph paper using an appropriate scale. Label each graph with its equation.

a. $y = -2x + 7$

b. $y = 11x$

3-48. WHICH IS GREATER?

Write the algebraic expressions shown below. Use “legal” simplification moves to determine which expression in the Expression Comparison Mat is greater.



a.

Left		Right
<div style="display: flex; justify-content: space-around;"> +□■</div> <div style="display: flex; justify-content: space-around;"> □□□</div> <hr style="border: 0.5px dashed black;"/> <div style="display: flex; justify-content: space-around;"> □■</div> <div style="display: flex; justify-content: space-around;"> ■■</div> <div style="display: flex; justify-content: space-around;"> -</div>	Which is greater?	<div style="display: flex; justify-content: space-around;"> □□+</div> <div style="display: flex; justify-content: space-around;"> □</div> <hr style="border: 0.5px dashed black;"/> <div style="display: flex; justify-content: space-around;"> ■■</div> <div style="display: flex; justify-content: space-around;"> ■■</div> <div style="display: flex; justify-content: space-around;"> -</div>

b.

Left		Right
<div style="display: flex; justify-content: space-around;"> +□■</div> <div style="display: flex; justify-content: space-around;"> □□□</div> <hr style="border: 0.5px dashed black;"/> <div style="display: flex; justify-content: space-around;"> ■x■</div> <div style="display: flex; justify-content: space-around;"> x■</div> <div style="display: flex; justify-content: space-around;"> -</div>	Which is greater?	<div style="display: flex; justify-content: space-around;"> □■+</div> <div style="display: flex; justify-content: space-around;"> x■</div> <hr style="border: 0.5px dashed black;"/> <div style="display: flex; justify-content: space-around;"> ■x</div> <div style="display: flex; justify-content: space-around;"> ■■</div> <div style="display: flex; justify-content: space-around;"> -</div>

3-49. Simplify each expression.

a. $\frac{2}{3}(0.8)$

b. $\frac{4}{3} \cdot \frac{3}{7}$

c. $-\frac{5}{6} \cdot \frac{4}{7}$

d. $-\frac{4}{5} \cdot (-1\frac{1}{3})$

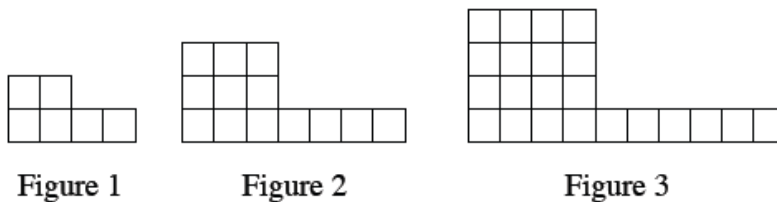
3-50. For the following equations, simplify and solve for the variable. Record your work.

a. $2x - 7 = -2x + 1$

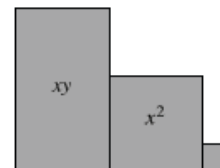
b. $-2x - 5 = -4x + 2$



- 3-56. Complete a table for the rule $y = x^2 + 2$. Then plot and connect the points on a graph. Be sure to label the axes and include the scale. Use negative and positive values for x , as well as a value of 0.
- 3-57. Complete a table for the rule $y = -x + 3$. Then plot and connect the points on a graph. Be sure to label the axes and include the scale. Use negative and positive values for x , as well as a value of 0.
- 3-58. On graph paper, draw Figure 0 and Figure 4 for the pattern below. Describe Figure 100 in detail.



- 3-59. Write an expression that represents the perimeter of the shape built with algebra tiles at right. Then find the perimeter if $x = 3$ units and $y = 7$ units.



- 3-60. Copy and simplify the following expressions by combining like terms.
- | | |
|---|---|
| <p>a. $y + 2x - 3 + 4x^2 + 3x - 5y$</p> <p>c. $2y^2 + 30x - 5y^2 + 4x - 4y - y$</p> | <p>b. $2x - 6x^2 + 9 - 1 - x - 3x$</p> <p>d. $-10 + 3xy - 3xy + y^2 + 10 - y^2$</p> |
|---|---|



3-65. ONE OF THESE POINTS IS NOT LIKE THE OTHERS, Part Two

a. Plot and connect the points listed in the table below.

IN (x)	-2	4	1	-4	0	3	-3	2
OUT (y)	0	12	-3	12	-4	5	-2	0

b. Identify the point that does not fit the pattern.

c. What shape does the graph appear to make?

d. Correct the point identified in part (b) so it fits the pattern. Write the points in (x, y) notation.



