**Lesson 4-4**

## Example 1 Solve Using a Replacement Set

**Find the solution set for $3x - 2y = 5$, given the replacement set {(3, 4), (5, 5), (-1, -4), (0, 2)}.**

Make a table. Substitute each ordered pair into the equation.

| $x$ | $y$ | $3x - 2y = 5$ | True or False? |
|---|---|---|---|
| 3 | 4 | $3(3) - 2(4) = 5$ | |
| | | $1 = 5$ | False |
| 5 | 5 | $3(5) - 2(5) = 5$ | |
| | | $5 = 5$ | True ✓ |
| -1 | -4 | $3(-1) - 2(-4) = 5$ | |
| | | $5 = 5$ | True ✓ |
| 0 | 2 | $3(0) - 2(2) = 5$ | |
| | | $-4 = 5$ | False |

The ordered pairs (5, 5) and (-1, -4) result in true statements. The solution set is {(5, 5), (-1, -4)}.

## Example 2 Solve Using a Given Domain

**Solve $y = 3x + 1$ if the domain is {-4, -2, 0, 2, 4}.**

Make a table. The values of $x$ come from the domain. Substitute each value of $x$ into the equation to determine the values of $y$ in the range.

| $x$ | $3x + 1$ | $y$ | $(x, y)$ |
|---|---|---|---|
| -4 | 3(-4) + 1 | -11 | (-4, -11) |
| -2 | 3(-2) + 1 | -5 | (-2, -5) |
| 0 | 3(0) + 1 | 1 | (0, 1) |
| 2 | 3(2) + 1 | 7 | (2, 7) |
| 4 | 3(4) + 1 | 13 | (4, 13) |

The solution set is {(-4, -11), (-2, -5), (0, 1), (2, 7), (4, 13)}.

## Example 3 Solve and Graph the Solution Set

**Solve $2x - y = 3$ if the domain is {-5, -2, 0, 1, 3}. Graph the solution set.**

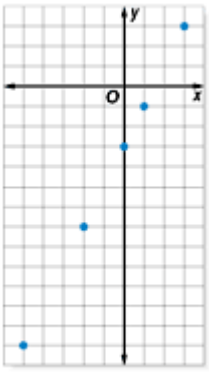
First solve the equation for $y$ in terms of $x$. This makes creating a table of values easier.

| | |
|---|---|
| $2x - y = 3$ | Original equation |
| $2x - y + y = 3 + y$ | Add $y$ to each side. |
| $2x = 3 + y$ | Simplify. |
| $2x - 3 = 3 + y - 3$ | Subtract 3 from each side. |
| $2x - 3 = y$ | Simplify. |

Substitute each value of $x$ from the domain to determine the corresponding values of $y$ in the range.

| $x$ | $2x - 3$ | $y$ | $(x, y)$ |
|---|---|---|---|
| -5 | 2(-5) - 3 | -13 | (-5, -13) |
| -2 | 2(-2) - 3 | -7 | (-2, -7) |
| 0 | 2(0) - 3 | -3 | (0, -3) |
| 1 | 2(1) - 3 | -1 | (1, -1) |
| 3 | 2(3) - 3 | 3 | (3, 3) |

Graph the solution set {(-5, -13), (-2, -7), (0, -3), (1, -1), (3, 3)}.



## Example 4 Solve for a Dependent Variable

**Aiden is planning a vacation. He wants to find the time it will take him to drive to several cities. Following is a table of driving distances between Kansas City Missouri (Aiden's home) and several other cities. Use the formula for *d* = *rt* to find the time that it would take Aiden to drive to each of the cities considering that he will drive at a constant speed of 70 miles per hour. Then graph the ordered pairs by graphing distance *d* on the *x*-axis and time *t* on the *y*-axis.**

| **City** | Atlanta | Boston | Denver | Des Moines | Seattle |
|---|---|---|---|---|---|
| **Distance (miles)** | 798 | 1391 | 600 | 195 | 1839 |

**Source:** *The World Almanac*

**Explore** In the equation $d = rt$, $d$ represents the distance traveled, $r$ represents the rate traveled, and $t$ represents the time traveled. Aiden traveled at a constant rate of 70 miles per hour so the equation is now $d = 70t$. We are given distances and want to find the time. Solve the equation for $t$ since the values of $t$ depend on the values of $d$.

$d = 70t$ Original equation

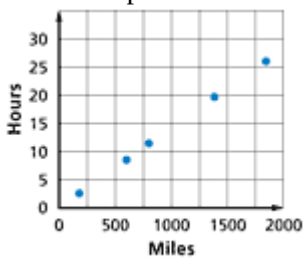
$\frac{d}{70} = \frac{70t}{70}$ Divide each side by 70.

$\frac{d}{70} = t$ Simplify.

**Plan** The values of $d$, {798, 1391, 600, 195, 1839} are the domain. Use the equation $\frac{d}{70} = t$ to find the values for the range.

**Solve** Make a table of values. Substitute each value of $d$ from the domain to determine the corresponding values of $t$. Round values to the nearest 1 decimal place.

| $d$ | $\frac{d}{70}$ | $t$ | $(d, t)$ |
|---|---|---|---|
| 798 | $\frac{798}{70}$ | 11.4 | (798, 11.4) |
| 1391 | $\frac{1391}{70}$ | 19.9 | (1391, 19.9) |
| 600 | $\frac{600}{70}$ | 8.6 | (600, 8.6) |
| 195 | $\frac{195}{70}$ | 2.8 | (195, 2.8) |
| 1839 | $\frac{1839}{70}$ | 26.3 | (1839, 26.3) |




Graph the ordered pairs. Notice that the values for the independent variable $d$ are graphed along the horizontal axis, and the values for the dependent variable $t$ are graphed along the vertical axis.

**Examine** Look at the values in the range. The farther the distance, the longer the time it took to travel. Do the results make sense?

| **City** | **Distance (miles)** | **Time (hours)** |
|---|---|---|
| Atlanta | 798 | 11.4 |
| Boston | 1391 | 19.9 |
| Denver | 600 | 8.6 |
| Des Moines | 195 | 2.8 |
| Seattle | 1839 | 26.3 |