

## TABLES, EQUATIONS, AND GRAPHS

#6

An input/output table provides the opportunity to find the rule that determines the output value for each input value. If you already know the rule, the table is one way to find points to graph the equation, which in this course will usually be written in  $y$ -form as  $y = mx + b$ . Review the information in the Tool Kit entry on page 96 in the textbook, then use the following examples and problems to practice these skills.

### Example 1

Use the input/output table below to find the pattern (rule) that pairs each  $x$ -value with its  $y$ -value. Write the rule below  $x$  in the table, then write the equation in  $y$ -form.

x (input)	-1	3	2	-3	1	0	-4	4	-2	x
y (output)		5			1	-1		7	-5	

Use a guess and check approach to test various patterns. Since  $(3, 5)$  is in the table, try  $y = x + 2$  and test another input value,  $x = 1$ , to see if the same rule works. Unfortunately, this is not true. Next try  $2x$  and add or subtract values. For  $(4, 7)$ ,  $2(4) - 1 = 7$ . Now try  $(-2, -5)$ :  $2(-2) - 1 = -5$ . Test  $(3, 5)$ :  $2(3) - 1 = 5$ . It appears that the equation for this table is  $y = 2x - 1$ .

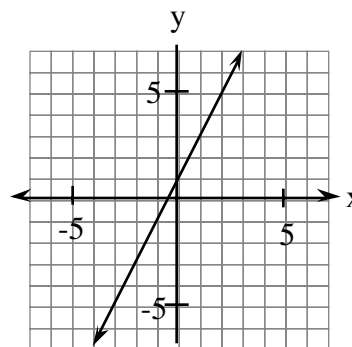
### Example 2

Find the missing values for  $y = 2x + 1$  and graph the equation. Each output value is found by substituting the input value for  $x$ , multiplying it by 2, then adding 1.

x (input)	-3	-2	-1	0	1	2	3	4	5	x
y (output)	-5				3		7			$2x+1$

- $x$ -values are referred to as inputs. The set of all input values is the domain.
- $y$ -values are referred to as outputs. The set of all output values is the range.

Use the pairs of input/output values in the table to graph the equation. A portion of the graph is shown at right.



For each input/output table below, find the missing values, write the rule for  $x$ , then write the equation in  $y$ -form.

1.

input x	-3	-2	-1	0	1	2	3	x
output y			-1	1			7	

2.

input x	-3	-2	-1	0	1	2	3	x
output y	0		2			5		

3.

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

4.

input x	-3	-2	-1	0	1	2	3	x
output y	-10			-1			8	

5.

input x	2	7		-3		-4	3	x
output y	10		8	-10	22			

6.

input x	0	5		-6		3	7	x
output y	3		1	-9	-1	9		-5

7.

input x	4	3	-2	0	1	-5	-1	x
output y		-11		-5			-3	

8.

input x	6		0	7		-2	-1	x
output y		-6	-3		2		-4	1

9.

input x	$-\frac{1}{2}$	0	0.3	0.5	0.75	$\frac{5}{4}$	3.2	x
output y	0		0.8			$\frac{7}{4}$		

10.

input x	$-\frac{3}{4}$	$-\frac{1}{2}$	$-\frac{1}{4}$	0	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	x
output y		$-\frac{1}{4}$		0			$\frac{3}{8}$		

11.

input x	-3	-2	-1	0	1	2	3	x
output y		5		3		1		

12.

input x	-3	-2	-1	0	1	2	3	4	x
output y		2		-2		-6			

13.

input x	5	-2		0		4		x
output y		5	-21	-3	13		9	

14.

input x	5	6	-3		7	4		2	x
output y	2		10	16			1	5	

15.

input x	-3	-2	-1	0	1	2	3	x
output y		4		0			9	

16.

input x	-3	-2	-1	0	1	2	3	x
output y	10		2			5		

Make an input/output table and use it to draw a graph for each of the following equations. Use inputs (domain values) of  $-3 \leq x \leq 3$ .

