

I will be able to find the length of a line segment and the distance between a point and a line.

Minds on

Try and find the length

Action!

Calculating length of a line

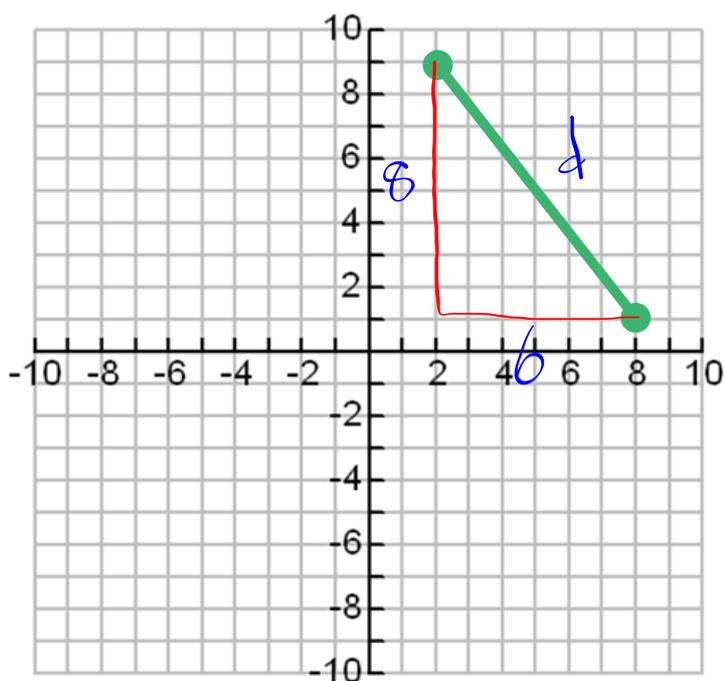
Calculating the distance from a point to a line

Consolidation

Challenge problem!!

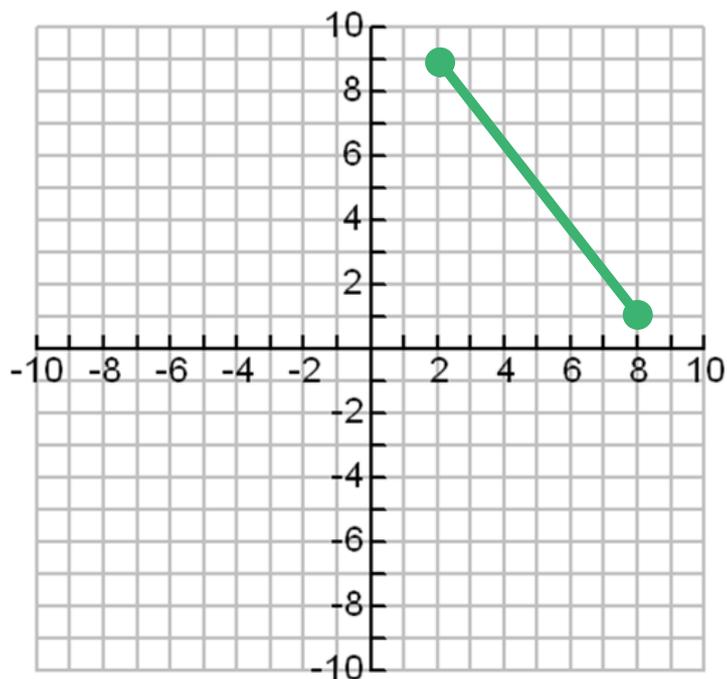
Minds on

Yesterday, we calculated the midpoint of this line segment.
Today: Calculate it's length.
(NOTE: Calculate doesn't mean measure.)

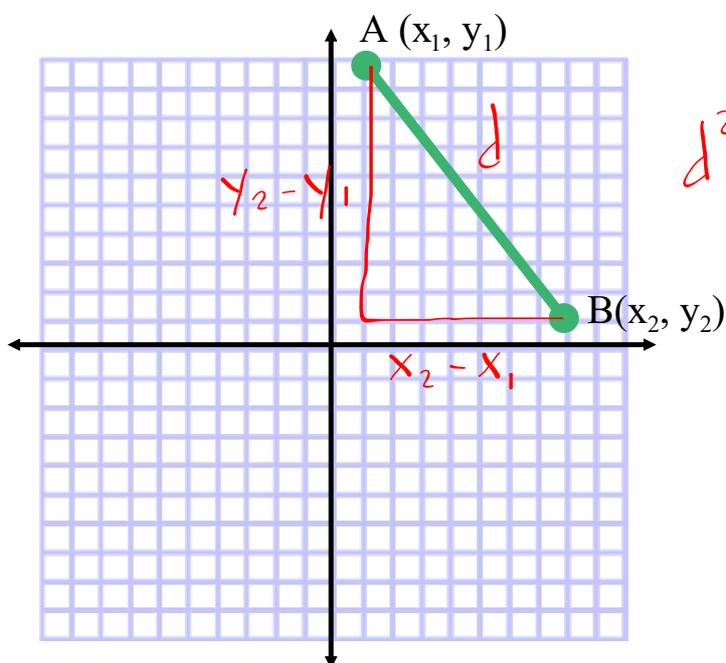


Minds on

On the back: Can you connect what you've done to the actual coordinates of the points?



