

**3 - 3**

# **Slopes of Lines**

slope:  $\frac{\text{rise}}{\text{run}}$

$$m = \frac{y - y}{x - x}$$



Find the slope of the line passing through each pair of points.



Ex:  $(-4, 6)$  and  $(-3, 8)$   $\frac{8-6}{-3-(-4)} = \frac{2}{1} = 2$

$$m = \frac{6-8}{-4-(-3)} = \frac{-2}{-1} = 2$$

Ex:  $(2, 7)$  and  $(8, -3)$

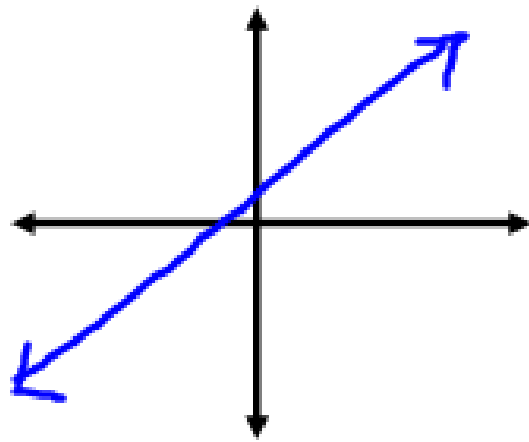
$$m = \frac{7-(-3)}{2-8} = \frac{10}{-6} = -\frac{5}{3}$$

What if we subtract and get....?

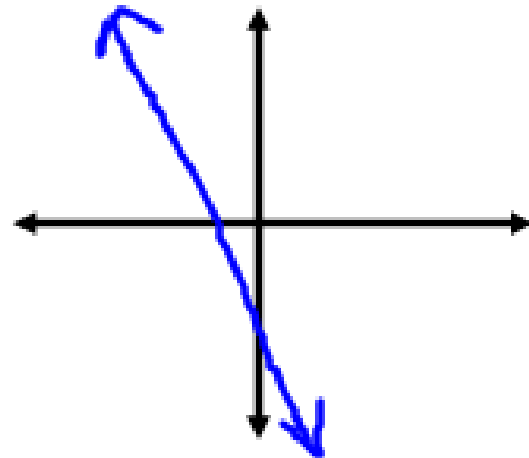


Ex:  $\frac{0}{4}$   $m=0$

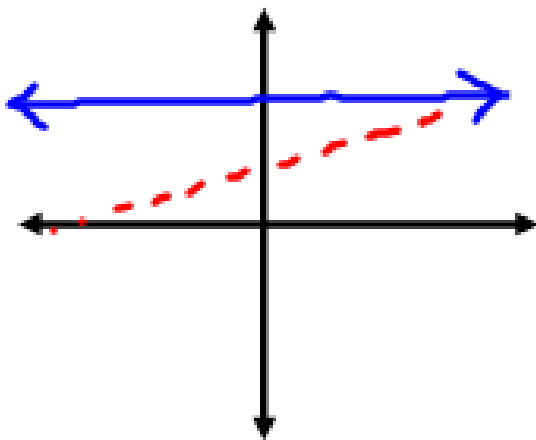
Ex:  $\frac{-7}{0}$   $m$  is undefined



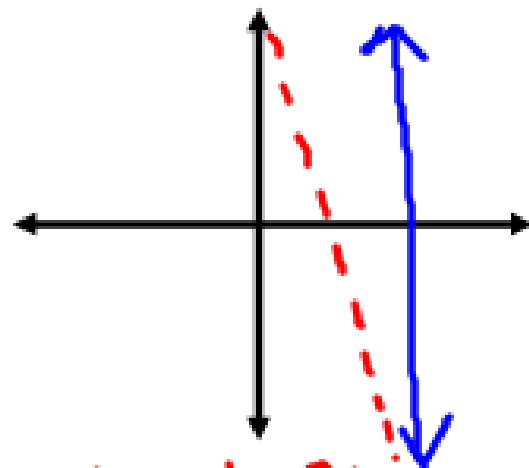
positive



negative



zero



undefined



***parallel lines***

same slope

***perpendicular lines***

opposite reciprocals

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



## Postulate 3.2:



**Two nonvertical lines have the same slope if and only if they are parallel.**

## Postulate 3.3:

**Two nonvertical lines are perpendicular if and only if the product of their slopes is  $-1$ .**

Ex: Determine whether  $\overleftrightarrow{AB}$  and  $\overleftrightarrow{CD}$  are parallel, perpendicular, or neither.