17.  $y = x + 5$

18.  $y = -x + 4$

19.  $y = 2x + 3$

20.  $y = \frac{1}{2}x - 2$

21.  $y = -\frac{2}{3}x + 3$

22.  $y = 2$

23.  $y = x^2 + 3$

24.  $y = -x^2 - 4$

## Answers

1.  $y = 2x + 1$

input x	-3	-2	-1	0	1	2	3	x
output y	-5	-3	-1	1	3	5	7	$2x + 1$

3.  $y = x - 2$

input x	-3	-2	-1	0	1	2	3	x
output y	-5	-4	-3	-2	-1	0	1	$x - 2$

5.  $y = 4x + 2$

input x	2	7	$\frac{3}{2}$	-3	5	-4	3	x
output y	10	30	8	-10	22	-14	14	$4x + 2$

7.  $y = -2x - 5$

input x	4	3	-2	0	1	-5	-1	x
output y	-13	-11	-1	-5	-7	5	-3	$-2x - 5$

9.  $y = x + 0.5$

input x	$-\frac{1}{2}$	0	0.3	0.5	0.75	$\frac{5}{4}$	3.2	x
output y	0	0.5	0.8	1	1.25	$\frac{7}{4}$	3.7	$x + .5$

11.

input x	-3	-2	-1	0	1	2	3	x
output y	6	5	4	3	2	1	0	$-x + 3$

13.

input x	5	-2	4.5	0	-4	4	-3	x
output y	-23	5	-21	-3	13	-19	9	$-4x - 3$

15.

input x	-3	-2	-1	0	1	2	3	x
output y	9	4	1	0	1	4	9	$x^2$

17.

input x	-3	-2	-1	0	1	2	3
output y	2	3	4	5	6	7	8

19.

input x	-3	-2	-1	0	1	2	3
output y	-3	-1	1	3	5	7	9

21.

input x	-3	-2	-1	0	1	2	3
output y	5	$4\frac{1}{3}$	$3\frac{2}{3}$	3	$2\frac{1}{3}$	$1\frac{2}{3}$	1

23.

input x	-3	-2	-1	0	1	2	3
output y	12	7	4	3	4	7	12

2.  $y = x + 3$

input x	-3	-2	-1	0	1	2	3	x
output y	0	1	2	3	4	5	6	$x + 3$

4.  $y = 3x - 1$

input x	-3	-2	-1	0	1	2	3	x
output y	-10	-7	-4	-1	2	5	8	$3x - 1$

6.  $y = 2x + 3$

input x	0	5	-1	-6	-2	3	7	-4	x
output y	3	13	1	-9	-1	9	17	-5	$2x + 3$

8.  $y = x - 3$

input x	6	-3	0	7	5	-2	-1	4	x
output y	3	-6	-3	4	2	-5	-4	1	$x - 3$

10.  $y = \frac{1}{2}x$

input x	$-\frac{3}{4}$	$-\frac{1}{2}$	$-\frac{1}{4}$	0	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	x
output y	$-\frac{3}{8}$	$-\frac{1}{4}$	$-\frac{1}{8}$	0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}x$

12.

input x	-3	-2	-1	0	1	2	3	4	x
output y	4	2	0	-2	-4	-6	-8	-10	$-2x - 2$

14.

input x	5	6	-3	-9	7	4	6	2	x
output y	2	1	10	16	0	3	1	5	$-x + 7$

16.

input x	-3	-2	-1	0	1	2	3	x
output y	10	5	2	1	2	5	10	$x^2 + 1$

18.

input x	-3	-2	-1	0	1	2	3
output y	7	6	5	4	3	2	1

20.

