I. Slope – intercept form of a line is a linear equation that is solved for the "y" variable.

slope-intercept form: $y = mx + b$

"m" is slope of the line. Its always next to "x" slope is $\frac{\text{rise}}{\text{run}}$

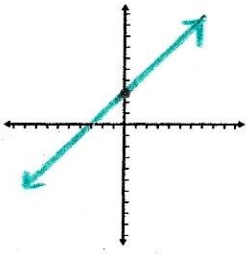
"b" is y-intercept of the line. Its a point on the y-axis (0, b) where the line crosses it.

Use your graphing calculator to take a look at slope of lines:
All equations must be in slope-intercept form in order to type it in the calculator.

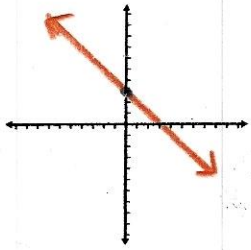
y = **y1: (type your equation)** **graph**

ZOOM **6: standard**

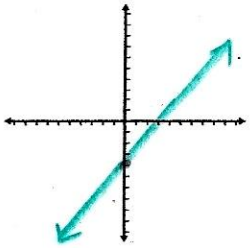
y = 2x + 3



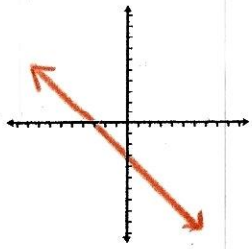
y = –2x + 3



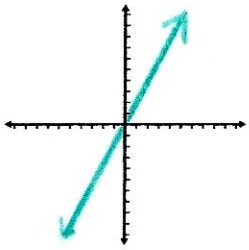
y = 2x – 3



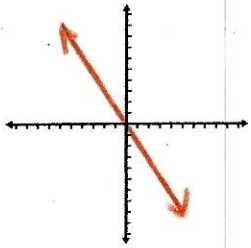
y = –2x – 3



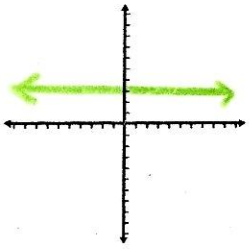
y = 2x



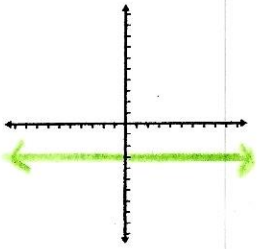
y = –2x



y = 3



y = –3



EXAMPLE: Use slope and y-intercept to write a linear equation.
Write an equation of a line in slope-intercept form using the given information:

1) slope $= 5$ and $y-$ intercept is $(0, 15)$ $y = 5x + 15$

2) slope $= \frac{3}{4}$ and $y-$ intercept is $\left(0, \frac{2}{3}\right)$ $y = \frac{3}{4}x + \frac{2}{3}$

3) slope $= -2$ and $y-$ intercept is $(0, -12)$ $y = -2x - 12$

4) $m = -1$ and $b = -2$ $y = -x - 2$

EXAMPLE: Write the slope (m) and y-intercept (b) for each linear equation.

1) $y = -\frac{5}{2}x + 5$ $m = -\frac{5}{2}$ $b = (0, 5)$

2) $y = -x + 3$ $m = -1$ $b = (0, 3)$

3) $y = -4x - 4$ $m = -4$ $b = (0, -4)$

4) $y = -6$ $m = 0$ $b = (0, -6)$

5) $2x + y = 1$
$-2x \quad -2x$
$y = -2x + 1$ $m = -2$ $b = (0, 1)$

6) $8x + 3y = -9$
$-8x \quad -8x$
$\frac{3y}{3} = \frac{-8x}{3} - \frac{9}{3}$
$y = -\frac{8}{3}x - 3$ $m = -\frac{8}{3}$ $b = (0, -3)$

7) $15x + 5y = -10$
$-15x \quad -15x$
$\frac{5y}{5} = \frac{-15x}{5} - \frac{10}{5}$
$y = -3x - 2$ $m = -3$ $b = (0, -2)$

8) $4x - 5y = 0$
$-4x \quad -4x$
$\frac{-5y}{-5} = \frac{-4x}{-5}$
$y = \frac{4}{5}x$ $m = \frac{4}{5}$ $b = (0, 0)$

Name: Key	Class:
Topic: Point-Slope Formula	Date:

Main Ideas/Questions	Notes
the POINT-SLOPE FORMULA	**Used to write the equation of a line when given a point (x_1, y_1) and the slope of the line (m)** **Formula:** $y - y_1 = m(x - x_1)$ ***Be sure to distribute and solve for y!**

EXAMPLES!

Find the equation of the line given the point and slope.

1. (4, 1); slope = 2

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

$y - 1 = 2x - 8$

$+1 \qquad +1$

$\boxed{y = 2x - 7}$

2. (2, 4); slope = $\frac{1}{2}$

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

$y - 4 = \frac{1}{2}x - 1$

$+4 \qquad +4$

$\boxed{y = \frac{1}{2}x + 3}$

3. (-6, 0); slope = $\frac{2}{3}$

$y - 0 = \frac{2}{3}(x + 6)$

$y - 0 = \frac{2}{3}x + 4$

$+0 \qquad +0$

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

4. (-8, -1); slope = $-\frac{3}{4}$

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

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

$-1 \qquad -1$

$\boxed{y = -\frac{3}{4}x - 7}$

5. (4, -3); slope = -1

$y + 3 = -1(x - 4)$

$y + 3 = -1x + 4$

$-3 \qquad -3$

$\boxed{y = -1x + 1}$

6. (0, -9); slope = 4

$y + 9 = 4(x - 0)$

$y + 9 = 4x$

$-9 \qquad -9$

$\boxed{y = 4x - 9}$

What if you are given two points?

