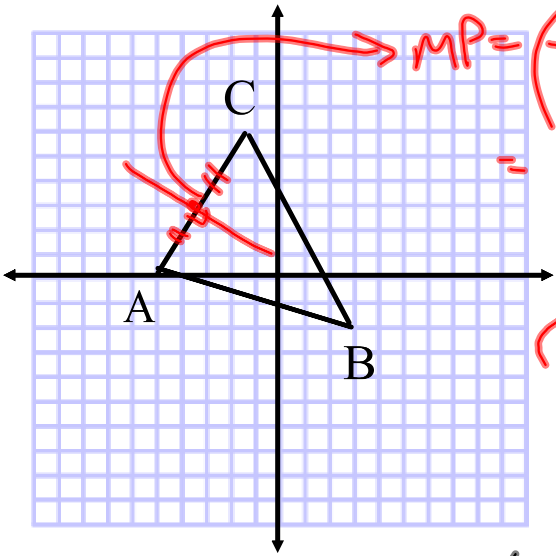
Warm Up

1. Triangle ABC has vertices A(-5 , 0), B(3 , -2) and C(-1 , 6).
   (a) Determine the area of ΔABC.
   (b) Determine the *x*-intercept of the perpendicular bisector of side AC.



$MP = \left(\frac{-5+-1}{2}, \frac{0+6}{2}\right)$

$= (-3, 3)$

$m_{AC} = \frac{6}{4} = \frac{3}{2}$

$\perp m = \frac{-2}{3}$

$y - 3 = -\frac{2}{3}(x+3)$

$3y - 9 = -2x - 6$

$\left(\underline{x\text{-Int:}}\ y = 0\right)$

$0 - 9 = -2x - 6$

$\frac{-3}{-2} = \frac{-2x}{-2}$

$\frac{3}{2} = x$

-5	0
3	-2
-1	6
-5	0

(a)

$A = \frac{1}{2}\left|(10+18+0) - (-30+2+0)\right|$

$A = \frac{1}{2}\left|(28) - (-28)\right|$

$A = \frac{1}{2}|56|$

$A = \underline{28u^2}$

REVIEW - Coordinate Geometry

Coordinate Geometry

- Finding the Slope of a Line:

(1) Given 2 points on the line

$$\boxed{m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}}$$

(2) Given the equation of the line

$$\boxed{y = mx + b}$$

- Slopes of Special Lines:
- Horizontal Lines → $m = 0$
- Vertical Lines → *m is undefined (no slope)*
- Parallel Lines → have slopes that are **equal** to each other
- Perpendicular Lines → have slopes that are **negative reciprocals** to each other

- Finding Intercepts:
- x intercept → let $y = 0$
- y intercept → let $x = 0$ OR $y = mx + b$

- Finding the Equation of a Line:

(1) Slope-Intercept Method

$$\boxed{y = mx + b}$$

(2) Point-Slope Method

$$\boxed{y - y_1 = m(x - x_1)}$$

- Equations of Special Lines:
- Horizontal Lines → $\boxed{y = constant}$
- Vertical Lines → $\boxed{x = constant}$

- Forms of an Equation:

(1) Slope-Intercept Form

$$\boxed{y = mx + b}$$

(2) Standard Form

$$\boxed{Ax + By + C = 0}$$

- no fractions
- # in front of "x" term is positive
- set equal to zero

- Distance Between 2 Points:

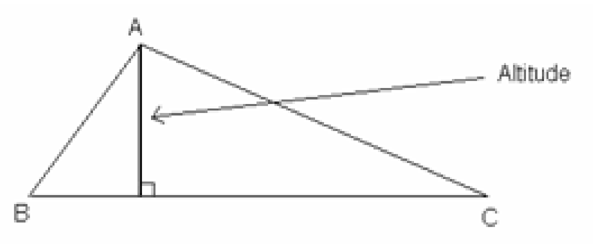
$$\boxed{d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}}$$

- Operations Involving Radicals:
- Simplifying → $\sqrt{a \times b} = \sqrt{a} \times \sqrt{b}$
- Addition / Subtraction → # under the radical sign (radicand) must be the **same**

- Midpoint of a Line:

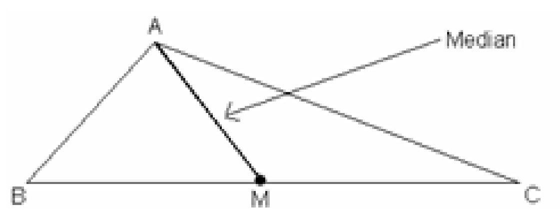
$$\boxed{midpoint\ (x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)}$$

- Properties of Triangles:
  (1) Altitude → a **perpendicular** line drawn from a vertex to the opposite side in a triangle



