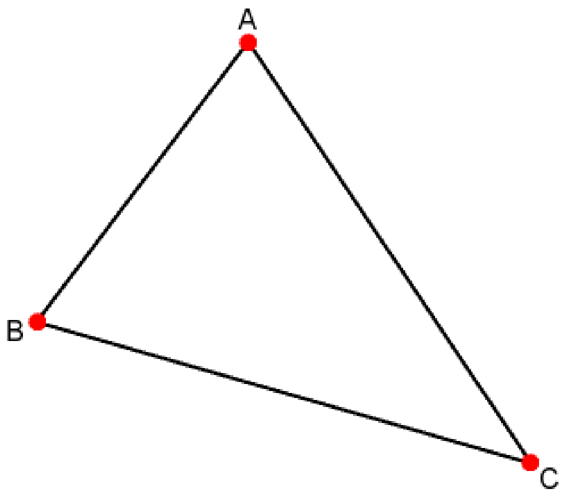
MEDIAN

A median of a triangle is a line segment that joins a vertex of a triangle to the midpoint of the opposite side.

Sketch the median of the triangle below from A to side BC. (Sketch it on the definition chart sheet)



Step 1 Use a ruler to find the midpoint of the side.

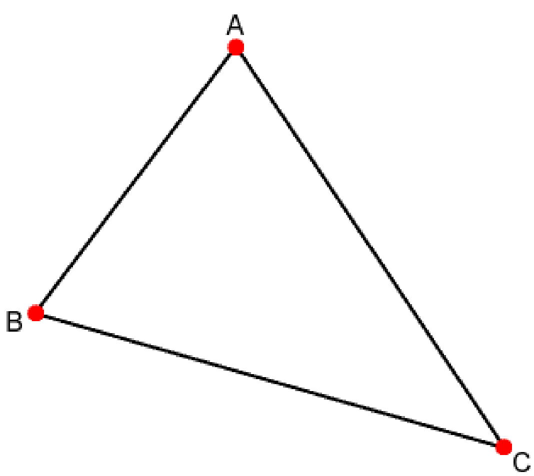
Step 2 Draw a segment from that midpoint to the opposite vertex.

Step 3 Do this for all three sides and you'll find the **centroid** of the **triangle**!

RIGHT OR PERPENDICULAR BISECTOR

A right bisector or a perpendicular bisector is a line that is perpendicular to a line segment and divides the line segment into two equal parts.

Sketch the perpendicular bisector of side BC in the triangle below.



Step 1: Use a ruler to find the midpoint of the side.

Step 2: Set an edge of the set square on the given line so that the other edge is just in contact with the point.

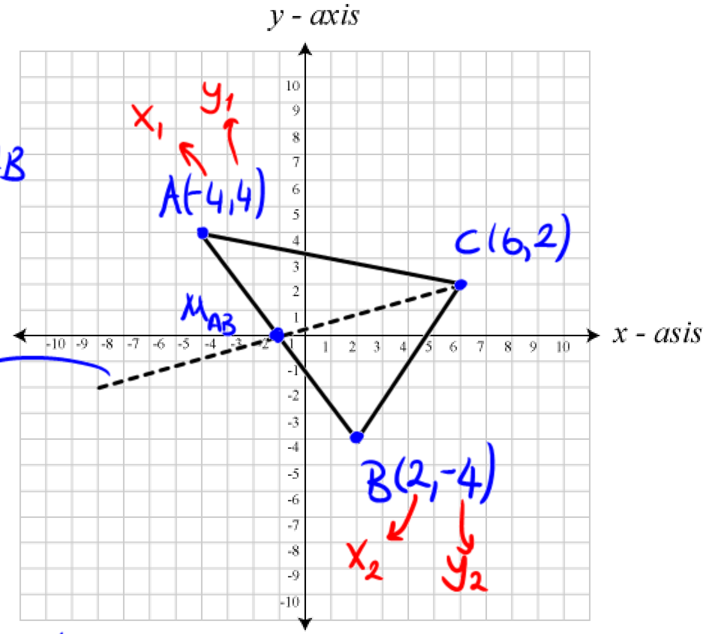
Step 3: Draw a line that passes through the given point with the help of the set square.

