

## Test

① Finding Slope:  $m = \frac{y_2 - y_1}{x_2 - x_1}$  or  $m = \frac{\text{rise}}{\text{run}}$

② Parallel: (Same Slope)  $\rightarrow m = \frac{1}{2}$   $m \parallel = \frac{1}{2}$

Perpendicular: (Opposite Reciprocals)  $\rightarrow m = \frac{1}{2}$   $m \perp = -\frac{2}{1}$

③ Finding k

④  $y = \underline{m}x + \underline{b}$   $m = \text{Slope}$   $b = \text{y-intercept}$

⑤ Graphing:

- ① Plot the y-intercept (b)
- ② Use your slope ( $m = \frac{\text{rise}}{\text{run}}$ ) to plot other points
- ③ Join the points with a straight line.

⑥ Word Problems:

b = base rate, fkt rate, fixed fee etc.

m = per hour, per km, per photo etc

$$y = mx + b$$

Find the slope of a line passing through the points  $(2, -3)$  and  $(-5, 8)$ .

$$x_1 = 2 \quad x_2 = -5$$

$$y_1 = -3 \quad y_2 = 8$$

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

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

$$m = \frac{11}{-7}$$

$$m = -\frac{11}{7}$$

A line passes through the points  $(2, k)$  and  $(5, 7)$ .  
If the slope is 2, what is the value of  $k$ ?

Given:

$$x_1 = 2$$

$$y_1 = k$$

$$x_2 = 5$$

$$y_2 = 7$$

$$\underline{m = 2}$$

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

$$2 = \frac{7 - k}{5 - 2}$$

$$\frac{2}{1} = \frac{7 - k}{3}$$

$$1(7 - k) = (2)(3)$$

$$7 - k = 6$$

$$\frac{-k}{-1} = \frac{-1}{-1}$$

$$k = 1$$

To find the equation of any line:

① Find the slope:  $m$

② Find the point:  $(x_1, y_1)$

③ Find the equation:  $y - y_1 = m(x - x_1)$   
Slope-Point Form

$y = mx + b$   
Slope-Intercept Form

$ax + by + c = 0$   
General Form

Determine the equation of a line perpendicular to  $4x+5y=7$  and having the same x-intercept as  $10x+7y=-20$ . *Slope-Intercept form*

① Find Slope:

$$4x+5y=7$$

$$5y = \frac{-4x+7}{5}$$

$$y = \frac{-4}{5}x + \frac{7}{5}$$

$$m = \frac{-4}{5}$$

$$\underline{\underline{m_{\perp} = \frac{5}{4}}}$$

② Find point:

$$x\text{-int } (y=0)$$

$$10x+7y=-20$$

$$10x+7(0)=-20$$

$$\frac{10x}{10} = \frac{-20}{10}$$

$$x = -2$$

$$(-2, 0)$$

$$x_1 = -2$$

$$y_1 = 0$$

③ Find equation

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

$$y - 0 = \frac{5}{4}(x - (-2))$$

$$y = \frac{5}{4}(x+2)$$

$$y = \frac{5x}{4} + \frac{10}{4}$$

$$\boxed{y = \frac{5x}{4} + \frac{5}{2}}$$

## Review Slope

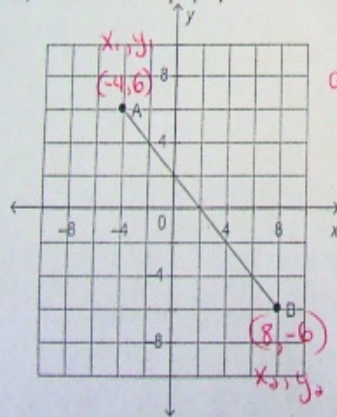
1. Write an equation (slope intercept form) for the graph of a linear function that has slope 8 and a y-intercept of 7.

$$y = 8x + 7$$

2. Write the equation (slope intercept form) of a line with a y-intercept of -4 and a slope of  $\frac{4}{3}$ .

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

3. a) Determine the slope of this line segment.  
b) What is the slope perpendicular to it?