3-66. For each rule below, make a table of x - and y -values and then graph the rule on graph paper. Label each graph with its equation.

a. $y = x^2$

b. $y = -x^2$

c. Compare the graphs. What do you notice?

d. For the graph of $y = x^2$, estimate the x -values corresponding to $y = 5$.

e. For the graph of $y = -x^2$, estimate the x -values corresponding to $y = -10$.

3-67. The amount of money Theresa earns at her job varies directly with the number of hours she works. This means that her earnings are proportional with the time she works. She knows that when she works 2 hours, she earns \$12. When she works 3 hours, she earns \$18.



a. How much do you predict Theresa would earn after working 5 hours?

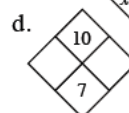
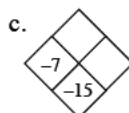
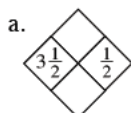
b. Use the unit rate to explain how can you find Theresa's earnings (y) if she works for x hours.

c. Create a complete graph of Theresa's earnings over time. Should the graph be continuous or discrete? Explain your decision.

3-68. Paris is trying to solve the equation $3x^2 - (2x - 4) = 3 + 3x^2 + 1$. Her work is partially recorded below. Copy her table and fill in her missing work to solve for x .

Left Expression	Right Expression	Explanation
$3x^2 - (2x - 4)$	$3 + 3x^2 + 1$	Starting expressions.
$3x^2 - 2x + 4$	$3 + 3x^2 + 1$	
		Remove $3x^2$ from both sides.
$-2x$	0	
		Divide both sides by -2 .

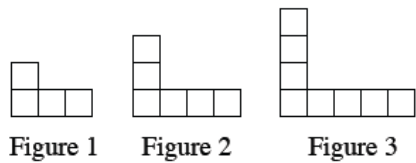
3-69. Copy and complete each of the Diamond Problems below. The pattern used in the Diamond Problems is shown at right.



3-84. On graph paper, draw Figure 0 and Figure 4 for the pattern below.

a. Represent the number of tiles in each figure with:

- An $x \rightarrow y$ table.
- An algebraic rule.
- A graph.

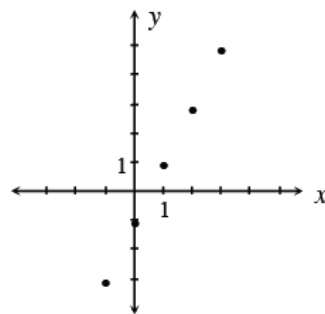


b. Without drawing Figure 5, predict where its point would lie on the graph. Justify your prediction.

3-85. Examine the graph at right.

a. Use the graph to complete the table:

IN (x)					
OUT (y)					



b. Use the graph to find the rule:

$y = \underline{\hspace{2cm}}$

3-86. Find the area and circumference of a circle with a diameter of 15 cm. If you need help remembering how to do this, read the Math Notes box in this lesson.

3-87. Simplify each of the following equations and solve for the variable. Show all work and check your solution, if possible.

- | | |
|------------------------------|--------------------------|
| a. $3x - 7 + 9 - 2x = x + 2$ | b. $-2m + 8 + m + 1 = 0$ |
| c. $2 = x + 6 - 2x$ | d. $0.5p = p + 5$ |

3-88. Mr. Wallis has done it again! He has started to create more tables to help him figure out things like how many gallons of gas it takes to travel a certain number of miles or how many minutes it takes to walk a certain number of blocks. Use proportional reasoning to complete his tables below.

a.

# of Books	Days
2	10
10	50
	60
3	
1	
$\frac{1}{5}$	
	365

b.

Minutes	Blocks
10	25
5	12.5
1	
20	
30	
	0
	35

c.

Miles	Gallons
280	14
140	7
	21
20	
100	
1000	
	17.5



3-94. For the following equations, solve for x . Check your solution, if possible. Record your work.

a. $3x - 7 = 3x + 1$

b. $-2x - 5 = -4x + 2$

c. $2 + 3x = x + 2 + 2x$

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

3-95. Evaluate the expressions below for the given values.

a. $30 - 2x$ for $x = -6$

b. $x^2 + 2x$ for $x = -3$

c. $-\frac{1}{2}x + 9$ for $x = -6$

d. \sqrt{k} for $k = 9$

3-96. The length of a rectangle is three centimeters more than twice the width. The perimeter is 78 centimeters. Define a variable and write and solve an equation to find out how long and how wide the rectangle is.