To write a linear equation given two points, (x_1, y_1) and (x_2, y_2), follow this process:

Use the Slope Formula

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

→

Use the Point-Slope Formula

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

EXAMPLES!

Find the equation of the line given the two points.

7. (-3, 7) and (1, -1)

$m = \frac{7+1}{-3-1} = \frac{8}{-4} = -2$

$y - 7 = -2(x+3)$

$y - 7 = -2x - 6$

$+7 \qquad +7$

$\boxed{y = -2x + 1}$

8. (-6, -7) and (3, -4)

$m = \frac{-7-(-4)}{-6-3} = \frac{-3}{-9} = \frac{1}{3}$

$y + 7 = \frac{1}{3}(x+6)$

$y + 7 = \frac{1}{3}x + 2$

$-7 \qquad -7$

$\boxed{y = \frac{1}{3}x - 5}$

9. (2, -1) and (4, -6)

$m = \frac{-1+6}{2-4} = \frac{5}{-2} = -\frac{5}{2}$

$y + 6 = -\frac{5}{2}(x-4)$

$y + 6 = -\frac{5}{2}x + 10$

$-6 \qquad -6$

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

10. (-3, -8) and (2, 7)

$m = \frac{-8-7}{-3-2} = \frac{-15}{-5} = 3$

$y + 8 = 3(x+3)$

$y + 8 = 3x + 9$

$-8 \qquad -8$

$\boxed{y = 3x + 1}$

11. (-6, -3) and (-4, -1)

$m = \frac{-3+1}{-6+4} = \frac{-2}{-2} = 1$

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

$y + 3 = 1x + 6$

$-3 \qquad -3$

$\boxed{y = x + 3}$

12. (-4, 7) and (6, 2)

$m = \frac{7-2}{-4-6} = \frac{5}{-10} = -\frac{1}{2}$

$y - 7 = -\frac{1}{2}(x+4)$

$y - 7 = -\frac{1}{2}x - 2$

$+7 \qquad +7$

$\boxed{y = -\frac{1}{2}x + 5}$

Partner A: _____ Partner B: _____

WHY WAS THE CAT KICKED OUT OF SCHOOL?

Either given a point and a slope, or two points, write each equation in slope-intercept form. Partner A should do the left side and Partner B should do the right side. One will have a letter and the other a number. Write the number in the matching numbered box at the bottom of the page.

Set 1

E. (-3, 0); slope = $\frac{2}{3}$	$y = \frac{2}{3}x + 2$	**8.** (2, -2); slope = 1	$y = x - 4$
H. (6, 2) and (-3, -7)	$y = x - 4$	**3.** (4, 1); slope = $\frac{3}{2}$	$y = \frac{3}{2}x - 5$
S. (-4, 6) and (3, 8)	$y = 2x + 2$	**10.** (3, 4) and (-6, -2)	$y = \frac{2}{3}x + 2$
W. (-2, -8) and (6, 4)	$y = \frac{3}{2}x - 5$	**5.** (-3, -4); slope = 2	$y = 2x + 2$

Set 2

A. (-9, 17); slope = $-\frac{4}{3}$	$y = -\frac{4}{3}x + 5$	**12.** (-4, -5); slope = $\frac{1}{2}$	$y = \frac{1}{2}x - 3$
C. (-3, 9) and (0, 1)	$y = -\frac{8}{3}x + 1$	**6.** (3, 1) and (9, -7)	$y = -\frac{4}{3}x + 5$
E. (1, -8); slope =-1	$y = -x - 7$	**7.** (3, -7); slope = $-\frac{8}{3}$	$y = -\frac{8}{3}x + 1$
A. (2, -2) and (8, 1)	$y = \frac{1}{2}x - 3$	**2.** (5, -12) and (-3, -4)	$y = -x - 7$

Set 3

H. (-12, 4) and (0, 2)	$y = -\frac{1}{6}x + 2$	**9.** (-6, -4) and (12, 11)	$y = \frac{5}{6}x + 1$
E. (6, 6); slope = $\frac{5}{6}$	$y = \frac{5}{6}x + 1$	**4.** (2, -8); slope = $-\frac{7}{2}$	$y = -\frac{7}{2}x - 1$
H. (-8, -4) and (4, -7)	$y = -\frac{1}{4}x - 6$	**11.** (5, 1) and (10, 5)	$y = \frac{4}{5}x - 3$
T. (-5, -7); slope = $\frac{4}{5}$	$y = \frac{4}{5}x - 3$	**13.** (6, 1); slope = $-\frac{1}{6}$	$y = -\frac{1}{6}x + 2$
A. (-4, 13) and (-2, 6)	$y = -\frac{7}{2}x - 1$	**1.** (-4, -5); slope = $-\frac{1}{4}$	$y = -\frac{1}{4}x - 6$

1	2		3	4	5		6		7	8	9	10	11	12	13	
H	E		W	A	S		A		C	H	E	E	T	A	H	!