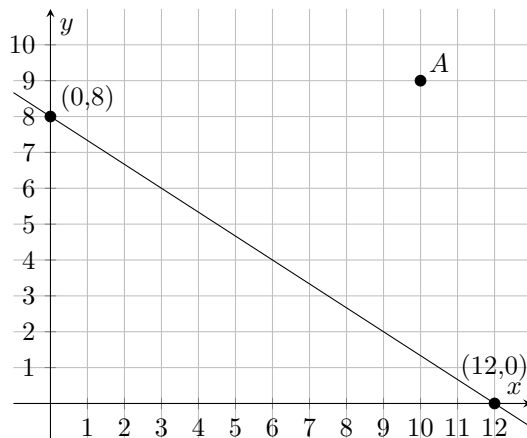# Finding the Distance from a Point to a Line

Grade 10 CST

Ex. 1)   Find the distance between the point $A(10, 9)$ and the line passing through the points $(0, 8)$ and $(12, 0)$.

1   Determine the rule of the line that <u>does not</u> pass through A

(Note that sometimes, this is given in the question.)

① Find the slope of the line:

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

② Find the initial value of the line by plugging in a point on the line to solve for the initial value:

$$y = ax + b$$

2   Find the rule of the line <u>passing through</u> A that is perpendicular to the first line

① Find the slope of the line (the *negative reciprocal* of the slope of the first line):

$$\text{Slope} = -\frac{1}{a}$$

② Find the initial value of the line by plugging in a point on the line (A) to solve for the initial value:

$$y = ax + b$$

3   Find the point of intersection of the two lines (H)

① Equate the two rules (make them equal to each other) to find the x-coordinate of the point of intersection H:

② Determine the y-coordinate of the point of intersection H:

$$y \;=\; y$$

4   Find the distance between points A and H

With this equation, it makes no difference which point you use for (x_1, y_1) and (x_2, y_2).

$$d(A, H) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$