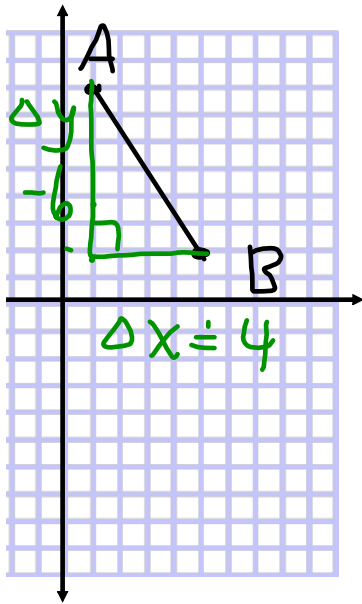


OPENER

What if we wanted to know the distance of A to B from the dumpster question. Can we do that without a ruler?

A(1, 8) and B(5, 2).



$$(x_2 - x_1)^2 + (y_1 - y_2)^2 = c^2$$

$$(5 - 1)^2 + (8 - 2)^2 = c^2$$

$$4^2 + 6^2 = c^2$$

$$\sqrt{16 + 36} = \sqrt{c^2}$$

$$7.2 = c$$

So the FORMULA for DISTANCE IS:

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

a) Find the length of the line segment K(-3, -3) and M(5, -4)

$$d = \sqrt{(5 - (-3))^2 + (-4 - (-3))^2}$$

$$d = \sqrt{(5 + 3)^2 + (-4 + 3)^2}$$

$$d = \sqrt{8^2 + (-1)^2}$$

$$d = \sqrt{64 + 1} \quad (-1)(-1) = 1$$

$$d = \sqrt{65}$$

$$d = 8.06$$

Special cases might arise:

ex: find the length of M(-3, 2) and N(-3, -4)

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

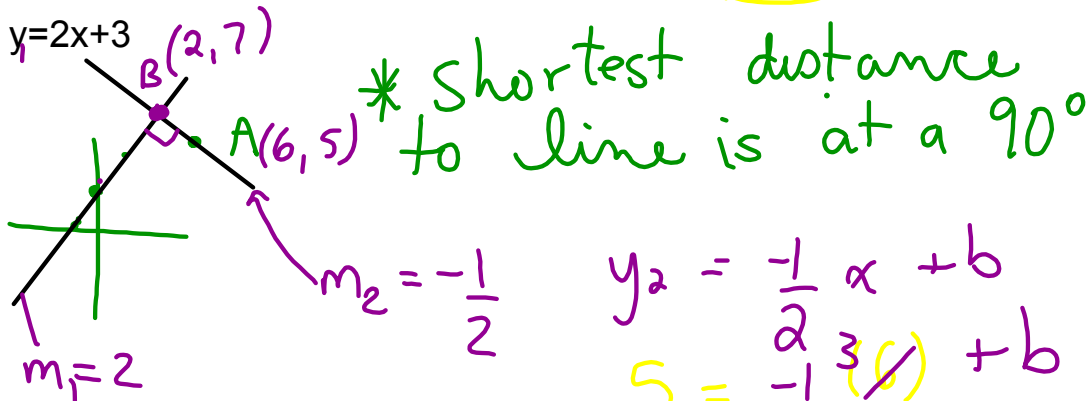
$$d = \sqrt{(-3 + 3)^2 + (-4 - 2)^2}$$

$$d = \sqrt{0 + 36}$$

$$d = 6$$

Ex: Calculate the distance between a point A (6,5) and the line

$$y = 2x + 3$$



$$y_2 = -\frac{1}{2}x + b$$

$$5 = -\frac{1}{2}(6) + b$$

$$5 = -3 + b$$

$$8 = b$$

$$y_2 = -\frac{1}{2}x + 8$$

③ Need POI
B(x, y)

POI $B(x, y)$

$$y_1 = 2x + 3$$

$$y_2 = -\frac{1}{2}x + 8$$

$$(2x + 3 = -\frac{1}{2}x + 8)^2$$

$$4x + 6 = -1x + 16 - 6$$

$$5x = 10$$

$$x = 2$$

sub $x=2$ into y_1

$$y = 2(2) + 3$$

$$y = 7 \checkmark$$

check

$$y = -\frac{1}{2}(2) + 8$$

$$y = 7 \checkmark$$

$B(2, 7)$

④ Now can calc distance between
A(6, 5) B(2, 7)

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

$$d = \sqrt{(2 - 6)^2 + (7 - 5)^2}$$

$$d = \sqrt{(-4)^2 + (2)^2}$$

$$d = \sqrt{16 + 4}$$

$$d = \sqrt{20}$$

$$d = 4.47$$

∴ the distance between A and $y = 2x + 3$ is 4.47 Units

To find the distance between a point and an equation of a line:

1. Draw a sketch to help visualize
2. Shortest distance is going to be a NEW line that will be at 90 degrees thus, it's slope will be the negative reciprocal to the original line.
3. Now come up with the new equation using the negative reciprocal and the point (x, y)
4. Solve for the point of intersection using substitution or elimination and perform your check
5. Now use point of intersection and original point to calculate the shortest distance using the distance formula

homework: p86 # 2ab, 3, 7, 9, 12a*, 13*, 15