3-97. For the rule $y = 4 - x^2$, calculate the y -values that complete the table below. The first value is given for you.

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

a. Create an x -axis and a y -axis and label your units. Plot and connect the points on your graph, and then label your graph with its rule.

b. What does your graph look like?

3-98. Simplify each expression.

a. $\frac{5}{4} \div \frac{7}{16}$

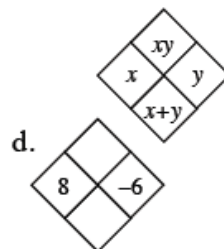
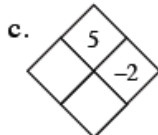
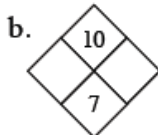
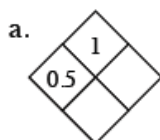
b. $-\frac{10}{13} \cdot \frac{5}{11}$

c. $\frac{9}{11} \div (-\frac{20}{21})$

d. $-\frac{8}{3} \div (-\frac{5}{18})$



3-102. Copy and complete each of the Diamond Problems below. The pattern used in the Diamond Problems is shown at right.



3-103. Joe is downloading songs from the Internet. He can download them at a rate of 8 songs every 10 minutes. Jasmine, who is also downloading songs, can download at a rate of 12 songs every 15 minutes. Who is downloading songs faster? What is the unit rate (songs per minute) for each person?

3-104. For each of the following equations, simplify and solve for the variable. Show all work and check your solution, if possible.

a. $-2 + x = -x + 2$

b. $-(x - 1) = -4x - 2$

c. $2 + 3x = 3x + 2$

d. $-(-x + 6) = -3x$

3-105. Use your pattern-finding skills to copy and complete the table below.

IN (x)	1	2	3		5	6	8	12	24	x
OUT (y)	24	12		6	4.8	4		2		

- Explain the pattern you found in your table. How are x and y related?
- Write the rule you described in part (a) with algebraic symbols.
- Use the points in your table to graph this rule on graph paper. Describe the resulting shape.

3-106. Translate each algebraic expression into words.

a. $5x - 3$

b. $2(x + y)$

c. $3 - (x + 5)$

3-113. Solve each equation.

a. $3(5x+2) = 8x+20$

b. $-2(x-3)+4x = -(-x+1)$

3-114. Simplify the following expressions.

a. $x+3x-3+2x^2+8x-5$

b. $3y+14y^2-6y^2-9y+1-y-3y$

c. $2y^2+30xy-2y^2+4y-4x$

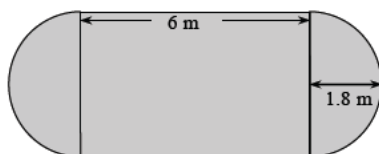
d. $x-0.2x$

3-115. Louis recorded how many times he could jump rope without stopping. Here is his data:

50 15 102 64 29 55 100 97 48 81 61

Find the median, upper quartile, and lower quartile of his data.

3-116. Find the area and perimeter of the shape below. Show your work.



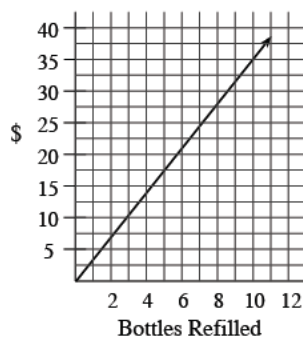
3-117. This problem is a checkpoint for unit rates and proportions. It will be referred to as Checkpoint 3.



In parts (a) through (c), use the given information to find the unit rate. In parts (d) through (f), write and solve a proportion based on the given information.

- a. If $2\frac{1}{4}$ pounds of bananas cost \$1.89, what is the cost per pound?
- b. What is the weight per cm?

weight (g)	9	12	18	30
length (cm)	15	20	30	50



- c. Use the graph at right to find the refill cost per bottle.
- d. If 200 vitamins cost \$4.75, what should 500 vitamins cost?
- e. If a basketball player made 72 out of 85 free-throw attempts, how many could she expect to make in 200 attempts?
- f. A cookie recipe uses $\frac{1}{2}$ teaspoon of vanilla with $\frac{3}{4}$ cup of flour. How much vanilla should be used with five cups of flour?

Check your answers by referring to the Checkpoint 3 materials located at the back of your book.

If you needed help solving these problems correctly, then you need more practice. Review the Checkpoint 3 materials and try the practice problems. Also, consider getting help outside of class time. From this point on, you will be expected to do problems like these quickly and easily.