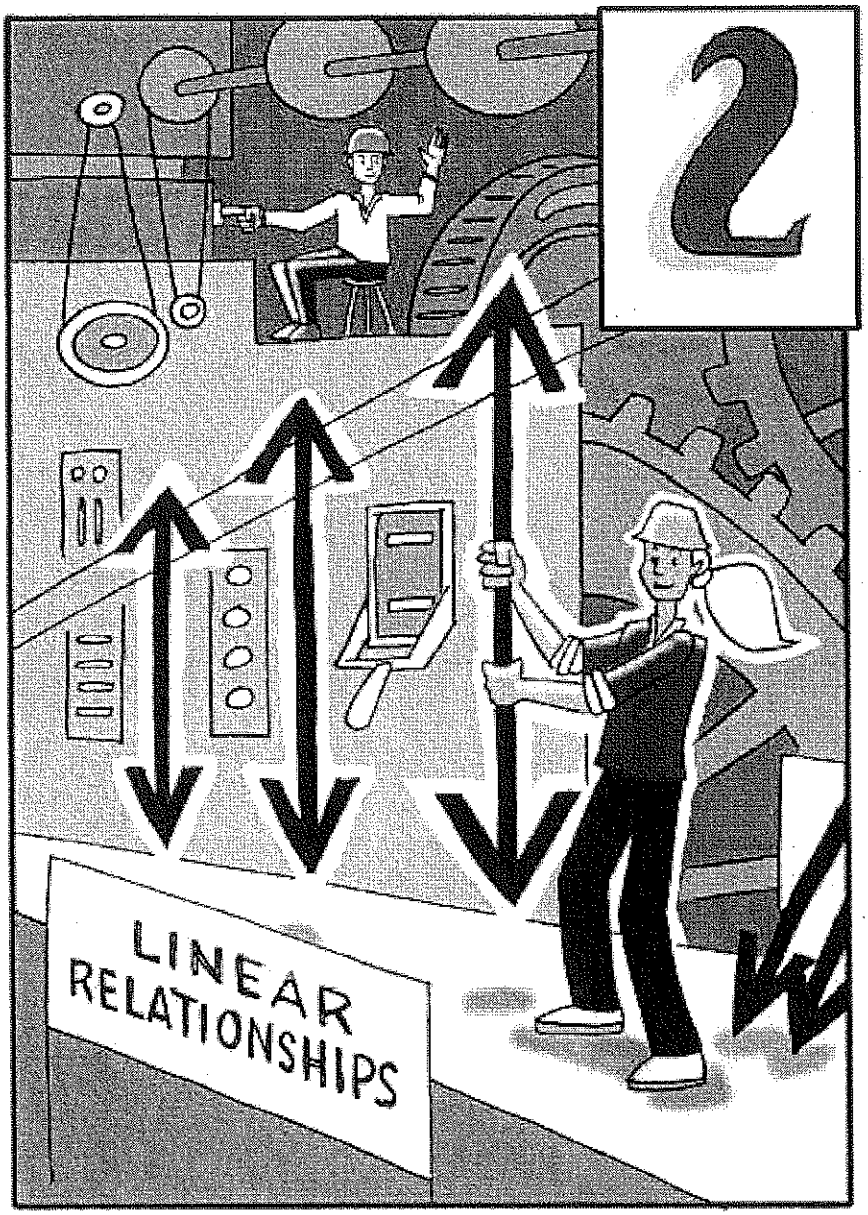

2
LINEAR
RELATIONSHIPS

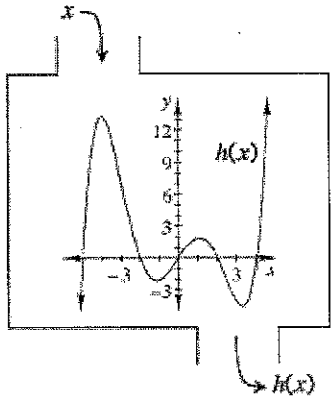
Review & Preview

2-6. A tile pattern has 5 tiles in Figure 0 and adds 7 tiles in each new figure. Write the equation of the line that represents the growth of this pattern.

2-7. Evaluate each expression if $r=-3$, $s=4$, and $t=-7$.

a. $\sqrt{s}+|r|$ b. $\frac{s-r}{t}$ c. $2s^3+r-t$ d. $\sqrt[3]{2(t-r)}$

2-8. Examine the relation $h(x)$ defined at right. Then estimate the values below.



a. $h(1)$

b. $h(3)$

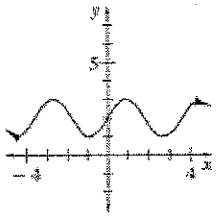
c. x when $h(x)=0$

d. $h(-1)$

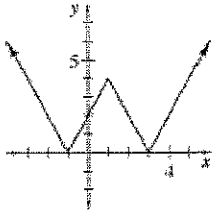
e. $h(-4)$

2-9. Which of the relations below are functions? Justify your answer.

