

Writing and Graphing Equations in the Form $y = mx + b$

Q: How do you write and graph a linear relationship?

A: Make a _____ and record different values for the linear relationship. Use the table to create _____, then _____ the ordered pairs on a coordinate grid.

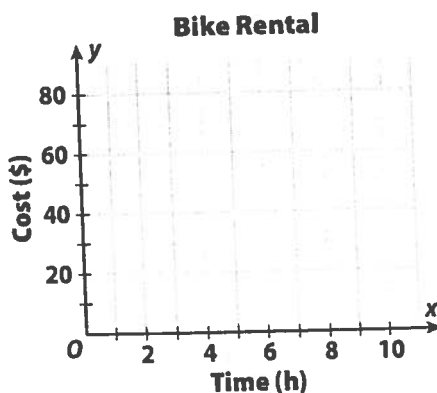
This is called _____ form.

$$y = \underline{m}x + \underline{b}$$

A bicycle rental company charges \$18 to rent a bicycle, plus \$7 for every two hours of rental time. Represent the relationship using a table, an equation, and a graph.

Hours rented	Cost (\$)
0	
2	
4	
6	
8	

Equation: _____



Writing and Graphing Equations in the Form $y = mx + b$

Q: How do you write and graph a linear relationship?

A: Make a table and record different values for the linear relationship. Use the table to create order pairs, then graph the ordered pairs on a coordinate grid.

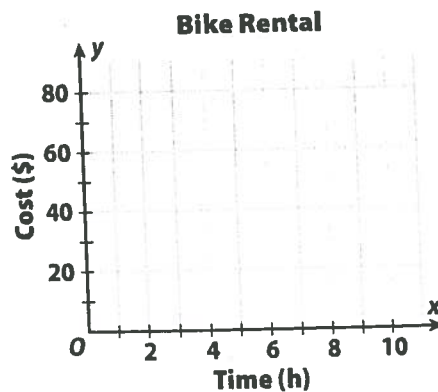
This is called slope intercept form.

$$y = \underbrace{m}_\text{slope} x + \underbrace{b}_{(0, b)}$$

A bicycle rental company charges \$18 to rent a bicycle, plus \$7 for every two hours of rental time. Represent the relationship using a table, an equation, and a graph.

Hours rented	Cost (\$)
0	
2	
4	
6	
8	

Equation: _____

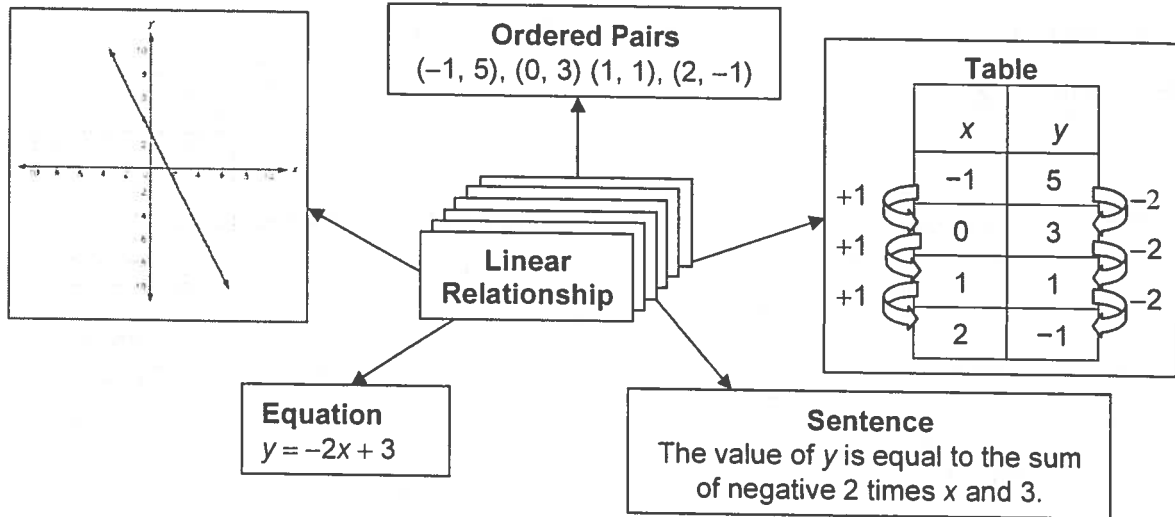


LESSON
7-2

Writing and Graphing Equations in the Form $y = mx + b$

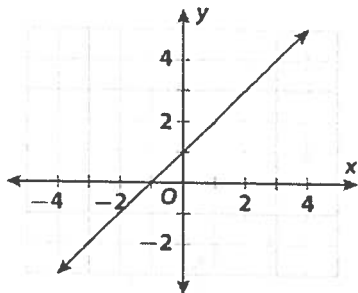
Reading Strategies: Use Multiple Representations

Linear relationships can be represented in many forms. The same relationship is represented below in five different ways.