$$A(-2, -5) \quad B(4, 7) \quad C(0, 2) \quad D(8, -2)$$

$$m_{\overleftrightarrow{AB}} = \frac{-5-7}{-2-4} = \frac{-12}{-6} = 2$$

$$m_{\overleftrightarrow{CD}} = \frac{2-2}{0-8} = \frac{0}{-8} = 0$$

perp.



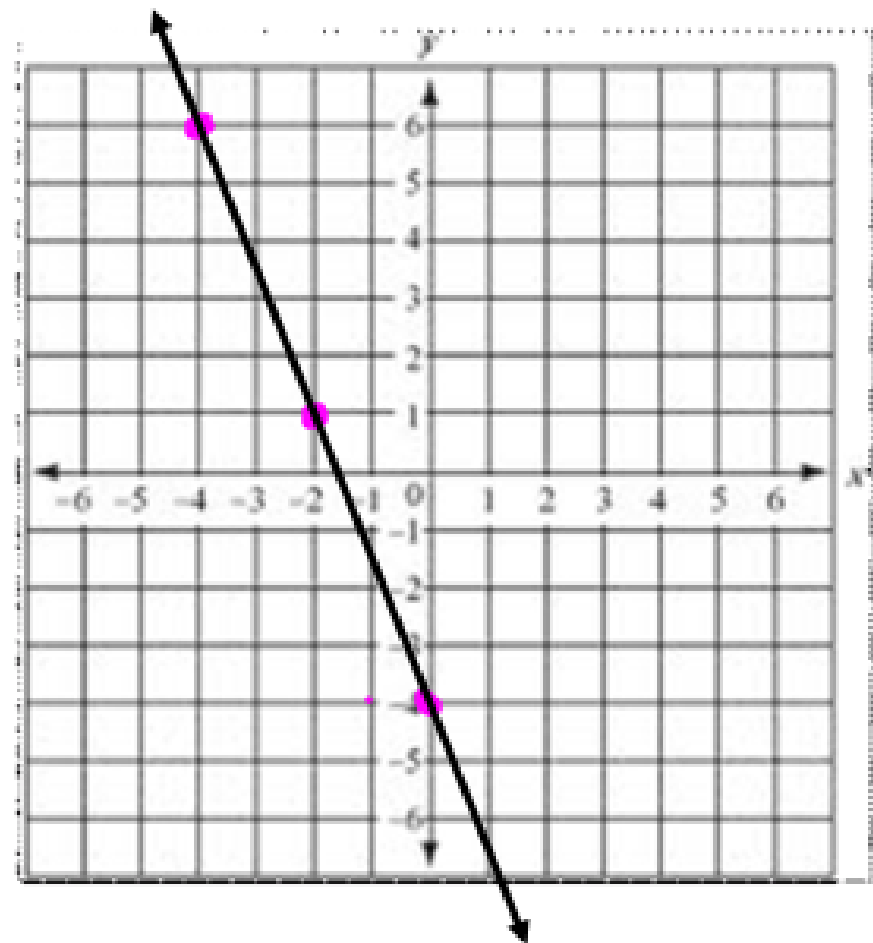
**Ex: Graph the line that contains P(-2, 1) and is perpendicular to  $\overleftrightarrow{JK}$  if J(-5, -4) and K(0, -2).**



$$m_{\overleftrightarrow{JK}} = \frac{-4 + 2}{-5 - 0} = \frac{-2}{-5}$$

$$m = \frac{+2}{+5} = \frac{2}{5}$$

$$\text{my } m = \frac{-5}{2}$$





Homework:

p.142 #15 - 23 odd, 33 - 35