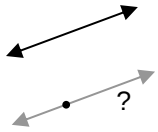
Equation of a Line Problem Buster

There are four types of problems covered on this diagram. First, figure out what information you have been given in your problem, and what information you're looking for. Then find the Problem on this page that matches it. Follow the arrows to the solution.

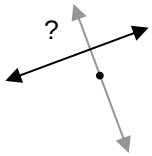
PROBLEM



Given a **line** and a **point**, find the equation of the line that is **parallel** to the given line, and passes through the point.

Convert the line to y=mx+b form. Pick out the slope, m. That is the slope of the line you want.

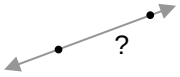
PROBLEM



Given a **line** and a **point**, find the equation of the line that is **perpendicular** to the given line, and passes through the point.

Convert the line to y=mx+b form. Pick out the slope, m. Take its negative reciprocal. That is the slope of the line you want.

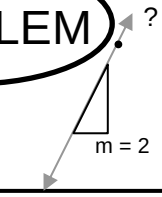
PROBLEM



Given **two points**, find the equation of the line that passes through them both.

Calculate the slope between the points using $m = \Delta y / \Delta x$. That is the slope of the line you want.

PROBLEM



Given a **slope** and a **point**, find the equation of the line that fits.

2 METHODS

Plug point (x, y) and slope m into $y - y_1 = m(x - x_1)$.

Rearrange equation in y = mx + b form.

Plug point (x, y) and slope m into y = mx + b. Solve for b.

Write the equation using m and b: y = mx + b.

Rearrange the equation into standard form if needed: Ax + By = C

Authored by Gordon Wong

EXERCISES

A. Given a slope and a point, find the equation of the line that fits:

1) (4, 2), m = 3

2) (0, 7), m = −2

3) (10, −3), m = $-\frac{1}{3}$

4) (8, 1), m = 0

B. Find the equation of the line that fits the following descriptions:

1) passes through (1, 5) and (3, 11)

2) passes through (2, −7); parallel to y = 2x + 5

3) parallel to y = 4x − 1; passes through origin

4) perpendicular to y = 3x + 4; has the same y-intercept as y = 6x + 2

5) perpendicular to 3x − 2y = 6; passes through (7, 11)

6) parallel to the y-axis; intersects 6x − y = 5 where y = 7

7) passes through ($\frac{1}{4}$, 6) and ($\frac{7}{2}$, 12)

8) has a y-intercept equal to the slope of 4x − 7y = 2 and a slope equal to the y-intercept of 8x − 3y = 15

SOLUTIONS

A. (1) y = 3x − 10 (2) y = −2x + 7 (3) y = $-\frac{1}{3}$x + $\frac{1}{3}$ (4) y = 1

B. (1) y = 3x + 2 (2) y = 2x − 11 (3) y = 4x (4) y = $-\frac{1}{3}$x + 2 (5) y = $\frac{3}{2}$x + $\frac{1}{2}$

(6) x = 2 (7) y = $\frac{24}{13}$x − $\frac{6}{13}$ (8) y = −5x + $\frac{4}{7}$