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

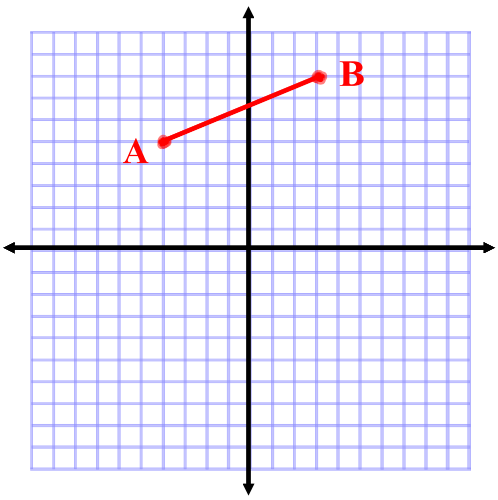
Slope Formula (m) : $m = \frac{y_2-y_1}{x_2-x_1}$

Midpoint Formula: $\left(\frac{x_1 + x_2}{2} , \frac{y_1+y_2}{2} \right)$

Find the following:

(x,y) (x,y)

A(-4,5) ; B(3,8)



a) length of segment AB

$AB = \sqrt{(\underset{-7}{-4-3})^2 + (\underset{-3}{5-8})^2}$

$AB = \sqrt{49+9} = \sqrt{58}$

b) slope of seg. AB

$m = \frac{8-5}{3-(-4)} = \frac{3}{7}$

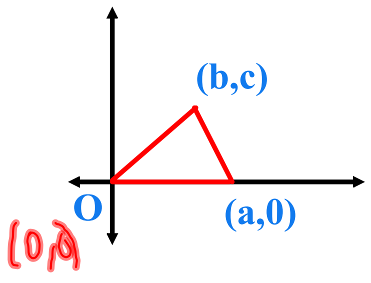
c) midpoint of seg. AB

$\left(\frac{-4+3}{2}, \frac{5+8}{2}\right) = \left(\frac{-1}{2}, \frac{13}{2}\right)$

or $\left(-\frac{1}{2}, 6.5\right)$

Sec. 4.8 Triangles & Coordinate Proof

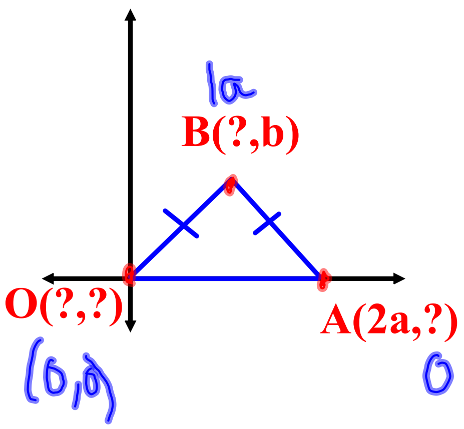
Triangle

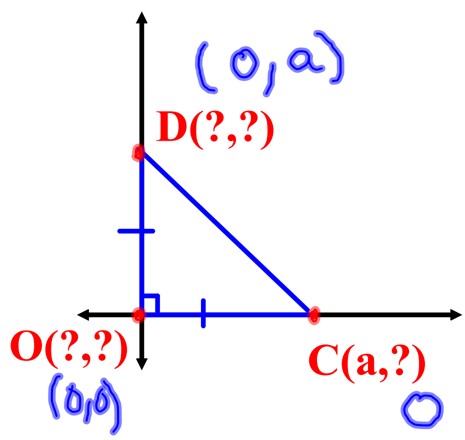


Figures in Standard Position

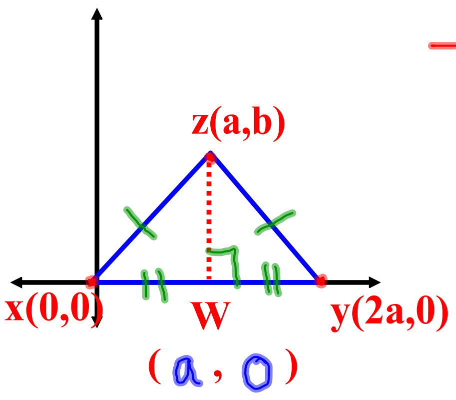
- has a vertex at (0,0)
- one side on x-axis
- keep the triangle in the 1st quadrant if possible
- use coordinates that make computations as simple as possible

Identify the missing coordinates:





Write a coordinate proof to prove that the segment that joins the vertex angle of an isosceles triangle to the midpoint of its base is perpendicular to the base.



$\perp$ lines – m is negative reciprocal

$m = \frac{3}{4} \rightarrow m = -4/3$

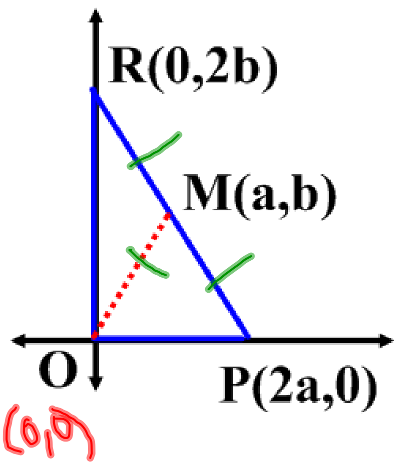
$\boxed{ZW \perp XY}$

$m\,ZW = \frac{b-0}{a-a} = \frac{b}{0} = \text{undefined}$

$m\,XY = \frac{0-0}{0-2a} = \frac{0}{-2a} = 0$

Since m ZW is undefined & the slope of XY = 0, the lines are $\perp$.

Show that the midpoint M of the hypotenuse of right triangle ORP is equidistant from vertices O, R, & P.



$\boxed{OM = MR = MP}$

$OM = \sqrt{(a-0)^2 + (b-0)^2} = \sqrt{a^2+b^2}$

$MR = \sqrt{(a-0)^2 + (\underbrace{b-2b}_{-b})^2} = \sqrt{a^2+b^2}$

$MP = \sqrt{(\underbrace{2a-a}_{a})^2 + (\underbrace{0-b}_{-b})^2} = \sqrt{a^2+b^2}$

$\sqrt{(a+b)^2} = a+b$

Since all segments $= \sqrt{a^2+b^2}$, M is equidistant from R, O, & P.

Homework:
p. 305, # 14-18 even, 25-28 all, 38-44 all

**** Honors - 19, 20**
you will need a diagram for # 19 & 20