12.1 Model Inverse Variation

TEKS A.1.C, A.1.D, A.11.B; 2A.10.G

Before You wrote and graphed direct variation equations.

Now You will write and graph inverse variation equations.

Why? So you can find a person's work time, as in Example 6.

Key Vocabulary
- **inverse variation**
- **constant of variation**
- **hyperbola**
- **branches of a hyperbola**
- **asymptotes of a hyperbola**

Recall that two variables x and y show direct variation if $y = ax$ and $a \neq 0$. The variables x and y show **inverse variation** if $y = \frac{a}{x}$ and $a \neq 0$. The nonzero number a is the **constant of variation**, and y is said to *vary inversely* with x.

EXAMPLE 1 Identify direct and inverse variation

Tell whether the equation represents *direct variation*, *inverse variation*, or *neither*.

a. $xy = 4$ **b.** $\frac{y}{2} = x$ **c.** $y = 2x + 3$

Solution

a. $xy = 4$ Write original equation.

$y = \frac{4}{x}$ Divide each side by x.

Because $xy = 4$ can be written in the form $y = \frac{a}{x}$, $xy = 4$ represents inverse variation. The constant of variation is 4.

b. $\frac{y}{2} = x$ Write original equation.

$y = 2x$ Multiply each side by 2.

Because $\frac{y}{2} = x$ can be written in the form $y = ax$, $\frac{y}{2} = x$ represents direct variation.

c. Because $y = 2x + 3$ cannot be written in the form $y = \frac{a}{x}$ or $y = ax$, $y = 2x + 3$ does not represent either direct variation or inverse variation.

GUIDED PRACTICE for Example 1

Tell whether the equation represents *direct variation*, *inverse variation*, or *neither*.

1. $y = \frac{2}{x}$ **2.** $4y = 3x$ **3.** $5x - y = 3$ **4.** $xy = \frac{1}{2}$