$$a) m = \frac{-6 - 6}{8 - (-4)} = \frac{-12}{12} = -1$$

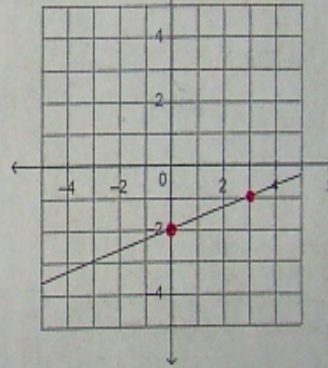
$$b) \text{perpendicular slope} = \frac{1}{1} = 1$$

4. Determine the slope of the line that passes through  $(-11, -8)$  and  $(6, 16)$ .

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{16 - (-8)}{6 - (-11)} = \frac{24}{17}$$

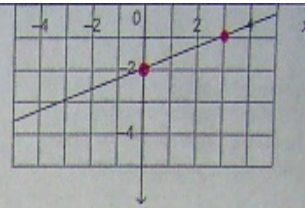
5. The slopes of two lines are  $\frac{6}{11}$  and  $\frac{6}{11}$ . Are the two lines parallel, perpendicular, or neither?
6. The slopes of two lines are  $-2$  and  $\frac{1}{2}$ . Are the two lines parallel, perpendicular, or neither?

7. Slope:  $m = \frac{4}{3}$   
 Point:  $y\text{-intercept} = -2 = b$   
 Equation:  $y = \frac{4}{3}x - 2$



8. Complete the chart:

	Equation	Slope	y-intercept
i)	$4(x - 9) = 3(y + 3)$	$m = \frac{4}{3}$	$b = -15$
ii)	2		$b = -9$



8. Complete the chart:

Equation	Slope	y-intercept
i) $4(x-9) = 3(y+3)$	$m = \frac{4}{3}$	$b = -15$
ii) $\frac{2}{3}y + 6 = 7x$	$m = \frac{2}{21}$	$b = -9$
iii) $5(2-y) = 10x - 30$	$m = -2$	$b = 8$

$$\begin{aligned} \text{(i)} \quad 4x - 36 &= 3y + 9 \\ -3y &= -4x + 45 \\ y &= \frac{4}{3}x - 15 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad 2y + 18 &= 21x \\ 2y &= 21x - 18 \\ y &= \frac{21}{2}x - 9 \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad 10 - 5y &= 10x - 30 \\ -5y &= 10x - 40 \\ y &= -2x + 8 \end{aligned}$$



9. Find the value of K.  $x_1, y_1$   $x_2, y_2$   
 $(-3, K)$  and  $(2, 10)$ .  $M = 17/6$

$$\frac{M}{6} = \frac{10-K}{2-(-3)}$$

$$\frac{17}{6} = \frac{10-K}{5}$$

$$17(5) = 6(10-K)$$

$$85 = 60 - 6K$$

$$6K = 60 - 85$$

$$6K = -25$$

$$K = -\frac{25}{6}$$

10. Determine the slope of the line of this equation:  $9x + 5y - 13 = 0$  ( $y=mx+b$ )

$$5y = -9x + 13$$

$$y = -\frac{9}{5}x + \frac{13}{5}$$

$$m = -\frac{9}{5}$$

11. a) Determine the slope and y-intercepts of this equation:  $5x + 8y + 40 = 0$  ( $y=mx+b$ )

$$8y = -5x - 40$$

$$y = -\frac{5}{8}x - 5$$

$$m = -\frac{5}{8}$$

$$b = -5$$

problem

12.

Slope:  $m = \frac{\text{rise}}{\text{run}} = \frac{-8}{4} = -2$

Point:  $b = -2$

Equation  $y = -2x - 2$   
( $y = mx + b$ )

13. A line passes through  $R(6, 9)$  and  $K(-6, 15)$ .

a) What is the slope of line RK?

b) What is the slope parallel to RK?

c) What is slope perpendicular to RK.

a)  $m_{RK} = \frac{15-9}{-6-6} = \frac{6}{-12} = -\frac{1}{2}$

b) Parallel slope =  $-\frac{1}{2}$

c) Perpendicular slope =  $\frac{2}{1}$

16. Francine runs a T-shirt company. For each order she receives, Francine charges a flat fee of \$50, plus \$8.95 per T-shirt.

a) Write an equation for the total cost,  $C$  dollars, for ordering  $n$  T-shirts.

b) George ordered 62 T-shirts. What was the total cost?

c) Jake paid a total cost of \$971.85. How many T-shirts did he order?

