7.4 Warm-Up

$y = mx + b$

$Ax + By + C = 0$

$y - y_1 = m(x - x_1)$ change to slope intercept $y = mx + b$

1. Identify the slope of each linear equation.

a) $3x - y + 8 = 0$

$+y \quad +y$

$3x + 8 = y$ $\quad$ $m = 3$

b) $2x - 5y + 7 = 0$

$-2x \quad -7 \mid -2x - 7$

$-5y = -2x - 7$

$\dfrac{-5y}{-5} \mid \dfrac{-2x - 7}{-5}$

$y = \dfrac{2}{5}x + \dfrac{7}{5}$

$\dfrac{2x + 7 - 5y}{5} \quad \dfrac{}{5}$

$\dfrac{2}{5}x + \dfrac{7}{5} = y$

2. Write the equation of each line in slope-point form.

a) slope of $\dfrac{2}{3}$ and passing through $(-1, 5)$

$y - \square = m(x - \square)$

$y - 5 = \dfrac{2}{3}(x - (-1))$

$y - 5 = \dfrac{2}{3}(x + 1)$

b) passing through $(4, 2)$ and $(8, 3)$

$y - 2 = \dfrac{1}{4}(x - 4)$

$\underline{or}$

$y - 3 = \dfrac{1}{4}(x - 8)$

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{2 - 3}{4 - 8}$

$= \dfrac{-1}{-4} \text{ or } \dfrac{1}{4}$

3. Write the equation of each line in slope-intercept form.

a) slope of -4 and passing through $(2, 7)$

$y - 7 = -4(x - 2)$

$y - 7 = -4x + 8$

$\underline{\quad +7 \qquad\qquad +7 \quad}$

$y = -4x + 15$

b) passing through $(2, 5)$ and $(0, 6)$

$y - 6 = -\dfrac{1}{2}(x - 0)$

$y - 6 = -\dfrac{1}{2}x$

$y = -\dfrac{1}{2}x + 6$

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{5 - 6}{2 - 0}$

$= -\dfrac{1}{2}$

4. Write an equation in general form of the line that passes through $(3, 7)$ and $(5, -1)$.

$y - = m(x -)$

$y - 7 = -4(x - 3)$

$y - 7 = -4x + 12$

$y = -4x + 19$

$\boxed{0 = -4x - y + 19}$

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{7 - -1}{3 - 5} = \dfrac{8}{-2} = -4$

5. Complete each statement.

a) $\dfrac{2}{3}$ is to $-\dfrac{3}{2}$ as $\dfrac{4}{5}$ is to $\square$. $-\dfrac{5}{4}$

b) -4 is to $\dfrac{1}{4}$ as -3 is to $\square$. $\dfrac{1}{3}$

c) $\dfrac{1}{2}$ is to -2 as $-\dfrac{1}{5}$ is to $\square$. 5
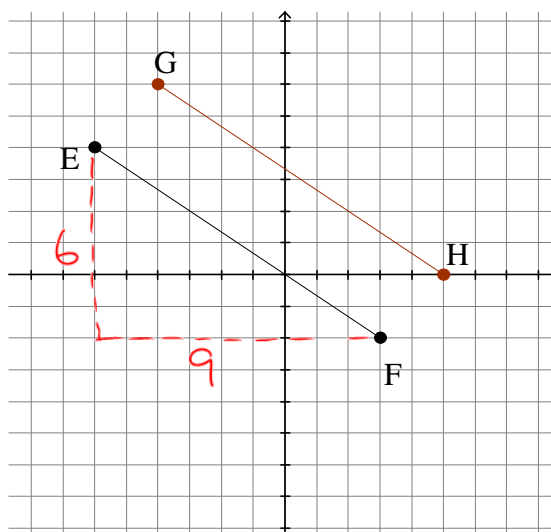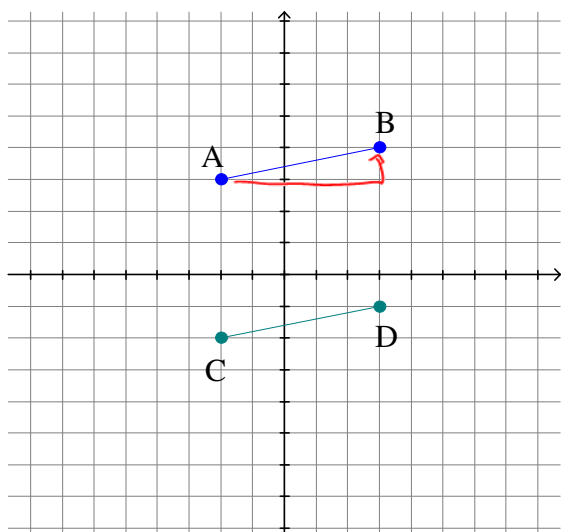
Parallel lines have equal slopes

