

## Exercise 50

For the following exercises, which of the tables could represent a linear function? For each that could be linear, find a linear equation that models the data.

$x$	5	10	20	25
$k(x)$	13	28	58	73

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### Solution

This table represents a linear function because as  $x$  increases by 5,  $k(x)$  increases by 15. Two points on this line are

$$(5, 13) \text{ and } (10, 28).$$

The general equation for a line is

$$y = mx + b.$$

The first point says that when  $x = 5$ ,  $y = 13$ .

$$13 = m(5) + b$$

The second point says that when  $x = 10$ ,  $y = 28$ .

$$28 = m(10) + b$$

This is a system of two equations with two unknowns that can be solved.

$$\begin{cases} 5m + b = 13 \\ 10m + b = 28 \end{cases}$$

Subtract the respective sides of these equations to eliminate  $b$ .

$$5m - 10m = 13 - 28 \quad \rightarrow \quad -5m = -15 \quad \rightarrow \quad m = 3$$

Multiply both sides of the first equation by  $-2$

$$\begin{cases} -10m - 2b = -26 \\ 10m + b = 28 \end{cases}$$

and add the respective sides to eliminate  $m$ .

$$-2b + b = -26 + 28 \quad \rightarrow \quad -b = 2 \quad \rightarrow \quad b = -2$$

Now that  $m$  and  $b$  have been solved for, the line is known.

$$y = 3x - 2$$