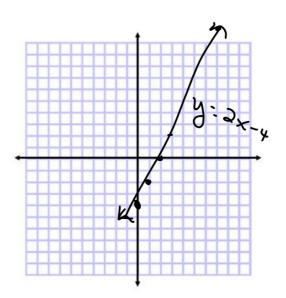Algebra 1   4.2
Write an equation of a a line given a slope and a point
Write an equation of a line given two points
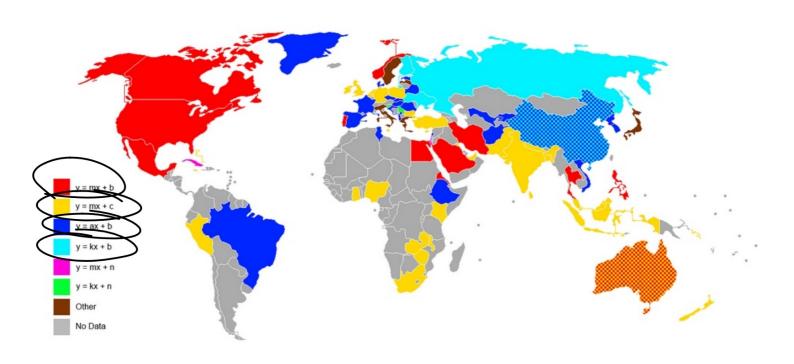slope
y-intercept
linear equation
slope-intercept form
constraints
linear extrapolation

activity: cut & paste

$$y = mx + B \qquad y = \frac{2}{1}x + 4$$

$$y = 2x - 4$$

Not everyplace in the world uses y=mx+b (surprisingly)

🟥	y = mx + b
🟨	y = mx + c
🟦	y = ax + b
🟦	y = kx + b
🟪	y = mx + n
🟩	y = kx + n
🟫	Other
⬜	No Data

Cut & paste

$$5 = 2 \cdot 3 + B$$
$$5 = 6 + B$$
$$\underline{-6 \quad -6}$$
$$\left(-1 = B \right)$$

$$y = 2x + -1$$

$$4 = -3 \cdot 1 + B$$
$$\underset{+3}{4} = \underset{+3}{-3} + B$$
$$\underline{}$$
$$7 = B$$

$$y = -3x + 7$$

Write the equation of the line:

b. $(-4, -2)$ and $(-5, -6)$

$$y = mx + B$$
$$m = 3 \qquad (2, 5)$$

$$5 = 3 \cdot 2 + B$$
$$5 = 6 + B$$
$$\underline{-6 \quad -6}$$
$$-1 = B$$

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

$$y = mx + B$$
$$m = \tfrac{1}{2} \qquad (4, 2)$$

$$2 = \tfrac{1}{2} \cdot 4 + B$$
$$2 = 2 + B$$
$$\underline{-2 \quad -2}$$
$$0 = B$$

$$y = \tfrac{1}{2}x + 0$$

$$m = -3 \qquad (2, -5)$$
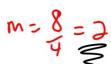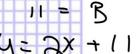
$$y = mx + B$$
$$-5 = -3 \cdot 2 + B$$
$$-5 = -6 + B$$
$$\underline{+6 \qquad +6}$$
$$1 = B$$
$$y = -3x + 1$$
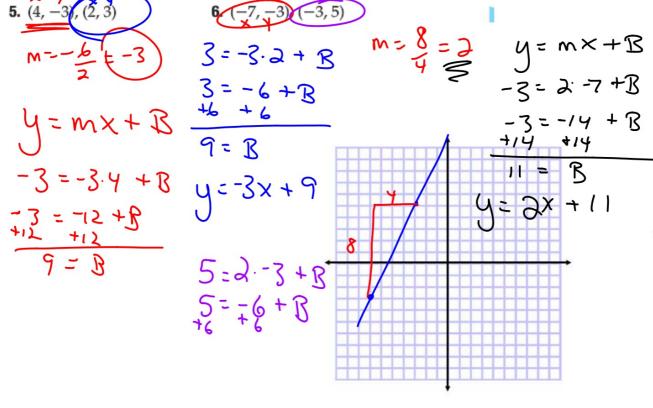
$$y = mx + B$$
$$m = -\frac{1}{2} \qquad (4, 10)$$

$$10 = -\frac{1}{2} \cdot 4 + B$$
$$10 = -2 + B$$
$$\underline{+2 \qquad +2}$$
$$12 = B$$
$$y = -\frac{1}{2}x + 12$$

$y = -3x + 9$

Write an equation of the line that passes through each pair of points.

5. $(4, -3), (2, 3)$

$x\ y$ $x\ y$

$M = -\frac{6}{2} = -3$

$y = mx + B$

$-3 = -3 \cdot 4 + B$

$-3 = -12 + B$

$+12 \qquad +12$

$9 = B$

6. $(-7, -3)(-3, 5)$

$x\ y$

$3 = -3 \cdot 2 + B$

$3 = -6 + B$

$+6 \qquad +6$

$9 = B$

$y = -3x + 9$

$5 = 2 \cdot -3 + B$

$5 = -6 + B$

$+6 \qquad +6$

$m = \frac{8}{4} = 2$

$y = mx + B$

$-3 = 2 \cdot -7 + B$

$-3 = -14 + B$

$+14 \qquad +14$

$11 = B$

$y = 2x + 11$

In mathematics, a **constraint** is a condition that a solution must satisfy. Equations can be viewed as constraints in a problem situation. The solutions of the equation meet the constraints of the problem.

"the requirements of the problem"

Real-World Example 3 Use Slope-Intercept Form

FLIGHTS The table shows the number of domestic flights in the U.S. from 2004 to 2008. Write an equation that could be used to predict the number of flights if it continues to decrease at the same rate.

Year	Flights (millions)
2004	9.97
2005	10.04
2006	9.71
2007	9.84
2008	9.37

(Use two pairs that are far apart on the graph)

linear extrapolation

Real-World Example 4 Predict from Slope-Intercept Form

FLIGHTS Estimate the number of domestic flights in 2020.