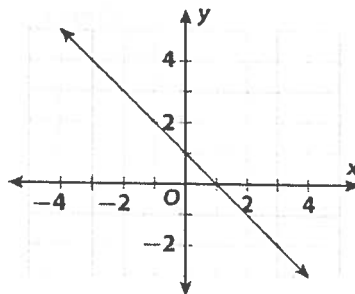


Use these graphs for Exercises 1–4. Graphs may be used more than once.

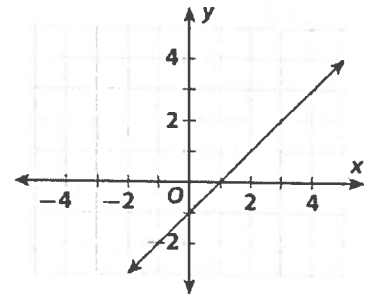
A.



B.



C.



- Which graph represents (-1, 2), (1, 0), (2, -1)? _____
- Which graph represents $y = x + 1$? _____
- Which graph represents "The sum of x and y is 1."? _____
- Which graph represents the table below? _____

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

LESSON
7-2

Writing and Graphing Equations in the Form $y = mx + b$
Success for English Learners

You can show the same data in different ways.

Problem 1

Equation: $y = 2x + 1$

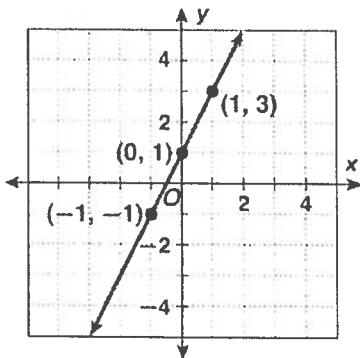
Table:

A table shows the values that make the equation true.

x	Think:	y
-1	$2(-1) + 1$	-1
0	$2(0) + 1$	1
1	$2(1) + 1$	3

Ordered Pairs: $(-1, -1), (0, 1), (1, 3)$

Graph:



Problem 2

Table:

x	-1	0	1	2
y	3	2	1	0

Find a pattern in the table.

$-1 + 3 = 2$

$0 + 2 = 2$

$1 + 1 = 2$

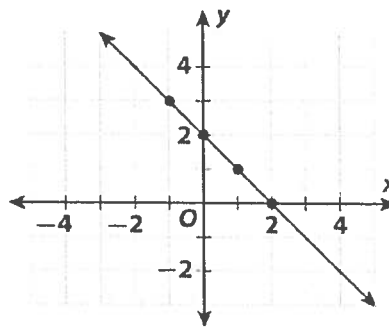
$2 + 0 = 2$

Think:
The sum of x and y is 2.

Equation: $x + y = 2$

Ordered Pairs: $(-1, 3), (0, 2), (1, 1), (2, 0)$

Graph:



Use the problems above for Exercises 1–3.

1. In Problem 1, if $y = -5$, what is the value of x ? _____
2. Write the equation for Problem 2 in the form $y = mx + b$ _____
3. When moving left to right, one graph goes up and the other goes down. Explain why.

LESSON
7-2

Writing and Graphing Equations in the Form $y = mx + b$
Practice and Problem Solving: D

Use the graph at the right for Exercises 1–5. The first one is done for you.

1. The graph shows the distance from the car that Laura is as she hikes on the second day of a 2-day hike. Write the equation for the graph.

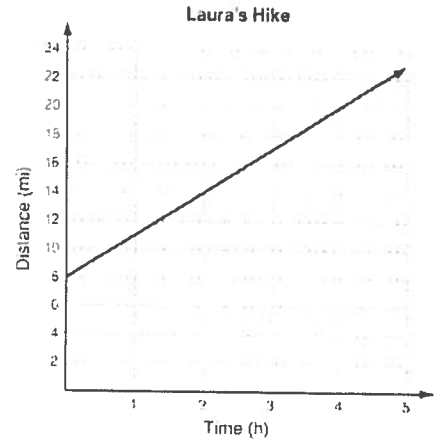
$y = 3x + 8$

2. How far did Laura hike on the first day?

3. On the second day, how far did Laura hike each hour?

4. If Laura stops after hiking 7 hours, how far will she be from her car?

5. Does it make sense to draw a line through the points? Explain.



For Exercises 6–8, write an equation to represent the given linear relationship. Then state the meaning of the given ordered pair. The first one is done for you.

6. Renting a bike costs \$15 plus \$2 per hour. (3, 21)

$y = 2x + 15$; It will cost \$21 to rent a bike for 3 hours.

7. Arlene started with 120 football cards. She bought a pack of 12 cards each week. (5, 180)

- 8.