$b = 50$   $m = 8.95$

$y = 971.85$

$x = 62$

c) perpendicular slope =  $-\frac{1}{3}$

16. Francine runs a T-shirt company. For each order she receives, Francine charges a flat fee of \$50, plus \$8.95 per T-shirt.

a) Write an equation for the total cost,  $C$  dollars, for ordering  $n$  T-shirts.

b) George ordered 62 T-shirts. What was the total cost?

c) Jake paid a total cost of \$971.85. How many T-shirts did he order?

$b=50$     $m=8.95$

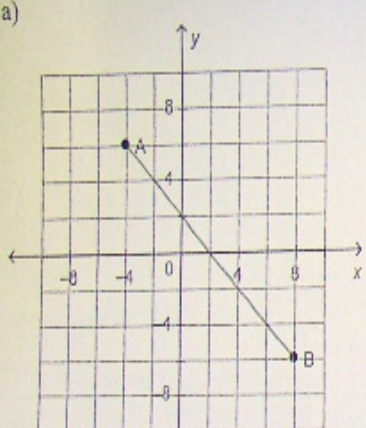
a)  $y = 8.95x + 50$

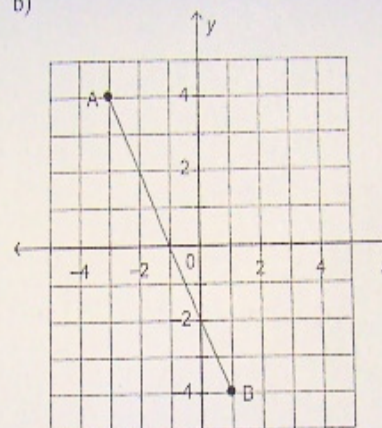
b)  $x=62$   
 $y = 8.95(62) + 50$   
 $y = 554.90 + 50$   
 $y = \$604.90$   
 It would cost  
 \$604.90

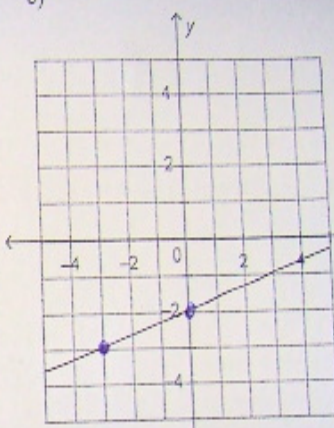
c)  $y = 971.85$   
 $971.85 = 8.95x + 50$   
 $\frac{971.85}{8.95} = \frac{8.95x}{8.95}$   
 $103 = x$   
 He ordered 103 shirts.

**Slope Review**

Determine the slope of this line segment.

a)   $m_{AB} = \frac{-6}{6} = -1$

b)   $m_{AB} = \frac{-8}{4} = -2$

c)   $m = \frac{1}{3}$

Determine the slope of the line that passes through (9, 11) and (15, 27).

$$m = \frac{27-11}{15-9} = \frac{16}{6} = \frac{8}{3}$$

The slopes of two lines are  $\frac{6}{11}$  and  $-\frac{11}{6}$ . Are the two lines parallel, perpendicular, or neither?



The slopes of two lines are  $-2$  and  $-1/2$ . Are the two lines parallel, perpendicular, or neither?

