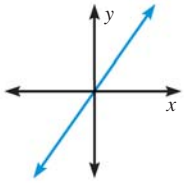
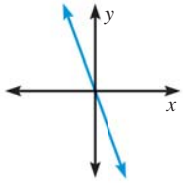
CONCEPT SUMMARY — For Your Notebook

Graphs of Direct Variation and Inverse Variation Equations

Direct variation

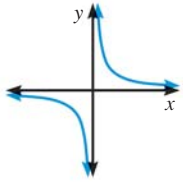


$y = ax, a > 0$

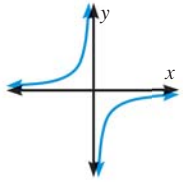


$y = ax, a < 0$

Inverse variation



$y = \frac{a}{x}, a > 0$



$y = \frac{a}{x}, a < 0$

HYPERBOLAS The graph of the inverse variation equation $y = \frac{a}{x}$ $(a \neq 0)$ is a **hyperbola**. The two symmetrical parts of a hyperbola are called the **branches of the hyperbola**. The lines that the hyperbola approaches but doesn't intersect are called the **asymptotes of the hyperbola**. The asymptotes of the graph of $y = \frac{a}{x}$ are the x-axis and the y-axis.

EXAMPLE 4 Use an inverse variation equation

The variables x and y vary inversely, and $y = 6$ when $x = -3$.

a. Write an inverse variation equation that relates x and y.

b. Find the value of y when $x = 4$.

Solution

a. Because y varies inversely with x, the equation has the form $y = \frac{a}{x}$.

Use the fact that $x = -3$ and $y = 6$ to find the value of a.

$y = \frac{a}{x}$ — Write inverse variation equation.

$6 = \frac{a}{-3}$ — Substitute -3 for x and 6 for y.

$-18 = a$ — Multiply each side by -3.

An equation that relates x and y is $y = \frac{-18}{x}$.

b. When $x = 4$, $y = \frac{-18}{4} = -\frac{9}{2}$.

GUIDED PRACTICE for Examples 2, 3, and 4

5. Graph **(a)** $y = \frac{3}{x}$ and **(b)** $y = \frac{-3}{x}$.

6. The variables x and y vary inversely, and $y = -2$ when $x = 12$. Write an inverse variation equation that relates x and y. Then find the value of y when $x = -3$.