Scan the lesson. Predict two things you will learn about linear equations. **Sample answers:**

- **Linear equations can contain more than one variable.**

- **A linear equation is an equation with a graph that is a**

  straight line.

Real-World Link Watch ▶

Space To achieve orbit, the space shuttle must travel at a rate of about 5 miles per second. The table shows the total distance d that the craft covers in certain periods of time t.

Time t (seconds)	Distance d (miles)
1	5
2	10
3	15
4	20
5	25

1. Write an algebraic expression for the distance in miles for any number of seconds t. **5t**

2. Describe the relationship in words.

   The distance is 5 times the number of seconds

3. Graph the ordered pairs. Describe the shape of the graph.

   The points appear to be in a line, so the graph is linear.

HO
rela
qua

Voca
abc

line

CCSS

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1, 3,

Got It? Do these problems to find out.

The total cost of tickets to the school play is shown in the table.

Number of Tickets, t	Total Cost ($), c
1	4.50
2	9.00
3	13.50
4	18.00

a. Write an equation to find the total cost of any number of tickets. Describe the relationship in words.

b. Use the equation to find the cost of 15 tickets.

a. $c = 4.5t$; Each ticket costs $4.50.

b. $67.50

1. The table shows the total number of text messages that Brad sent over 4 days. (Examples 1 and 2)

Number of Days, d	1	2	3	4
Total Messages, m	50	100	150	200

   a. Write an equation to find the total number of messages sent in any number of days. Describe the relationship in words.

   $m = 50d$; He sends an averages of 50 messages each day.

   b. Use the equation to find how many text messages Brad would send in 30 days. **1,500 messages**

2. **Financial Literacy** The graph shows the amount of money the Rockwell family budgets for food each month. Write an equation to find the total amount of money c budgeted in any number of months m. Use the equation to determine how much money the Rockwell family should budget for

   12 months. (Examples 3 and 4) **$c = 625m$; $7,500**
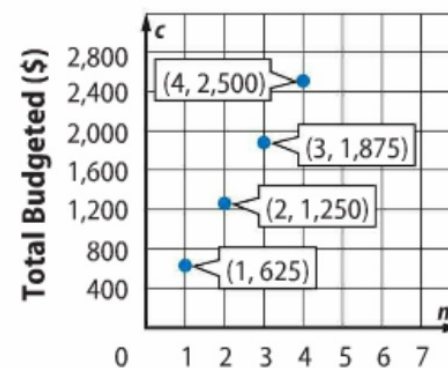
3. A store receives an average of 7 new movies per week.

(Examples 5 and 6)

a. Write an equation to find the number of new movies m in any number of weeks w. $m = 7w$

b. Make a table to find the number of new movies received in 4, 5, 6, or 7 weeks. Then graph the ordered pairs.

w	$7w$	m
4	7(4)	28
5	7(5)	35
6	7(6)	42
7	7(7)	49

0   1 2 3 4 5 6 7
Number of Months

Number of Movies (vertical axis, 0–55)
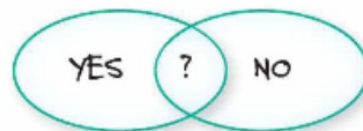Number of Weeks (horizontal axis, 1–10)
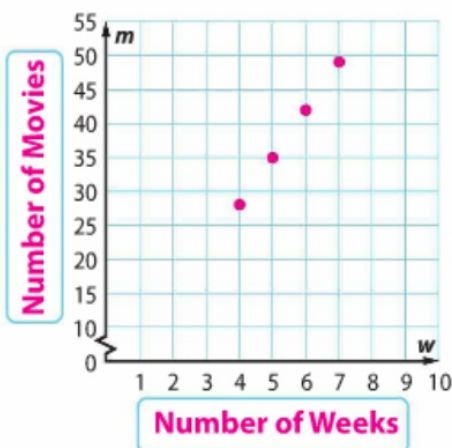
4. ⓔ **Building on the Essential Question** How can you use a graph to write an equation?

Sample answer: Choose two points on the graph and find the slope. Then use the slope and one point in the slope-intercept form of an equation to find the y-intercept. Then write the equation.

1 The number of baskets a company produces each day is shown in the table. (Examples 1 and 2)

Show your work.

a. Write an equation to find the total number of baskets crafted in any number of days. Describe the relationship in words.

