LESSON 23

Linear and Nonlinear Relations

Review It!

When you work with linear and non-linear relations, remember these words:

linear relation a relation with a graph that is a line

nonlinear relation a relation with a graph that is NOT a line

Determine whether the relation $y = x^3$ is linear or nonlinear.

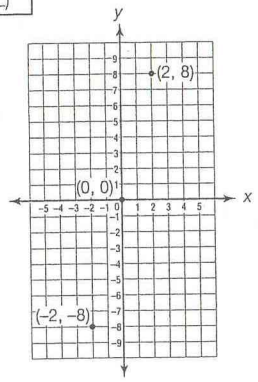
Step 1 Make a table of values.

REMEMBER
neg × neg × neg = neg

x	$y = x^3$	y	(x, y)
−2	$y = (-2)^3 = -8$	−8	(−2, −8)
−1	$y = (-1)^3 = -1$	−1	(−1, _____)
0	$y = (0)^3 = 0$	_____	(0, _____)
1	$y = (1)^3 =$ _____	_____	(1, _____)
2	$y =$ (_____)$^3 =$ _____	_____	(2, _____)

Step 2 Finish graphing the ordered pairs.

Step 3 See if the points form a line.
Connect the points.
You cannot draw a line through all the points.



So, the relation $y = x^3$ is a _____ relation.

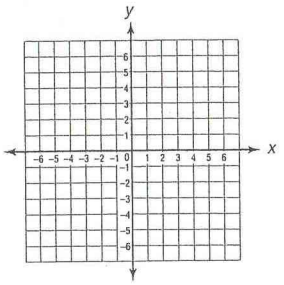
Try It!

Complete the table and graph the ordered pairs. Then write *linear* or *nonlinear* to describe the relation.

Ask Yourself

1. $y = 2x + 1$

x	y	(x, y)
−2	−3	(−2, −3)
−1	_____	_____
0	_____	_____
1	_____	_____
2	_____	_____

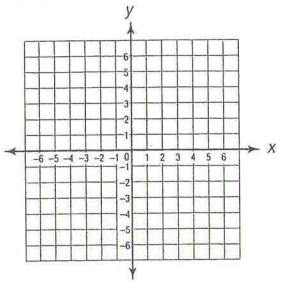


_____

1. What is $2x$ when $x = 0$? 20, or 2×0?

2. $y = x^2$

x	y	(x, y)
−2	4	_____
−1	_____	_____
0	_____	_____
1	_____	_____
2	_____	_____

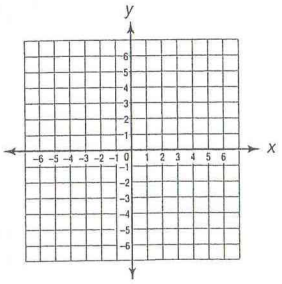


_____

2. What is $(-2)^2$? −4, or 4?

3. $y = x^2 + 1$

x	y	(x, y)
−2	5	_____
−1	_____	_____
0	_____	_____
1	_____	_____
2	_____	_____



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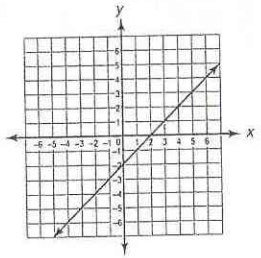
3. What does the graph of a linear relation look like? line, or curve?

On Your Own!

Circle the best answer for each question.

1. What is the equation of the relation shown in the graph?



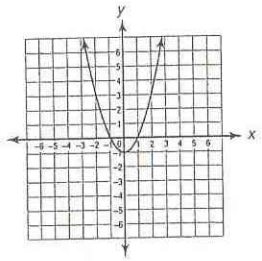
A. $y = x^3 - 2$

B. $y = x^2 - 2$

C. $y = x - 2$

D. $y = \frac{x}{2}$

2. What is the equation of the relation shown in the graph?



A. $y = x - 1$

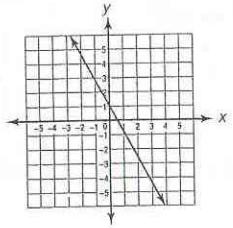
B. $y = x^2 - 1$

C. $y = 3x - 1$

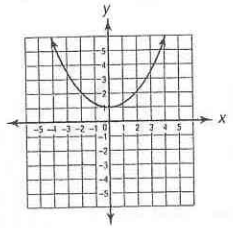
D. $y = 2x + 1$

3. Which is the graph of a linear relation?

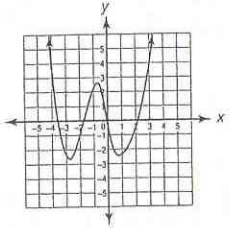
A.



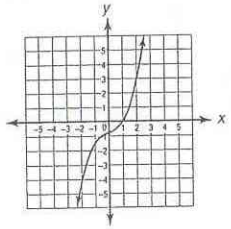
B.



C.



D.

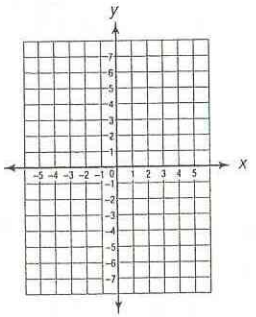


4. Use the equation $y = x^2 + 2$.

Part A Complete the table.

x	y	(x, y)
−2	_____	_____
−1	_____	_____
0	_____	_____
1	_____	_____
2	_____	_____

Part B Graph the relation $y = x^2 + 2$.



Part C Determine whether the relation is linear or nonlinear.

_____

Math Words

Fill in the blanks.

5. The graph of a _____ relation is a line.

6. The graph of a _____ relation is NOT a line.