Number of Weeks	0	1	2	3
Amount in Savings Account	\$10	\$16.50	\$23	\$29.50

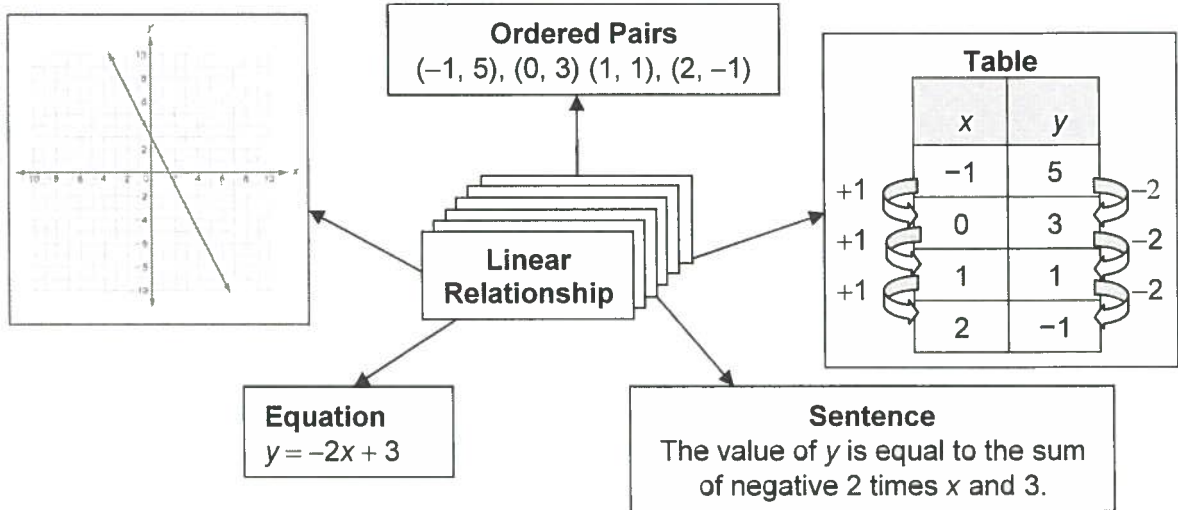
(10, 75)

LESSON
7-2

Writing and Graphing Equations in the Form $y = mx + b$

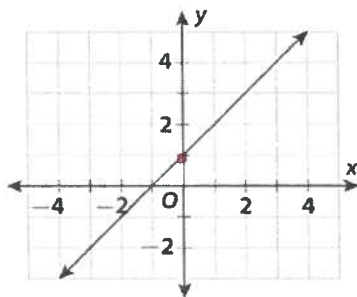
Reading Strategies: Use Multiple Representations

Linear relationships can be represented in many forms. The same relationship is represented below in five different ways.

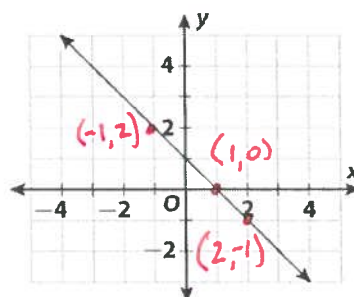


Use these graphs for Exercises 1–4. Graphs may be used more than once.

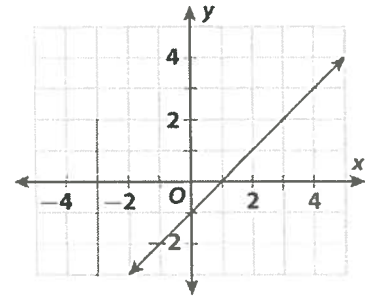
A.



B.



C.



1. Which graph represents $(-1, 2), (1, 0), (2, -1)$? B

2. Which graph represents $y = x + 1$? A

3. Which graph represents "The sum of x and y is 1."? B

4. Which graph represents the table below? C

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

LESSON 7-2 **Writing and Graphing Equations in the Form $y = mx + b$**
Success for English Learners

You can show the same data in different ways.

Problem 1

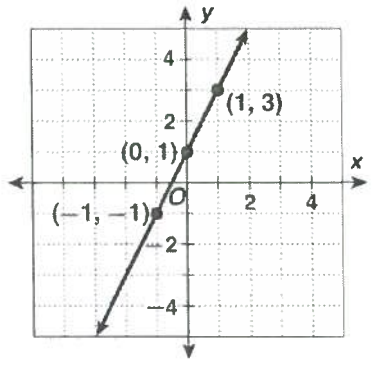
Equation: $y = 2x + 1$

Table: A table shows the values that make the equation true.

x	Think:	y
-1	$2(-1) + 1$	-1
0	$2(0) + 1$	1
1	$2(1) + 1$	3

Ordered Pairs: $(-1, -1), (0, 1), (1, 3)$

Graph:



Problem 2

Table:

x	-1	0	1	2
y	3	2	1	0

Find a pattern in the table.