Ex 1: Given triangle ABC with vertices $A(-4,4)$, $B(2,-4)$ and $C(6,2)$:

a) Plot the triangle on the grid below.

b) Find the equation of the median from vertex M to side AB. line segment of AB

c) Draw the median.



median

Step 1: Find the midpoint of $\overline{AB}$

$M_{AB} = \left(\frac{-4+2}{2}, \frac{4+(-4)}{2}\right)$

$M_{AB} = \left(\frac{-2}{2}, \frac{0}{2}\right)$

$M_{AB} = (-1, 0)$

Step 2. Find the equation

→ We know 2 points on the median

→ $M_{AB}(-1,0)$ and $C(6,2)$

$m = \frac{y_2 - y_2}{x_2 - x_1} = \frac{2-(-1)}{6-0} = \frac{2+1}{6} = \frac{3}{6} = \frac{1}{2}$ } $m = \frac{1}{2}$

$y - y_1 = m(x - x_1)$ $M_{AB}(\underset{x_1}{-1}, \underset{y_1}{0})$

$2(y - 0) = \left(\frac{1}{2}(x-(-1))\right)2$

$2y = (x+1) \Rightarrow \boxed{0 = x - 2y + 1}$ } std form

Or

$y = mx + b$ $m = \frac{1}{2}$ $M_{AB}(-1,0)$

$y = \frac{1}{2}x + b$

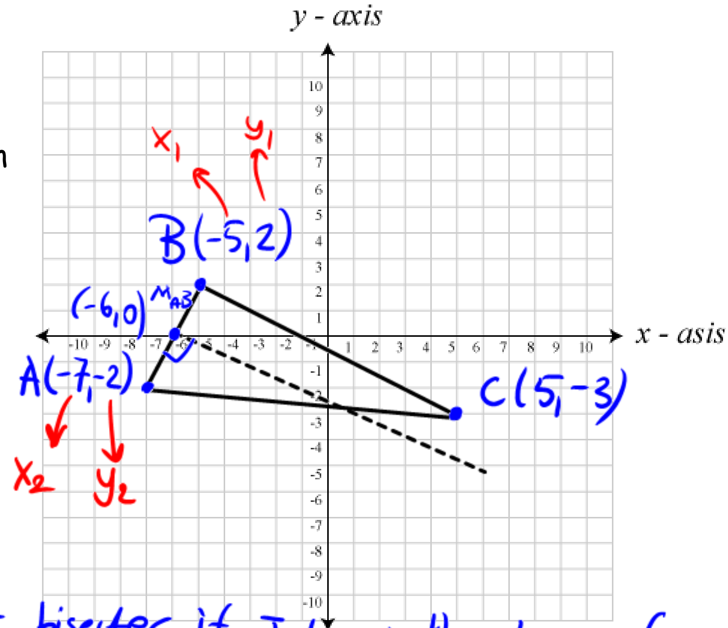
$0 = \frac{1}{2}(-1) + b$

$\frac{1}{2} = b$

$\boxed{y = \frac{1}{2}x + \frac{1}{2}}$ } slope y-int form

Ex 2: Given triangle ABC with vertices $A(-7,-2)$, $B(-5,2)$ and $C(5,-3)$:

a) Plot the triangle on the grid below.
b) Find the equation of the right bisector of AB.
c) Draw the perpendicular bisector of side AB on the grid given.



Step 1: midpoint of $\overline{AB}$

$M_{AB} = \left(\frac{-7+(-5)}{2}, \frac{-2+2}{2}\right)$

$M_{AB} = \left(\frac{-7-5}{2}, \frac{0}{2}\right)$

$M_{AB} = (-6, 0)$

Step 2: Find the equ.
I can find the slope of the right bisector if I know the slope of $\overline{AB}$.

$m\overline{AB} = \frac{(-2)-(2)}{(-7)-(-5)} = \frac{-4}{-7+5} = \frac{-4}{-2} = 2 \Rightarrow \boxed{m\overline{AB} = 2}$

I know that the product of the slopes of perpendicular lines is -1

$m_1 \times m_2 = -1$

$2 \times m_2 = -1$

$\boxed{m_2 = -1/2}$

$y = mx + b \quad m = -\frac{1}{2}$

$0 = -\frac{1}{2}(-6) + b$

$0 = 3 + b \Rightarrow \boxed{b = -3}$

M(-6,0)

$\therefore \boxed{y = -\frac{1}{2}x - 3}$ slope-y-int.

An application of the equation of the right bisector: To find a point that is equidistant (equally distant) from two towns to place a hospital, recreation centre or a fire hall.

Work on p. 66 #8, 16, 17, and 19