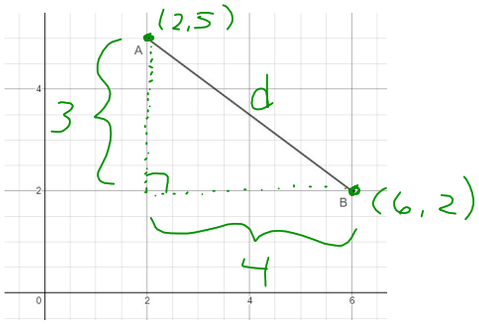
# 6.3 Distance Between 2 Points

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:

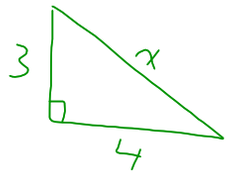
What is the distance between the points A(2, 5) and B(6, 2)?




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

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

$= 5$




$x^2 = 3^2 + 4^2$

$x = \sqrt{3^2+4^2}$

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

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

.

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)

$x_1$ $y_1$ $x_2$ $y_2$

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

$= \sqrt{0+4}$

$= \sqrt{4}$

$= 2$

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

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

$= \sqrt{49+36}$

$= \sqrt{85}$

$\doteq 9.2$

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

a) length of line segment AB.

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

$= \sqrt{1 + 16}$

$= \sqrt{17}$

$\doteq 4.1$

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 perpendicular to AB

Negative Reciprocal!

$m = -4$

$m_\perp = \frac{1}{4}$

d) midpoint of line AB

$M_{AB} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

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

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

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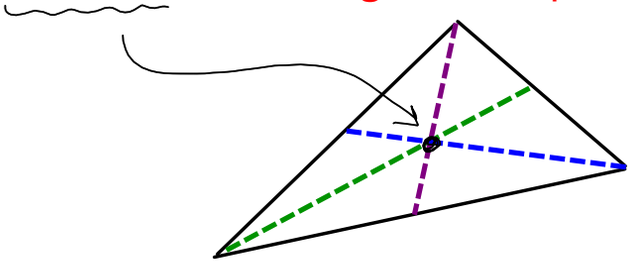
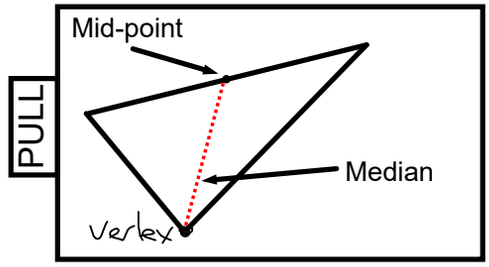
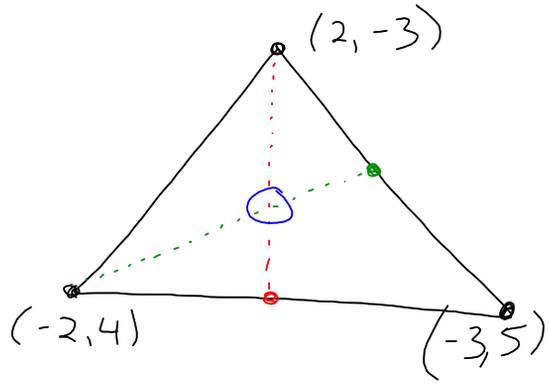
Note: The centroid of a triangle is the point where all three medians i






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.~~

- Goal is to find intersection of two lines! (Two medians)
- Already have vertices
- Need two midpoints
- Use one vertex & one midpoint to get equation of line
- Do it again!
- Intersect them.

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