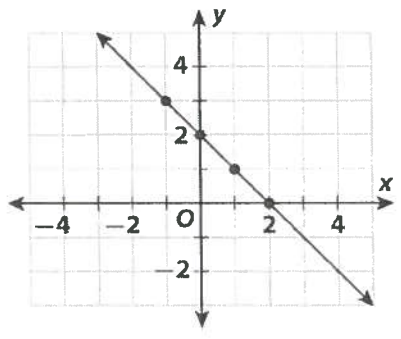
$-1 + 3 = 2$
 $0 + 2 = 2$
 $1 + 1 = 2$
 $2 + 0 = 2$

Think:
The sum of x and y is 2.

Equation: $x + y = 2$

Ordered Pairs: $(-1, 3), (0, 2), (1, 1), (2, 0)$

Graph:



Use the problems above for Exercises 1-3.

1. In Problem 1, if $y = -5$, what is the value of x ? -9
2. Write the equation for Problem 2 in the form $y = mx + b$ $y = -x + 2$
3. When moving left to right, one graph goes up and the other goes down. Explain why.

the slope of problem 1 is positive if it goes up as you read
the slope of problem 2 is negative if it goes down as you read

LESSON
7-2
Writing and Graphing Equations in the Form $y = mx + b$
Practice and Problem Solving: D

Use the graph at the right for Exercises 1–5. The first one is done for you.

1. The graph shows the distance from the car that Laura is as she hikes on the second day of a 2-day hike. Write the equation for the graph.

$$y = 3x + 8$$

2. How far did Laura hike on the first day?

8 mi

3. On the second day, how far did Laura hike each hour?

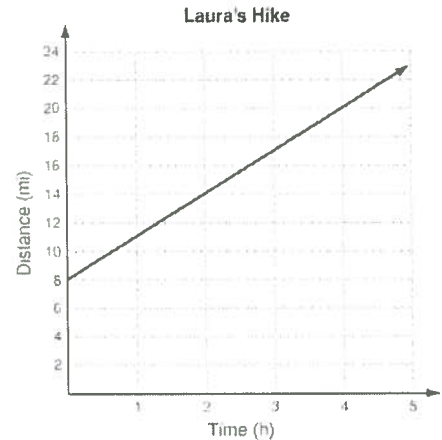
3 mi

4. If Laura stops after hiking 7 hours, how far will she be from her car?

$$8 + 7(3) = 8 + 21 = 29 \text{ mi}$$

5. Does it make sense to draw a line through the points? Explain.

Yes, she hikes continuously, so distances can be fractional parts of a mile



For Exercises 6–8, write an equation to represent the given linear relationship. Then state the meaning of the given ordered pair. The first one is done for you.

6. Renting a bike costs \$15 plus \$2 per hour. (3, 21)

$$y = 2x + 15; \text{ It will cost } \$21 \text{ to rent a bike for 3 hours.}$$

7. Arlene started with 120 football cards. She bought a pack of 12 cards each week. (5, 180)

$$y = 12x + 120$$

$$y = 12(5) + 120 = 180$$

- 8.

Number of Weeks	0	1	2	3
Amount in Savings Account	\$10	\$16.50	\$23	\$29.50

(10, 75)

$$y = 6.5x + 10$$

$$y = 6.5(10) + 10 = 75$$

LESSON
7-2

Writing and Graphing Equations in the Form $y = mx + b$

Practice and Problem Solving: A/B

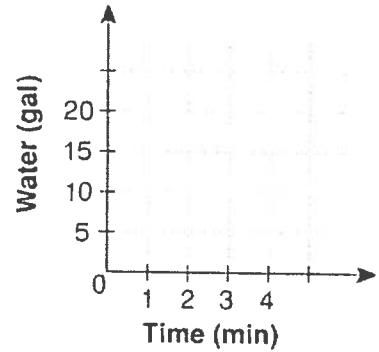
Use the description below and the graph at the right for Exercises 1–4.

A tank contains 5 gallons of water. Joanna uses a hose to slowly add more water to the tank. Five gallons of water are added to the tank every minute.

- Write an equation to describe the relationship between the number of gallons in the tank and the number of minutes the tank is being filled.

- On the grid at the right, graph the linear relationship.
- Does it make sense to draw a line through the points? Explain.

- Suppose there had been no water in the tank. How would the graph change?



For Exercises 5–7, write an equation to represent the given linear relationship. Then state the meaning of the given ordered pair.

- Renting bowling shoes costs \$5. Bowling costs \$4 per game. (3, 17)

- William started with 40 photographs. He took 8 more photographs each day. (6, 88)

-

Monthly Sales	0	\$5,000	\$10,000	\$15,000	\$20,000
Earnings	\$2,000	\$2,500	\$3,000	\$3,500	\$4,000

(\$50,000, \$7,000)
