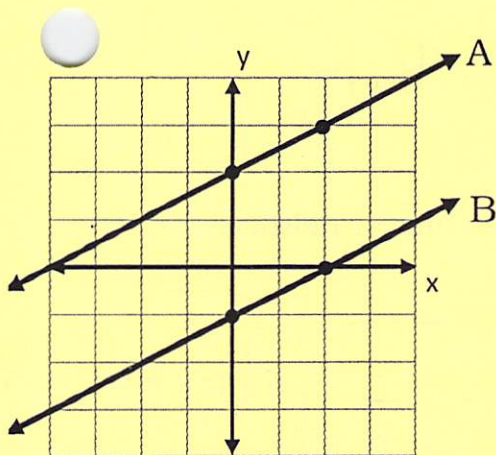# 6-6 Parallel and Perpendicular Lines

Lines A and B are **Parallel**. What does this mean?

The lines don't cross.
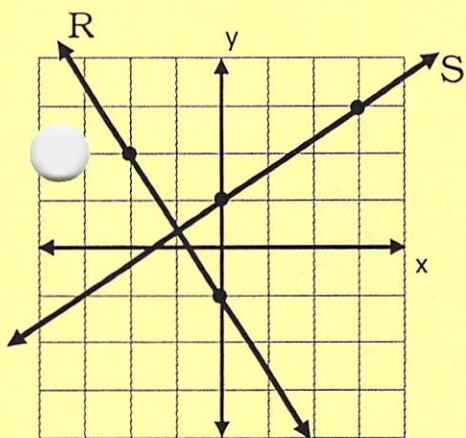
Write the equation of line A.

$$y = \left(\frac{1}{2}\right)x + 2$$

Write the equation of line B.

$$y = \left(\frac{1}{2}\right)x - 1$$

Parallel Lines have **Same Slope**

Lines R and S are **Perpendicular**. What does this mean?

Cross at 90° angles (right ∡'s)

Write the equation of line R.

$$y = \left(-\frac{3}{2}\right)x - 1$$

Write the equation of line S.

$$y = \left(\frac{2}{3}\right)x + 1$$

$$-\frac{3}{2} \rightarrow +\frac{2}{3}$$

Perpendicular Lines have **Slopes that are negative reciprocals.**

$$-\frac{3}{2} \quad \frac{1}{4} \quad -\frac{2}{5}$$

Quick Check:

1. Write the equation of a line parallel to the line $y = 5x - 4$.

$$y = 5x + 3$$

2. Write the equation of a line perpendicular to the line $y = 5x - 4$

$$m = \frac{5}{1} \qquad \boxed{m_\perp = -\frac{1}{5}} \qquad y = -\frac{1}{5}x + 4$$

3. Are the graphs of $y = -3x + 4$ and $2y = 6x - 4$ parallel, perpendicular or neither?

same   negative reciprocals

$m = -3$

$\dfrac{2y}{2} = \dfrac{6x}{2} - \dfrac{4}{2}$

$y = 3x - 2$ Neither

$m = 3$

4. Are the graphs of $y = \dfrac{3}{4}x + 9$ and $3y - 9 = -4x$ parallel, perpendicular or neither?

$+9 \qquad +9$

$m = \dfrac{3}{4}$

$\dfrac{3y}{3} = \dfrac{-4x}{3} + \dfrac{9}{3}$
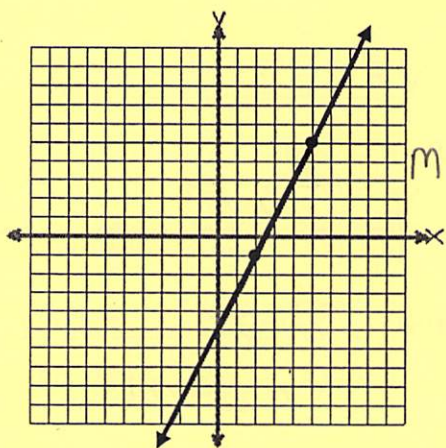
$y = -\dfrac{4}{3}x + 3$
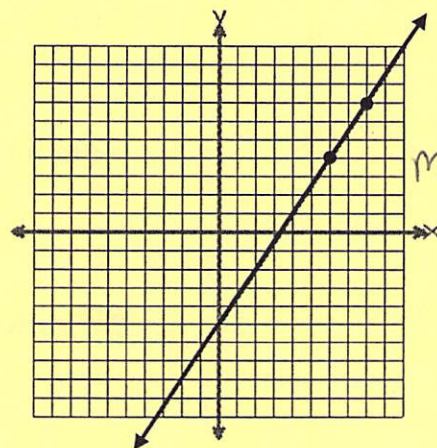
$m = -\dfrac{4}{3}$ Perpendicular

5. Are the graphs of $y = 5$ and $x = 2$ parallel, perpendicular or neither?

Perpendicular

Examine the following graphs of Linear Equations
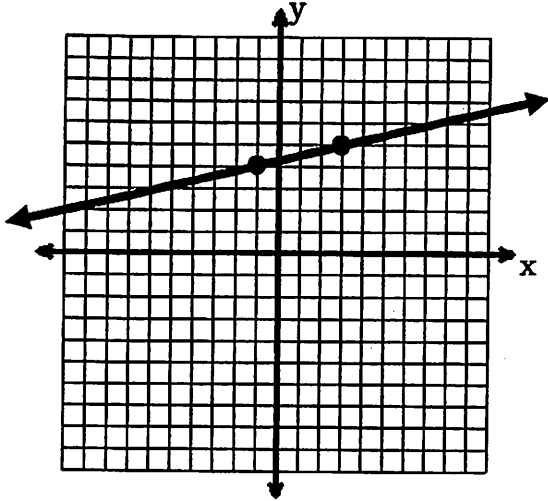

$m = \dfrac{6}{3} = 2$

$m = \dfrac{3}{2}$

6. Are the two lines parallel to each other? Justify your answer.

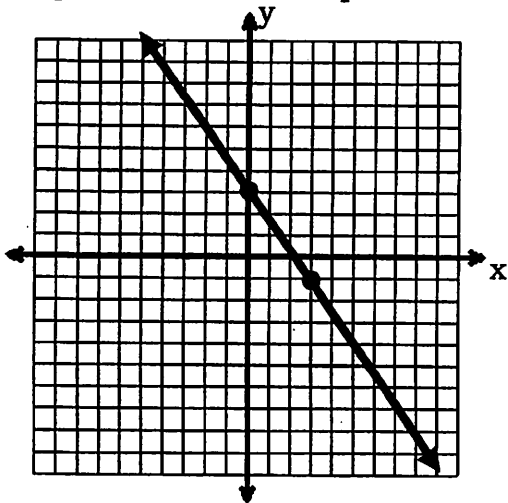The lines are not parallel because they do not have equal slopes.

1. Graph **and** write the equation of a line that is **parallel** to the line graphed below.

2. Graph **and** write the equation of a line that is **perpendicular** to the line graphed below.

3. Which equation represents a line that is parallel to the line $y = 3 - 2x$?

(1) $4x + 2y = 5$ (2) $2x + 4y = 1$ (3) $y = 3 - 4x$ (4) $y = 4x - 2$

4. Which equation represents a line that is perpendicular to the line $y = 3$?

(1) $y = 4$ (2) $y = 3x + 7$ (3) $y = x$ (4) $x = 4$

5. Which equation represents a line that is parallel to the *x-axis*?

(1) $x = y$ (2) $y = 10$ (3) $x = 10$ (4) $y = x + 10$