Deriving a formula for the length of a line segment
with endpoints A (x_1, y_1) and B (x_2, y_2) :



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

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

So the formula for length of the line segment AB between $A(x_1, y_1)$ and $B(x_2, y_2)$ is:

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

~~OR:~~

Example 1: Calculate the length of the line segment with endpoints E(2, 3) and F(9, 8).

x_2 y_2

x_1 y_1

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

$$d = \sqrt{(9 - 2)^2 + (8 - 3)^2}$$

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

$$d = \sqrt{49 + 25}$$

$$d = \sqrt{74}$$

$$d = 8.6$$

Calculate the length of the line segment with endpoints G(-1, 4) and H(-5, -8).

$$\begin{array}{cc} x_1 & y_1 \\ x_2 & y_2 \end{array}$$

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

$$d = \sqrt{(-5 - (-1))^2 + (-8 - 4)^2}$$

$$d = \sqrt{(-4)^2 + (-12)^2}$$

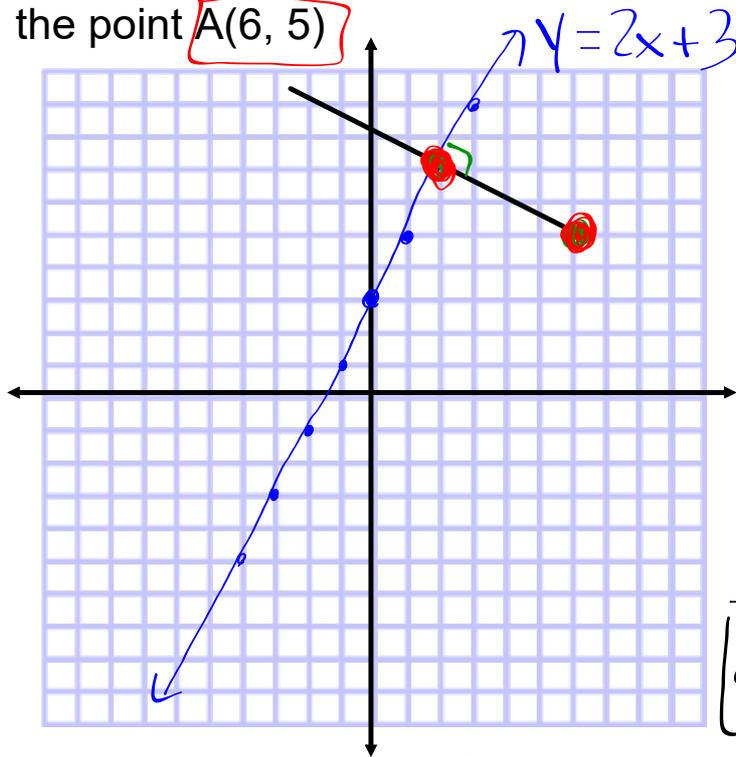
$$d = \sqrt{16 + 144}$$

$$d = \sqrt{160}$$

$$d = 12.6$$

Calculating the distance between a point and a line

Calculate the distance between the line $y = 2x + 3$ and the point $A(6, 5)$



lets start by graphing and making a plan!!

1. Find the line \perp to $y = 2x + 3$, through $A(6, 5)$.

$$\boxed{\text{slope} = -\frac{1}{2}}$$

y-intercept: $b = y - mx$

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

$$b = 5 - (-3)$$

$$\boxed{b = 8}$$

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

2. Determine where the lines meet.

Solve the system

$$y = 2x + 3 \text{ and } y = -\frac{1}{2}x + 8$$

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

$$-0.5x + 8 = 2x + 3$$

$$-2.5x = -5$$

$$\boxed{x = 2}$$

Sub $x = 2$ into $y = 2x + 3$

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

$$\boxed{y = 7}$$

\therefore lines meet at $(2, 7)$

3. Find distance between the two points.

$$\begin{array}{cc} (2, 7) & \text{and} & (6, 5) \\ x_1 & y_1 & x_2 & y_2 \end{array}$$

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

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

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

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

$$d = \sqrt{20}$$

$$d = 4.5$$

Determine the distance from the line $y = x + 3$ to the point $(3, 4)$

1. Find the line perpendicular to $y = x + 3$ through the point $(3, 4)$.
2. Determine where the two lines meet.
3. Find distance between the two points.

Practice:

Pg. 86

2ii b&d only

3

9

12b, d

13

Calculate the distance between the line $y = 2x + 3$ and the point $A(6, 5)$

Consolidation

Group challenge problem!!

Get your chart paper....

Example: Given $Q(3, 2)$ $R(-3, 4)$ $S(-4, -1)$ of $\triangle QRS$ use the length to classify the triangle as either scalene, isosceles or equilateral.

Practice:

Pg. 86

2ii b&d only

3

9

12b, d

13