

MPM 1D

USING POINTS TO DETERMINE THE EQUATION OF A LINE

WRITING LINEAR RELATIONS in the form $y = mx + b$

STEPS:

1. Determine the slope of the line using
$$m = \frac{\text{rise}}{\text{run}} \quad \text{or} \quad m = \frac{y_2 - y_1}{x_2 - x_1}$$
2. Using the equation $y = mx + b$, substitute the slope m , and the x and y values of the given point to find the value of b .
3. Write the equation in the form $y = mx + b$.

EXAMPLES: Determine the equation of the linear relation with the given information.

① having slope $2/5$ and with y -intercept -4 .

- Since we are already given the slope and the y -intercept, we substitute both values into the equation of a line $y = mx + b$

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

② having slope $-3/2$ and passing through $(5, -1)$.

- Substitute $m = -\frac{3}{2}$, $x = 5$ and $y = -1$ into $y = mx + b$ to solve for b .

$$-1 = -\frac{3}{2}(5) + b$$

$$-1 = -\frac{15}{2} + b$$

$$-1 + \frac{15}{2} = b$$

$$\frac{13}{2} = b$$

Therefore, $y = -\frac{3}{2}x + \frac{13}{2}$ is the equation of the line.

③ passing through A(-2, 7) and B(4, 5)

- Determine the slope of the line using the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$

$$m = \frac{5-7}{4-(-2)} = \frac{-2}{6} = -\frac{1}{3}$$

- Substitute m and one of the given points into the equation of the line to find b .

Using the second point (4, 5):

$$5 = -\frac{1}{3}(4) + b$$

$$5 = -\frac{4}{3} + b$$

$$5 + \frac{4}{3} = b$$

$$\frac{19}{3} = b$$

Therefore, $y = -\frac{1}{3}x + \frac{19}{3}$ is the equation of the line.

EXERCISE: Determine the equation of each line.

1. line with slope 4/3 and with y-intercept -3.	2. line with slope 4 and passing through the point (-2, 1).
3. line passing through the points (-4, 7) and (-2, 1).	4. line passing through the points (2, 6) and (5, 2).
5. line with x-intercept -1 and with y-intercept 5.	6. line having y-intercept 8 and passing through (1, -1).
7. line passing through (-4, -2) and (1, 1).	8. line passing through (3, -6) and (3, 2).
9. line having slope -5/6 and passing through the point (4, 2).	10. line having slope 0 and passing through the point (-3, 8).

ANSWERS: (in no particular order)

$$y = -9x + 8 \quad x = -5 \quad y = 4x + 9$$

$$y = -\frac{4}{3}x + \frac{26}{3} \quad y = -\frac{1}{2}x - \frac{7}{2}$$

$$y = -\frac{5}{6}x + \frac{16}{3} \quad y = \frac{4}{3}x - 3$$

$$y = 5x + 5 \quad x = 3 \quad y = 8$$

$$y = \frac{3}{5}x + \frac{2}{5} \quad y = -3x - 5$$