Perpendicular lines are opposite AND reciprocal

7.4 Parallel and Perpendicular Lines

Objectives:
- Relate the slopes of parallel lines
- Relate the slopes of perpendicular lines
- Solve problems using parallel and perpendicular lines

Find the slopes of each of the line segments below.
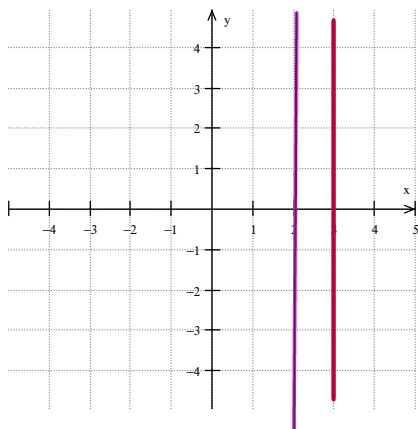
m_{AB} = $\dfrac{1}{5}$

m_{CD} = $\dfrac{1}{5}$

m_{EF} = $-\dfrac{2}{3}$

m_{GH} = $-\dfrac{2}{3}$

What do you notice about the slopes of parallel lines?

Parallel Lines: have the same slope and
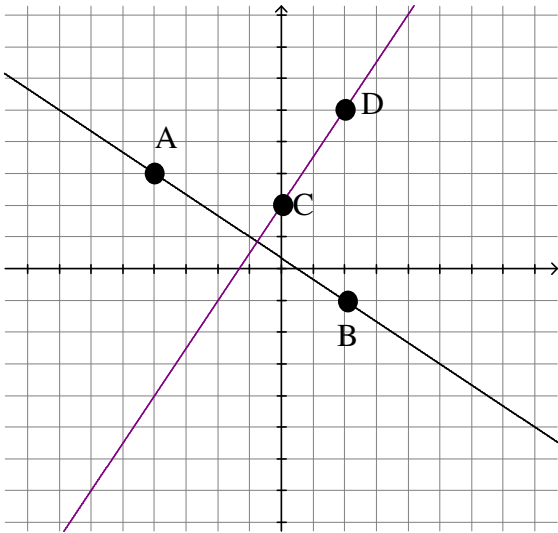2 lines with the same slope are parallel

The line shown has a slope of ___n.p.___

Draw a parallel line on the same grid. What is the slope of the parallel line?

slope of parallel line = n.p.

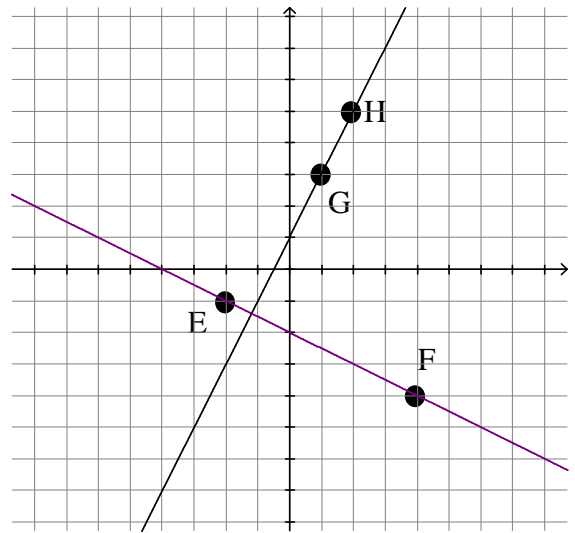x=2   x=3

Find the slopes of each of the following pairs of perpendicular lines. **Write all answers as fractions in lowest terms**:

$m_{AB} = -\dfrac{2}{3}$

$m_{CD} = \dfrac{3}{2}$

$m_{EF} = -\dfrac{1}{2}$

$m_{GH} = \dfrac{2}{1}$

Perpendicular Lines: have slopes that are opposites and reciprocals

$m = \dfrac{2}{7}$ and $-\dfrac{7}{2}$ are perpendicular

Draw the line given by the equation:

3x + 6y - 12 = 0.
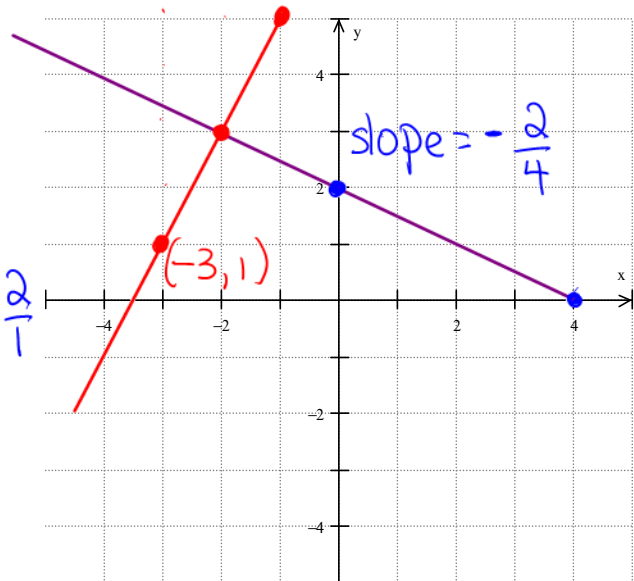
x	y
0	2
4	0

Draw the perpendicular line that passes through (-3,1) and find its equation.

perpendicular slope = $\dfrac{4}{2}$ or $\dfrac{2}{1}$
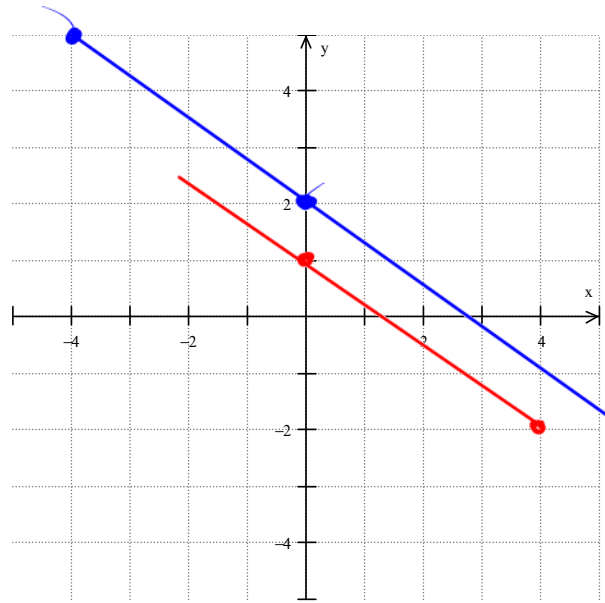
Point slope

$y - k = m(x - h)$

$y - 1 = \dfrac{2}{1}(x + 3)$

slope $= -\dfrac{2}{4}$

(-3, 1)

Draw the lines given by the equations:

$3x + 4y - 8 = 0$

$-4y \qquad -4y$

$\dfrac{3x - 8 = -4y}{-4} \qquad \dfrac{}{-4}$

$6x + 8y - 8 = 0$

$-8y \qquad -8y$

$\dfrac{6x - 8 = -8y}{-8} \qquad \dfrac{}{-8}$

$-\frac{3}{4}x + 2 = y$

The lines are __parallel__ because:

$-\frac{6}{8}x + 1 = y$

they have the same slope

$\boxed{y = \frac{-3}{4}x + 1}$

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Find the equation of a perpendicular line to $3x + 4y - 6 = 0$

Some different methods you could try include:

① need to find the slope

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

$y = \frac{4}{3}x + \square$

find slope $3x + 4y - 6 = 0$

$-4y \qquad -4y$

$\dfrac{3x - 6 = -4y}{-4} \qquad \dfrac{}{-4}$

$-\frac{3}{4}x + \frac{6}{4} = y$

Three coordinates A(-1,-1), B(3,-2) and C(4,3) form a triangle. Is this a right triangle?

no. in order for angle B to be a 90° angle, the slope of AB must be perpendicular to slope of BC.
They are not perpendicular because they are not opposite and reciprocal.

$m = \frac{5}{1}$

$m = -\frac{1}{4}$ B

?