Complete the chart:

Equation	Slope	y-intercept
a) $y = 4x - 2$	$m = 4$	$b = -2 \rightarrow (0, -2)$
b) $-y = 5x - 2$ $y = -5x + 2$	$m = -5$	$b = 2 \rightarrow (0, 2)$
c) $2y - 3 = 8x - 5$ $2y = 8x - 2$ $y = 4x - 1$	$m = 4$	$b = -1 \rightarrow (0, -1)$
d) $3(y + 1) = 2x + 9$ $y + 1 = \frac{2}{3}x + 3$ $y = \frac{2}{3}x + 2$	$m = \frac{2}{3}$	$b = 2 \rightarrow (0, 2)$
e) $1/2y + 2 = 2x + 1$ $1/2y = 2x - 1$ $y = 4x - 2$	$m = 4$	$b = -2 \rightarrow (0, -2)$
f) $3x + 5 = 2y - 5$ $3x + 10 = 2y$ $3x + 5 = y$	$m = \frac{3}{2}$	$b = 5 \rightarrow (0, 5)$
g) $-5y - 1 = 10x - 20$ $-5y = 10x - 19$ $y = -2x + \frac{19}{5}$	$m = -2$	$b = \frac{19}{5} \rightarrow (0, \frac{19}{5})$

a) The slope parallel to the x-axis is  $m = 0$ .

b) The slope perpendicular to the x-axis is  $m = \text{undefined}$ .

c) The slope of a vertical line is  $m = \text{undefined}$ .

d) The slope of a horizontal line is  $m = 0$ .

e) The perpendicular slope to 5 is  $m = -\frac{1}{5}$ .

7. Determine the *slope* and the *y*-intercept for the graph of this equation:  $16x + 32 - 2y = 0$  ( $y = mx + b$ )

$-2y = -16x - 32$

$y = 8x + 16$

$m = 8$  (slope)

$b = 16$  (y-intercept)

8. Find the value of K.  $(K, -7)$  and  $(1, 12)$   $m = 19/6$ .

$$\frac{19}{6} = \frac{12+7}{1-K}$$

$$\frac{19}{6} = \frac{19}{1-K}$$

$$19(1-K) = 114$$

$$1-K = 6$$

$$-K = 5$$

$$\boxed{K = -5}$$

9. Determine the slope parallel to  $3(2y-1) = 12x+3$

$$2y-1 = 4x+1$$

$$2y = 4x+2$$

$$y = 2x+1$$

$$m = 2$$

$$\boxed{m_{||} = 2}$$
 parallel slope is the same

10. Determine the slope perpendicular to  $3y-4 = 8x+5$

$$3y = 8x+9$$

$$y = \frac{8}{3}x+3$$

$$m = \frac{8}{3}$$

$$\boxed{m_{\perp} = -\frac{3}{8}}$$
 perpendicular slope, is the opposite reciprocal

11. A line passes through points  $(4, 8f)$  and  $(2f, -2)$ . If the slope is parallel to the y-axis, find  $f$ .

$$\frac{1}{0} = \frac{-2-8f}{2f-4}$$

$$m = \frac{1}{0}$$

$$2f-4 = 0$$

$$2f = 4$$

$$\boxed{f = 2}$$

12.  $\boxed{m=0}$   
 A line passes through points  $(-3k, 2)$  and  $(8, k)$ . If the slope is parallel to the x-axis, find  $k$ .

$$\frac{0}{1} = \frac{k-2}{8+3k}$$

$$k-2=0$$

$$\boxed{k=2}$$

$$m = \frac{0}{1}$$

13. A line passes through points  $(5, 6k)$  and  $(-3, 4k)$ . If the slope is perpendicular to  $1/3$ , find  $k$ .

$$\frac{-3}{1} = \frac{4k-6k}{-3-5}$$

$$\frac{-3}{1} = \frac{-2k}{-8}$$

$$-3(-8) = 1(-2k)$$

$$-24 = -2k$$

$$\boxed{12 = k}$$

$$m = -\frac{3}{1}$$

14. A line passes through  $R(6, 9)$  and  $K(-6, 15)$ .

- What is the slope of line  $RK$ ?
- What is the parallel slope?
- What is the perpendicular slope?

a)  $m = \frac{15-9}{-6-6}$   
 $m = \frac{6}{-12}$   
 $\boxed{m = -\frac{1}{2}}$

b)  $\boxed{m \parallel = -\frac{1}{2}}$

c)  $\boxed{m \perp = 2}$

15. Find the slope perpendicular to  $(5, 4)$  and  $(-9, 5)$

$$m = \frac{5-4}{-9-5}$$

$$m = \frac{1}{-14}$$

$$\boxed{m \perp = \frac{14}{1}}$$