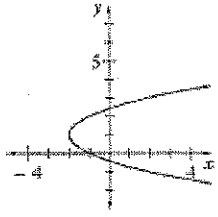
a.



b.



c.



d. For each graph above, state the domain and range.

2-10. Examine the graphs in problem 2-9 again. Which, if any, have lines of symmetry? Copy each graph on your paper and show any lines of symmetry.

Review & Preview

2-19. What shape will the graph of $y = x^2 + 2$ be? How can you tell? Justify your prediction by making a table and graphing $y = x^2 + 2$ on graph paper.

2-20. Evaluate each expression for $x = -2$ and $y = -5$.

a. $1 - 2x + 3y$

b. $-|x - y|$

c. $\sqrt{x^2} + \sqrt[3]{y^3}$

d. $\frac{1}{2}x + \frac{1}{3}y$

2-21. Create a tile pattern that matches the table below. Be creative and make your pattern interesting!

Figure # x	0	1	2	3	4
# of tiles y	2	5	8	11	14

2-22. Figure 2 of a tile pattern is shown at right. If the pattern grows linearly and if Figure 5 has 15 tiles, then find a rule for the pattern.

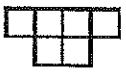
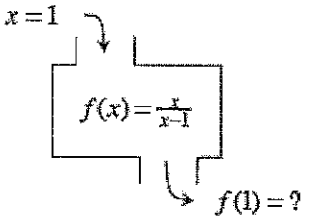
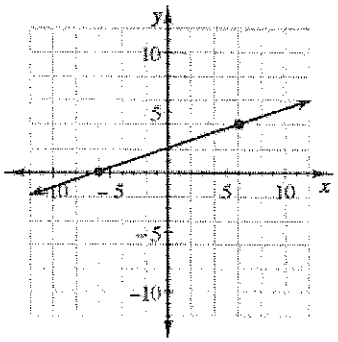


Figure 2

2-23. Find the output for the relation with the given input. If there is no possible output for the given input, explain why not.



2-24. Find the slope of the line shown on the graph at right.

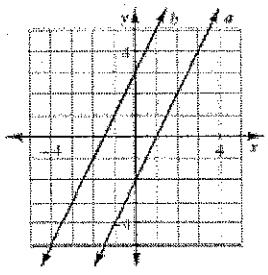


Review & Preview

2-31. Does the table below appear to represent a function? If so, write an equation using function notation that represents the table. If not, explain why it cannot represent a function.

Figure # x	0	1	2	3	4
# of tiles y	4	8	12	16	20

2-32. When Yoshi graphed the lines $y=2x+3$ and $y=2x-2$, she got the graph shown at right.



a. One of the lines at right matches the equation $y=2x+3$, and the other matches $y=2x-2$. Which line matches which equation?

b. Yoshi wants to add the line $y=2x+1$ to her graph. Predict where it would lie and sketch a graph to show its position. Justify your prediction.

c. Where would the line $y=-2x+1$ lie? Again, justify your prediction and add the graph of this line to your graph from part (b).

2-33. On graph paper, graph a line with y-intercept $(0, -4)$ and x-intercept $(3, 0)$. Find the equation of the line.

2-34. Draw Figures 1, 2, and 3 for a tile pattern that could be described by $y=-3x+10$.

2-35. What number is not part of the domain of $f(x)=\frac{3}{x+5}$? How can you tell?

Review & Preview

2-41. If $y=\frac{1}{2}x-4$:

a. What is the slope of the line?

b. What is the y-intercept of the line?

c. Graph the line.

2-42. Without graphing, find the slope of each line described below.

a. A line that goes through the points (4, 1) and (2, 5).

b. A line that goes through the origin and the point (10, 5).

c. A vertical line (one that travels "up and down") that goes through the point (6, –5).

d. A line that goes through the points (1, 6) and (10, 6).

2-43. Ms. Cai's class is studying a tile pattern. The rule for the tile pattern is $y=10x-18$. Kalil thinks that Figure 12 of this pattern will have 108 tiles. Is he correct? Justify your answer.

2-44. State the slope and y-intercept of each line.

