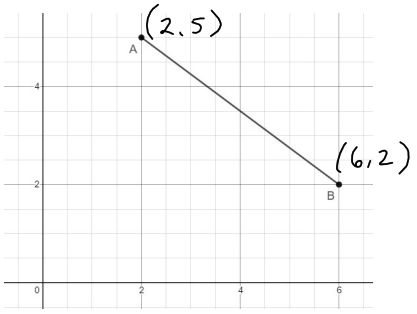
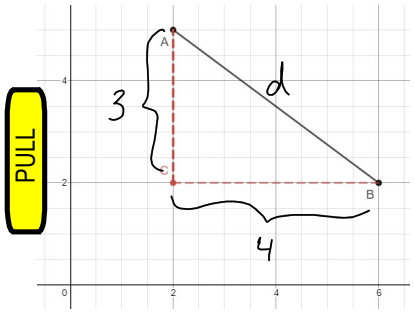
6.3 Distance Between 2 Points

Recall: The Pythagorean Theorem: the square of the hypotenuse is equal to the sum of the squares of the other two sides in a **right triangle**.

In groups, discuss the following question:

What is the distance between the points A(2, 5) and B(6, 2)?





$d^2 = 3^2 + 4^2$

$d^2 = 9 + 16$

$d = \sqrt{25}$

$= 5$

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

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

Ex 1: Determmine the distance from the origin to the point (-1,-4)?

(0,0)

$d = \sqrt{(-1-0)^2 + (-4-0)^2}$

$= \sqrt{1 + 16}$

$= \sqrt{17}$

$\doteq 4.1$

Ex 2: Find the length of the line segments with the following endpoints.

a) A (-3,0) and B (-3,2)

$d = \sqrt{(-3-(-3))^2 + (2-0)^2}$

$= \sqrt{(0)^2 + (2)^2}$

$= 2$

b) C(-4,7) and D (3,1)

$d = \sqrt{(3-(-4))^2 + (1-7)^2}$

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

$= \sqrt{85}$

$\doteq 9.2$

Ex 3: Given the points A(2, 2) and B(1, 6), determine the

a) length of line segment AB.

$d = \sqrt{(6-2)^2 + (1-2)^2}$

$= \sqrt{16+1}$

$= \sqrt{17}$

$\doteq 4.1$

b) slope of line segment AB.

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

$= \frac{6-2}{1-2}$

$= \frac{4}{-1}$

$= -4$

c) slope of a line <u>perpendicular</u> to AB

Negative Reciprocal!

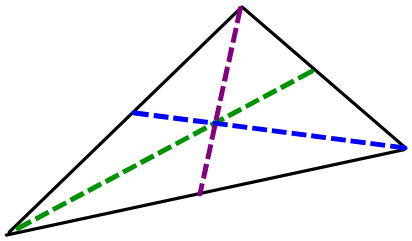
$m = \frac{1}{4}$

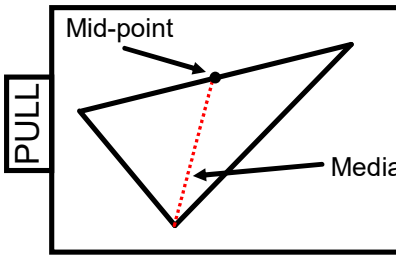
d) midpoint of line AB

$M_{AB} = \left(\frac{2+1}{2}, \frac{2+6}{2}\right)$

$= \left(\frac{3}{2}, 4\right)$

Note: The centroid of a triangle is the point where all three medians intersect.





Ex. 4: Find the centroid of the triangle with vertices A(2,-3), B(-3,5) and C(-2, 4). Then verify that the centroid divides each median in a 2:1 ratio.

Many steps!

1) First, need to find centroid

Create two medians (lines between vertex and opposite midpoint)

Find Intersection of two lines (this is centroid)

2) Then find distance from centroid to vertex, and centroid to midpoint