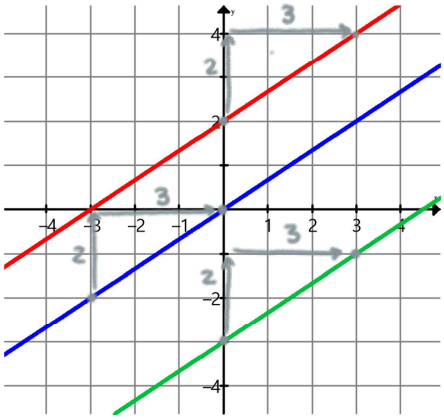
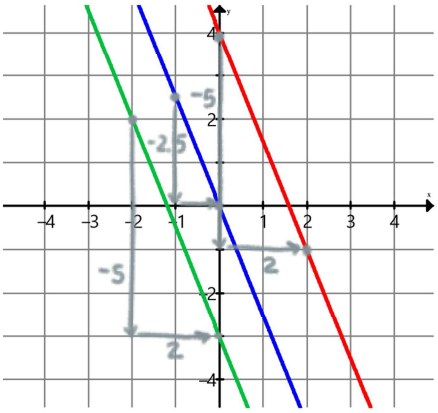
7.4 Parallel and Perpendicular Lines

Math 10 **Parallel and Perpendicular Lines**

The following sets of lines are parallel. What do they have in common?





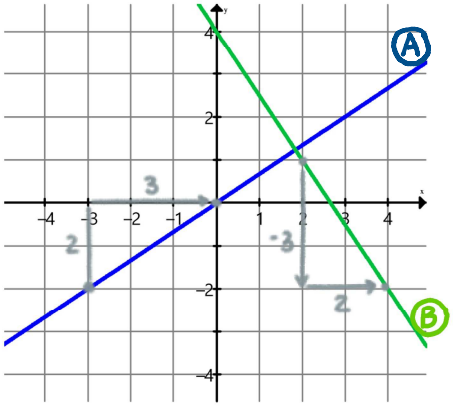
They have the same slope.

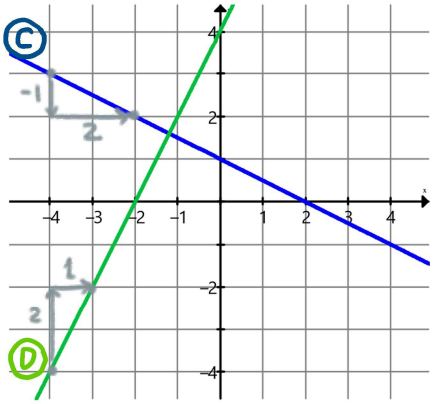
The slope of these lines is $\frac{2}{3}$.

The slope of these lines is $-\frac{5}{2}$.

Parallel lines have the same slope.

Each graph shows a pair of perpendicular lines. How do their slopes compare?





slope A = $\frac{2}{3}$

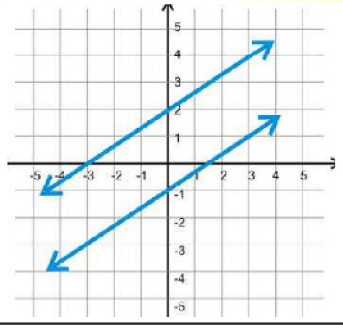
slope B = $-\frac{3}{2}$

slope C = $-\frac{1}{2}$

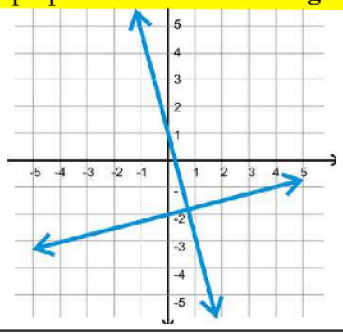
slope D = $\frac{2}{1} = 2$

The slopes of perpendicular lines are negative reciprocals.

The slopes of parallel lines are the same.



The slopes of perpendicular lines are **negative reciprocals**.



State whether each pair of lines is parallel, perpendicular, or neither.

a) $y = 3x - 6$
$y = -\frac{1}{3}x + 4$

$3 \cdot \frac{3}{1}$, $-\frac{1}{3}$

perpendicular lines

b) $y = 4x + 3$
$y = 4x - 5$

$4 = 4$

parallel lines

c) $y = 2x + 6$
$6x + 3y + 3 = 0$

$3y = -6x - 3$

$y = -2x - 1$

neither

Write the equation of a line that is parallel to $2x - y + 4 = 0$ and passes through the point (1, –6). Express the equation in slope-intercept form. Then write the equation in general form.

① Determine the slope.

$2x - y + 4 = 0$

$(-1) \cdot (-y = -2x - 4)$

$y = 2x + 4$

⇒ slope is 2

② Write equation in slope-point form since the y-intercept is not known.

$y + 6 = 2(x - 1)$

$y + 6 = 2x - 2$

$-6 \quad -6$

$y = 2x - 2 - 6$

$y = 2x - 8$

③ Move all terms to one side.

$y = 2x - 8$

$0 = 2x - y - 8$

$2x - y - 8 = 0$

Write the equation of a line that is perpendicular to $3x + 2y - 6 = 0$ with an x-intercept of 9. Express the equation in slope-intercept form and in general form.

$3x + 2y - 6 = 0$

$2y = -3x + 6$

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

⇒ slope of perpendicular line is $\frac{2}{3}$

x-int = 9 : (9, 0)

$y - 0 = \frac{2}{3}(x - 9)$

$y = \frac{2}{3}x - 6$

$(y = \frac{2}{3}x - 6) \cdot 3$

$3y = 2x - 18$

$(-2x + 3y + 18 = 0) \cdot (-1)$

$2x - 3y - 18 = 0$

Assignment: p.156 #1, 2, 3bc, 4ab, 5, 6ac, 7, 9, 12