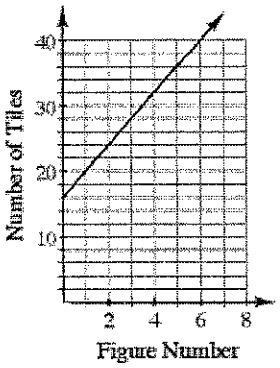
a. $y=\frac{5}{3}x-4$ b. $y=-\frac{4}{7}x+3$ c. $y=-5$

2-45. Evaluate the expressions below for the given values.

a. $-x^2+3x$ for $x=-3$ b. $5-(x-2)^2$ for $x=-1$

c. $\frac{-5}{k+1}$ for $k=-1$ d. $\left|\frac{x}{x+y}\right|-x^2+y$ for $x=2, y=-3$

2-48. The graph below represents the number of tiles in a tile pattern.



a. Based on the information in the graph, how many tiles are being added each time (that is, what is the growth factor of the pattern)? Pay close attention to the scale of the axes.

b. How many tiles are in Figure 0?

c. Write the equation for the tile pattern.

d. How would the line change if the pattern grew by 12 tiles each time instead?

2-49. On graph paper, graph the line that goes through the points (–6, 3) and (–3, –1).

a. What is the slope of the line?

b. What is the y-intercept?

c. Find the equation of the line.

2-50. Solve each of the following equations.

a. $2x+8=3x-4$

b. $1.5w+3=3+2w$

c. $48+8x+23=7$

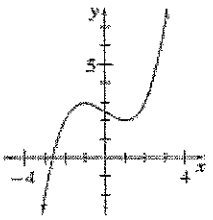
d. $6x-21=5x+17+x$

2-51. Write an equation for the line containing the points shown in the table below.

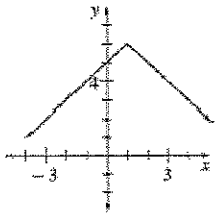
x	–2	–1	0	1
y	5	1	–3	–7

2-52. Which graphs below have a domain of all numbers? Which have a range of all numbers? Which are functions?

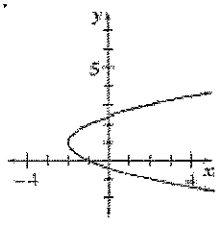
a.



b.



c.



Review & Preview

2-59. Find the rule for the following tile pattern.

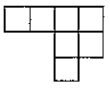


Figure 2

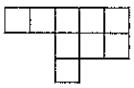
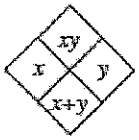


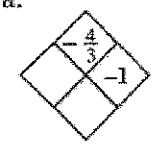
Figure 3

Figure 4

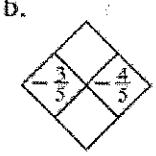
2-60. Copy and complete each of the Diamond Problems below. The pattern used in the Diamond Problems is shown at right.



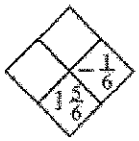
a.



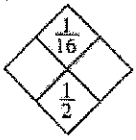
b.



c.



d.



2-61. THE BIG RACE – HEAT 3

Barbara, Mark, and Carlos participated in the third heat of "The Big Race." Barbara thought she could win with a 3 meter head start even though she only pedaled 3 meters every 2 seconds. Mark began at the starting line and finished the 20 meter race in 5 seconds. Meanwhile, Carlos rode his tricycle so that his distance (y) from the starting line in meters could be represented by the equation $y=\frac{5}{2}x+1$, where x represents time in seconds.

a. What is the dependent variable? What is the independent variable?

b. Using the given information, graph lines for Barbara, Mark, and Carlos on the same set of axes. Who won the 20 meter race and will advance to the final race?

c. Find equations that describe Barbara's and Mark's motion.

d. How fast did Carlos pedal? Write your answer as a unit rate.

e. When did Carlos pass Barbara? Confirm your answer algebraically.

2-62. Create a table and a graph for the line $y=5x-10$. Find the x-intercept and y-intercept in the table and on the graph.

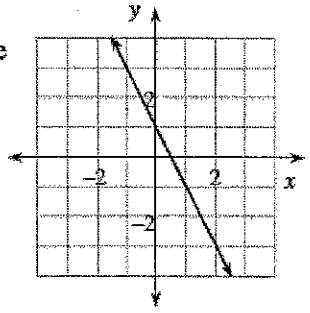
2-63. Find the slope of the line containing the points in the table below.

