

Geometry**Notes**

Name _____

Slope, lines, parallel lines and perpendicular lines

What is slope?

rise on change in y's
run on change in x's

| | |
|-------|-------------------------------|
| Slope | $\frac{y_2 - y_1}{x_2 - x_1}$ |
| $m =$ | $\frac{y_2 - y_1}{x_2 - x_1}$ |

1. A(-8,2) and B (0,-4) = Find slope of \overline{AB} .

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - 2}{0 - (-8)} = \frac{-6}{8} = -\frac{3}{4}$$

2. What is the slope of line parallel to \overline{AB} ? $-\frac{3}{4}$ 3. What is the slope of line perpendicular to \overline{AB} ? $\frac{4}{3}$

| | |
|--------------------------------------|----------------|
| Slope = $\frac{a}{b}$ | $\frac{a}{b}$ |
| parallel slope = $\frac{a}{b}$ | $\frac{a}{b}$ |
| perpendicular slope = $-\frac{b}{a}$ | $-\frac{b}{a}$ |

4. So, Given A(0,-6), B(4,-4), C(0,2), D(2,3) Is \overline{AB} parallel to \overline{CD} ?

$$m_{\overleftrightarrow{AB}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - (-6)}{4 - 0} = \frac{2}{4} = \frac{1}{2}$$

$$m_{\overleftrightarrow{CD}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 2}{2 - 0} = \frac{1}{2}$$

Yes, $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$.5. Write an equation of the line that is parallel to $y = -x - 5$ and passes through

P(-3,6).

 $m = -1$ so // line has $m = -1$ also

slope-intercept

$$y = mx + b$$

$$6 = -1(-3) + b$$

$$-6 = -3 + b$$

$$3 = b$$

$$\boxed{y = -x + 3}$$

or pt.-slope:

$$y - y_1 = m(x - x_1)$$

$$y - 6 = -1(x - (-3))$$

$$y - 6 = -x - 3$$

$$\boxed{y = -x + 3}$$

6. Are these lines perpendicular?

Yes,
5 is the opposite reciprocal of $-\frac{1}{5}$.

$$y = 5x$$
$$y = -\frac{1}{5}x + 7$$

If the product of the slopes is equal to -1 , then perpendicular.

If the product of the slopes is not equal to -1 , then NOT perpendicular!

7. Write an equation of a line perpendicular to $y = \frac{1}{2}x - 1$ and goes through $P(2, 3)$

$$m_{\perp} = -2$$

Slope-intercept

$$y = mx + b$$

$$3 = -2(2) + b$$

$$3 = -4 + b$$

$$+4 \quad +4$$

$$7 = b$$

$$y = -2x + 7$$

pt. - slope

$$y - y_1 = m(x - x_1)$$

$$y - 3 = -2(x - 2)$$

$$y - 3 = -2x + 4$$

$$+3 \quad +3$$

$$y = -2x + 7$$