$b = 45d$; **Forty-five baskets are produced every day.**

b. Use the equation to determine how many baskets the company makes in one non-leap year. **16,425 baskets**

Number of Days, d	Total Baskets, b
1	45
2	90
3	135
4	180

2. A type of dragonfly is the fastest insect. The graph shows how far the dragonfly can travel. (Examples 3 and 4)

a. Write an equation to find how far the dragonfly can travel d in any number of seconds s. $d = 23s$

b. Use the equation to determine how far the dragonfly can travel in one minute. **1,380 ft**

Distance Traveled (ft)

(5, 115)
(4, 92)
(3, 69)
(2, 46)
(1, 23)

Time (s)
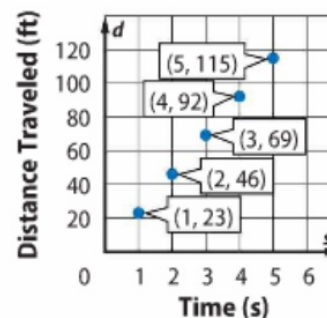
3 A library charges a late return fee of $3.50 plus $0.15 per day that a book is returned late. (Examples 5 and 6)

a. Write an equation to find the total late fee *f* for any number of days late *d*. $f = 3.5 + 0.15d$

b. Make a table to find the total fee if a book is 10, 15, 20, or 25 days late. Then graph the ordered pairs.

d	3.5 + 0.15d	f
10	3.5 + 0.15(10)	5.00
15	3.5 + 0.15(15)	5.75
20	3.5 + 0.15(20)	6.50
25	3.5 + 0.15(25)	7.25

Total Cost ($)

Number of Days
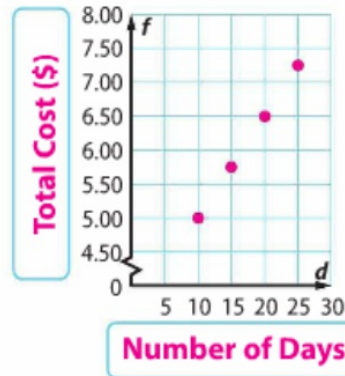
4. **CCSS** **Multiple Representations** The two fastest times for swimming the English Channel belong to Petar Stoychev and Yvetta Hlaváčová. Petar's average speed was 265 feet per minute. Yvetta's average speed was 249 feet per minute.

Time (min)	Petar	Yvetta
1	265	249
2	530	498
3	795	747
4	1,060	996
5	1,325	1,245

a. **Tables** Complete the table of ordered pairs in which the x-coordinate represents the time and the y-coordinate represents the total distance swum in 1, 2, 3, 4, and 5 minutes.
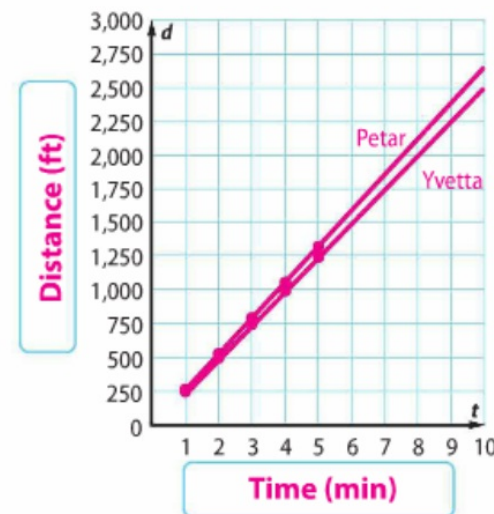
b. **Graphs** Graph each set of ordered pairs on the coordinate plane.

c. **Algebra** Write an equation for each swimmer to find the number of feet swam d in any number of minutes t. **Petar: $d = 265t$; Yvetta: $d = 249t$**

d. **Numbers** If Petar Stoychev swam the Channel in 6 hours, 57 minutes, and 50 seconds, approximately how wide in miles is the English Channel?

(*Hint:* 1 mi = 5,280 ft) **about 21 mi**

H.O.T. Problems Higher Order Thinking

5. **CCSS** **Model with Mathematics** Write an equation with two variables that represents a real-world situation. **Sample answer: $d = 60t$; A car is traveling at a rate of 60 miles per hour.**

6. **CCSS** **Persevere with Problems** The table shows the areas of circles with radii from 1 through 3 feet.

Radius (ft), r	1	2	3
Area (ft²), A	π	4π	9π

Recall that π has a value of about 3. Write an equation in two variables to represent the relation in the table. **$A = \pi \cdot r \cdot r$ or $A = \pi r^2$**

7. **CCSS** **Model with Mathematics** Write about a real-world situation that can be represented by the equation $y = 4x$.

See students' work.