IN (x)	2	4	6	8	10
OUT (y)	4	10	16	22	28

2-64. Use what you know about $y=mx+b$ to graph each of the following equations quickly on the same set of axes.

a. $y=3x+5$ b. $y=-2x+10$ c. $y=1.5x$

2-65. Review what you know about graphs by answering the following questions.



a. Find the equation of the line graphed at right.

b. What are its x- and y-intercepts?

2-66. Use the idea of cube root from problem 1-35 to evaluate the following expressions.

a. $\sqrt[3]{1}$ b. $\sqrt[3]{0}$ c. $\sqrt[3]{2^3}$ d. $\sqrt[3]{7^3}$

2-67. Each part (a) through (d) below represents a different tile pattern. For each one, find the growth factor and the number of tiles in Figure 0.

a.

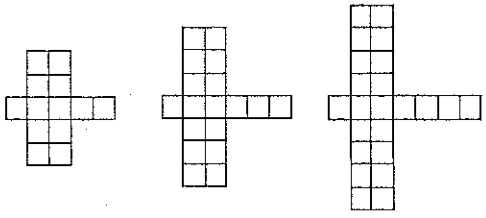
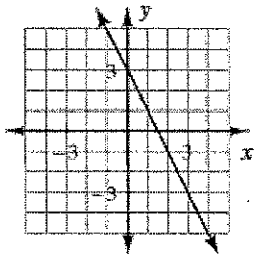


Figure 2 Figure 3 Figure 4

b.



c. $y=3x-14$

d.

x	–3	–2	–1	0	1	2	3
y	18	13	8	3	–2	–7	–12

Review & Preview

2-70. Sometimes the quickest and easiest two points to use to graph a line that is not in slope-intercept form are the x- and y-intercepts. Find the x- and y-intercepts for the two lines below and then use them to graph each line. Write the coordinates of the x- and y-intercepts on your graph.

a. $x-2y=4$ b. $3x+6y=24$

2-71. Find the slope of the line passing through each pair of points below.

a. $(1, 2)$ and $(4, -1)$ b. $(7, 3)$ and $(5, 4)$

c. $(-6, 8)$ and $(-8, 5)$ d. $(55, 67)$ and $(50, 68)$

e. Azizah got 1 for the slope of the line through points $(1, 2)$ and $(4, -1)$. Explain to her the mistake she made and how to find the slope correctly.

2-72. Evaluate the following expressions.

a. $8\frac{2}{5}\div 3\frac{1}{4}$ b. $5\frac{1}{2}\cdot\left(-6\frac{3}{4}\right)$ c. $-3\frac{5}{8}-1\frac{1}{2}$ d. $-7+\frac{2}{3}$

2-73. Copy and complete the table below. Then write the corresponding equation.

IN (x)	2	4	6	7		10
OUT (y)	–7	–17			–37	

2-74. MATCH-A-GRAPH

Match the following graphs with their equations. Pay special attention to the scaling of each set of axes. Explain how you found each match.

a. $y=\frac{1}{4}x+4$ b. $y=\frac{1}{2}x+4$

c. $y=2x+4$ d. $y=-\frac{2}{3}x+4$

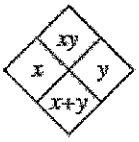
Review & Preview

2-82. The point (21, 32) is on a line with slope 1.5.

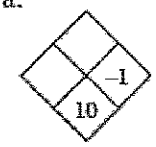
a. Find the equation of the line.

b. Find the coordinates of a third point on the line.

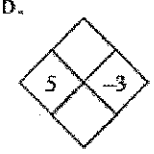
2-83. Copy and complete each of the Diamond Problems below. The pattern used in the Diamond Problems is shown at right.



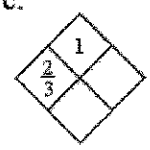
a.



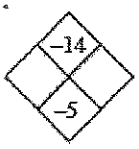
b.



c.



d.



2-84. The graph of the equation $2x-3y=7$ is a line.

a. Find the x- and y-intercepts and graph the line using these two points.

b. If a point on this line has an x-coordinate of 10, what is its y-coordinate?

2-85. Without graphing, identify the slope and y-intercept of each equation below.

a. $y=3x+5$

b. $y=\frac{5}{-4}x$

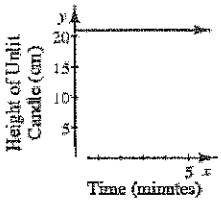
c. $y=3$

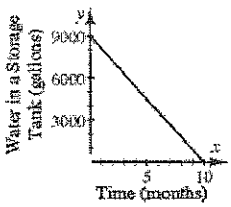
d. $y=7+4x$

2-86. Graph the line $y=-\frac{2}{3}x+3$.

