

1-9

Patterns, Equations, and Graphs



Vocabulary

Review

1. Draw a line from each pair of numbers in Column A to its description in Column B.

Column A

Column B

$\frac{5}{6}$ and $-\frac{5}{6}$

opposites (additive inverses)

$\frac{3}{4}$ and $\frac{4}{3}$

reciprocals (multiplicative inverses)

-2 and $-\frac{1}{2}$

Vocabulary Builder

inductive reasoning (noun) in DUK tiv REE zun ing

Definition: Inductive reasoning is the process of reaching a conclusion based on an observed pattern.

Main Idea: You can use inductive reasoning to go from a set of particular observations to a general rule.

Example: Each piece of ice in this bucket is cold. I conclude, by inductive reasoning, that all ice is cold.

Use Your Vocabulary

Use the table at the right for Exercises 2–4. Complete each statement with one of the words or phrases below.

add inductive reasoning multiply pattern subtract

2. To find the value of Item 5, you can look for a ? .

3. To obtain the value for an item, you can ? the item number by itself.

4. You can use ? to predict the value of Item 5.

Item Number	Value
1	1
2	4
3	9
4	16
5	■



Problem 1 Identifying Solutions of a Two-Variable Equation

Got It? Is the ordered pair (5, 20) a solution of the equation $y = 4x$?

5. Complete the reasoning model below.

Think	Write
In (5, 20), I need to identify the x -coordinate and the y -coordinate.	x -coordinate: <input type="text"/> ; y -coordinate: <input type="text"/>
Now I can substitute 5 for x and 20 for y .	$y = 4x$ <input type="text"/> = 4 · <input type="text"/>
Then I can simplify the equation.	<input type="text"/> = <input type="text"/>

6. Is (5, 20) a solution of $y = 4x$?



Problem 2 Using a Table, an Equation, and a Graph

Got It? Will runs 6 laps before Megan joins him at the track. They then run together at the same pace. How can you represent the relationship between the number of laps Will runs and the number of laps Megan runs in different ways? Use a table, an equation, and a graph.

Exercises 7 and 8 help you use a table to represent the relationship.

7. Complete the table.

Number of laps Megan runs	0	1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Number of laps Will runs	6	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

8. Circle the relationship that is represented in the table.

- Will runs 13 more laps than Megan.
- Megan runs 6 times as many laps as Will.
- Will runs 7 more laps than Megan.
- Will runs 6 more laps than Megan.

Exercises 9–11 help you write an equation to represent the relationship.

9. Let x = the number of laps Megan runs.

Then let y = .

10. Underline the correct words to complete the sentence.

In the relationship, y will always be greater than / less than x .

11. Now write an equation to represent the relationship.

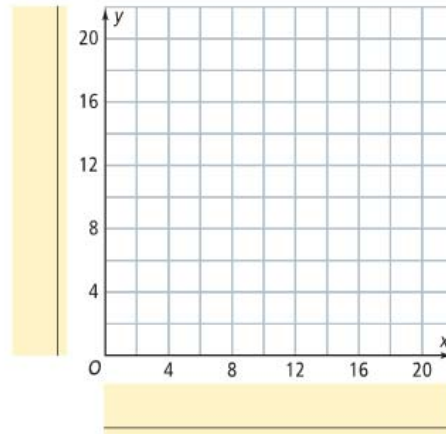
Exercises 12-14 help you graph the relationship.

12. The ordered pair that corresponds to Megan arriving at the track is (, 6).

13. Use the table in Exercise 7. Write three more ordered pairs.

(2,) (, 10) (,)

14. Graph the ordered pairs you wrote in Exercises 12 and 13 on the coordinate plane at the right. Then connect the points with a line. Be sure to label the axes.



Problem 3 Extending a Pattern

Got It? Use the figure below. Make a table showing the number of black (B) tiles and the total number of tiles in each figure. How many tiles in all will be in a figure with 24 black (B) tiles?



15. Complete the table.

Figure	Number of Black (B) Tiles	Total Number of Tiles
1	4	
2		
3		

16. **Multiple Choice** For each new figure, how does the total number of tiles change as the number of black (B) tiles increases by 4?

- A it doubles
 B it triples
 C it increases by 4
 D it increases by 9

17. A figure with 24 black (B) tiles will have total tiles.

Got It? Make a table showing the number of light gray (LG) tiles and the number of white (W) tiles in each figure. How many white (W) tiles will be in a figure with 24 light gray (LG) tiles?

18. Complete the table.

Figure	Number of Light Gray (LG) Tiles	Number of White (W) Tiles
1	1	2
2	<input type="text"/>	<input type="text"/>
3	<input type="text"/>	<input type="text"/>

19. Circle the correct description of the relationship between the figure number and the number of light gray (LG) tiles.

- They are the same.
- The number of light gray (LG) tiles is double the figure number.
- The number of light gray (LG) tiles is triple the figure number.

20. Circle the correct description of the relationship between the number of light gray (LG) tiles and the number of white (W) tiles.

- They are the same.
- The number of white (W) tiles is double the number of light gray (LG) tiles.
- The number of white (W) tiles is triple the number of light gray (LG) tiles.

21. A figure with 24 light gray (LG) tiles will have white (W) tiles.



Lesson Check • Do you UNDERSTAND?

Reasoning Which of (3, 5), (4, 6), (5, 7), and (6, 8) are solutions of $y = x + 2$?
What is the pattern in the solutions of $y = x + 2$?

22. Check each ordered pair in the equation $y = x + 2$. Circle the solutions.

- (3, 5)
- (4, 6)
- (5, 7)
- (6, 8)

23. In Exercise 22, each value of y is each value of x .

24. Describe the pattern in the solutions of $y = x + 2$.



Math Success

Check off the vocabulary words that you understand.

- solution of an equation
- inductive reasoning

Rate how well you can *identify solutions of a two-variable equation*.