input x	-3	-2	-1	0	1	2	3
output y	-3.5	-3	-2.5	-2	-1.5	-1	-0.5

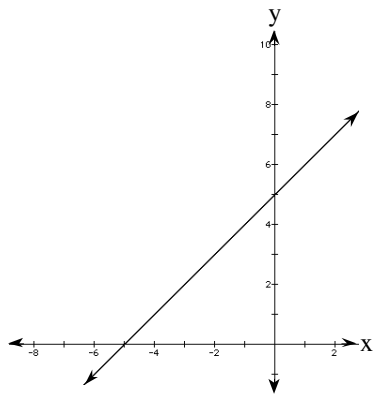
22.

input x	-3	-2	-1	0	1	2	3
output y	2	2	2	2	2	2	2

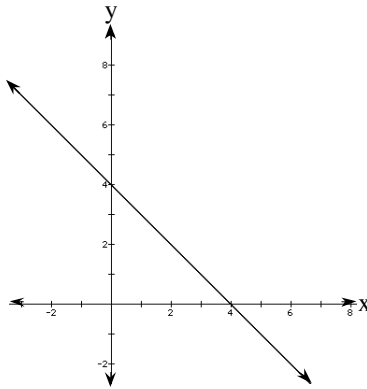
24.

input x	-3	-2	-1	0	1	2	3
output y	-13	-8	-5	-4	-5	-8	-13

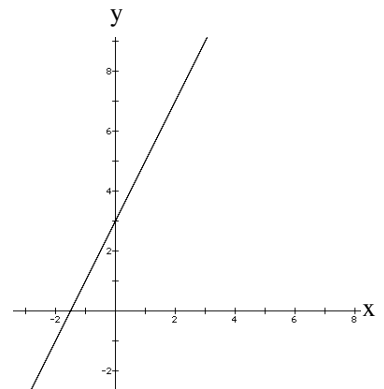
17.



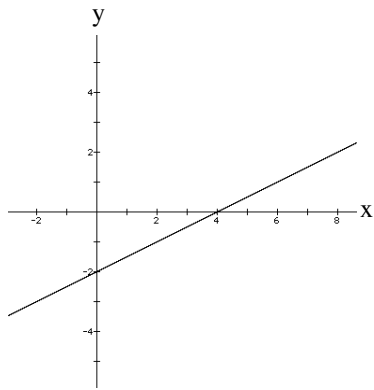
18.



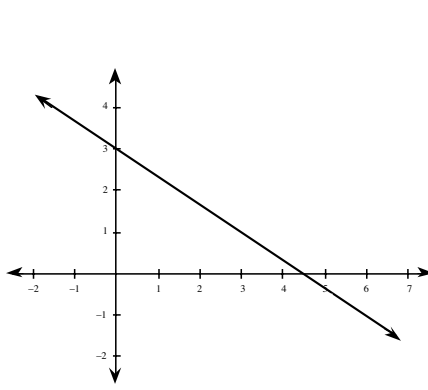
19.



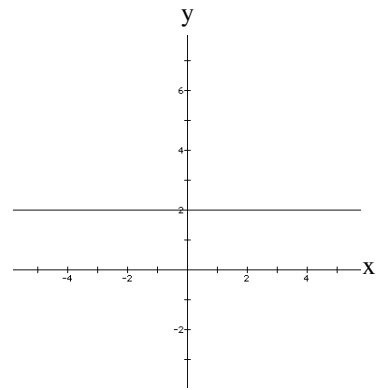
20.



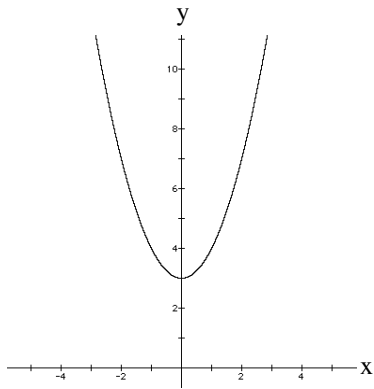
21.



22.



23.



24.