Review & Preview

2-90. Explain what the slope of each line below represents. Then find the slope and give its units.

a. 

b. 

2-91. Find the equation of the line that goes through the points (–15, 70) and (5, 10).

2-92. This problem is the checkpoint for evaluating expressions and the Order of Operations. It will be referred to as Checkpoint 2.

Evaluate each expression if $x=-2$, $y=-3$, $z=5$.

a. $2x+3y+z$ b. $x-y$ c. $2\left(\frac{x+y}{z}\right)$

d. $3x^2-2x+1$ e. $3y(x+x^2-y)$ f. $\frac{-x^2(1-2x)}{y-x}$

Check your answers by referring to the Checkpoint 2 materials located at the back of your book.

If you needed help solving these problems correctly, then you need more practice. Review the Checkpoint 2 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.

2-93. Greta is opening a savings account. She starts with $100 and plans to add $50 each week. Write an equation she can use to calculate the amount of money she will have after any number of weeks. How much money will she have after 1 year.

2-94. Paula found a partially completed table that her friend Donna was using to determine how fast water evaporated from a bucket during the summer. Every other day she measured the height of the water remaining in the bucket in centimeters.

Days (x)	0	2	4	6	8
Height cm (y)	30	27	24		

a. Complete the table.

b. For this table, what is the rate of change, including the units?

c. Write an equation to represent the height of the water after any number of days.

Review & Preview

2-96. Which equation below has *no* solution? Explain how you know.

a. $4(x+1)=2x+4$ b. $9-5x+2=4-5x$

2-97. Rena says that if $x=-5$, the equation below is true. Her friend, Dean, says the answer is $x=3$. Who is correct? Justify your conclusion.

$$9(x+4)=1+2x$$

2-98. Sally currently weighs 120 pounds and is on a diet to lose five pounds every two months.

a. What is the rate of growth for this situation, including the units?

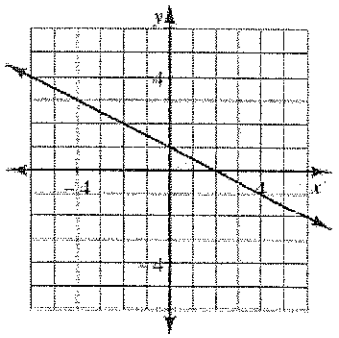
b. Write an equation that represents this situation.

2-99. Graph the equation $y=-2x+9$.

2-100. Write the equation for the function in the table below.

x	–1	1	3	5
y	2	16	30	44

CL 2-101. For the line graphed at right:



a. Find the slope.

b. Find the y-intercept.

c. Write the equation.

CL 2-102. Find m and b in the following equations. What do m and b represent?

a. $y = 2x + 1$

b. $y = \frac{2}{5}x - 4$

CL 2-103. Graph each equation in problem CL 2-102.

CL 2-104. Shirley starts with \$85 in the bank and saves \$15 every 2 months. Write an equation for the balance of Shirley's bank account.

CL 2-105. Find the slope for each linear relation described in the tables below.

a.

x	–2	–1	0	1	2
y	19	14	9	4	–1

b.

x	2	3	4	5	6
y	22	31	40	49	58

CL 2-106. Write a rule for the given tile pattern. How many tiles will be in figure 58?

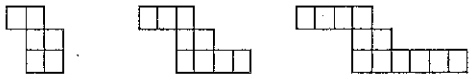


Figure 1 Figure 2 Figure 3

CL 2-107. Solve for w: $6w-5+8w-2w-3=9w-24$.

CL 2-108. Copy and complete the table below for the rule $y=x^2-6x+5$. Then graph the rule on graph paper.

x	–1	0	1	2	3	4	5	6	7
y									

a. Completely describe the graph.

b. Is the relation a function?

c. State the domain and range.

CL 2-109. Find the slope of the line that passes through the points $(-5, 7)$ and $(10, 1)$.

CL 2-110. Evaluate the expressions below for the given values.

a. $-3x^2+4x+5$ for $x=-2$

b. $6-(5x-9)^2$ for $x=1$

c. $\frac{-4}{k+7}$ for $k=-8$

d. $\frac{2m}{n-1}-m^3-n$ for $m=-2, n=3$

e. If (c) were $f(k)=\frac{-4}{k+7}$, what value of k would be excluded from the domain?

CL 2-111. Check your answers using the table at the end of the closure section. Which problems do you feel confident about? Which problems were hard? Use the table to make a list of topics you need help with and a list of topics you need to practice more.