To get equation, find…
- m_{BC}
- $m_{\perp BC}$ ← slope
- point A ← point

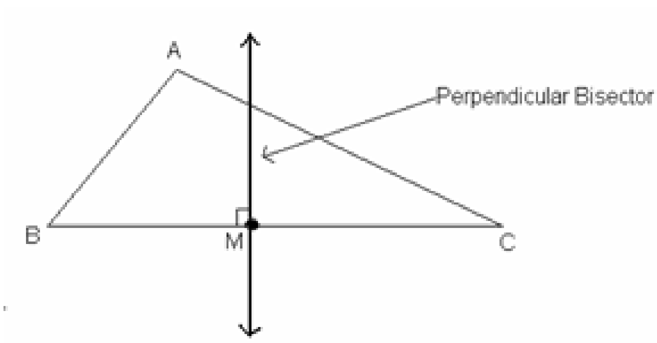
(2) Median → a line drawn from a vertex to the **midpoint** of the opposite side in a triangle



To get equation, find…
- midpoint of BC
- m_{AM} ← slope
- point A or M ← point

To get length, find…
- midpoint of BC
- d_{AM} ← 2 points

(3) Right Bisector (Perpendicular Bisector) → a **perpendicular** line drawn through the **midpoint** of a line segment



To get equation, find…
- m_{BC}
- $m_{\perp BC}$ ← slope
- midpoint of BC ← point

Given triangle ABC, with vertices A(4,3), B(2,-7) and C(-6,-1), find:

1. The equation of the altitude drawn from A (general form)

2. The equation of the median drawn from C (slope-intercept form)

3. The equation of the perpendicular bisector of side AC (point-slope form)

4. The **x-intercept** of the altitude drawn from B

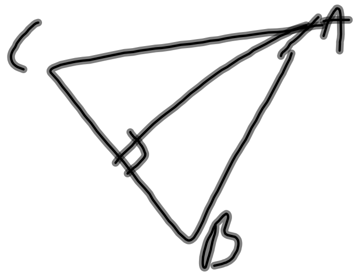
5. The length of the median drawn from B

6. The equation of the perpendicular bisector of the median drawn from A (standard form)

7. The area of triangle ABC

Point

Given triangle ABC, with vertices $\boxed{A(4,3)}$, B(2,-7) and C(-6,-1), find:



1. The equation of the altitude drawn from A (general form)

$$m_{BC} = \frac{-1+7}{-6-2} = \frac{6}{-8} = -3/4$$

$$m_{\perp BC} = 4/3 \quad \text{Point } (4,3)$$

$$3 \cdot y - 3 \cdot 3 = 3 \cdot \frac{4}{3}(x-4)$$

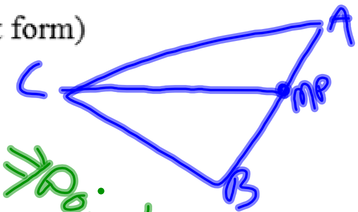
$$3y - 9 = 4x - 16$$

$$0 = 4x - 3y - 7 \quad \text{G.F.}$$

Given triangle ABC, with vertices A(4,3), B(2,-7) and C(-6,-1), find:

2. The equation of the median drawn from C (slope-intercept form)

$$MP_{AB} = \left(\frac{4+2}{2}, \frac{3+^{-}7}{2}\right) = \boxed{(3,-2)} \Rightarrow \text{Point}$$



$$m_{C,MP} = \frac{-2-^{-}1}{3-^{-}6} = \boxed{\frac{-1}{9}} \Rightarrow \text{Slope}$$

$$y+2 = \frac{-1}{9}(x-3)$$

$$y+\frac{18}{9} = \frac{-1}{9}x + \frac{3}{9}$$

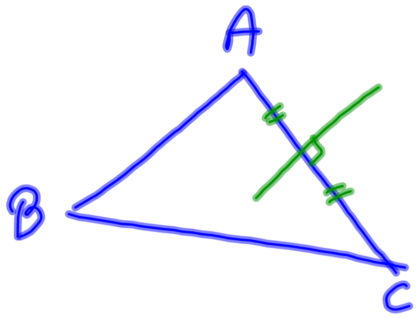
$$y = \frac{-1}{9}x + \frac{3}{9} - \frac{18}{9}$$

Slope-Int.

$$\boxed{y = \frac{-1}{9}x - \frac{5}{3}}$$

Given triangle ABC, with vertices A(4,3), B(2,-7) and C(-6,-1), find:

3. The equation of the perpendicular bisector of side AC (point-slope form)



$$MP_{AC} = \left(\frac{4+-6}{2}, \frac{3+-1}{2}\right)$$

$$MP_{AC} = (-1, 1)$$

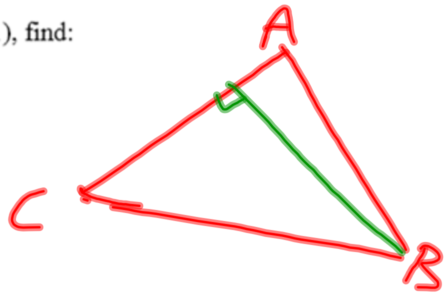
$$m_{AC} = \frac{3-(-1)}{4-(-6)} = \frac{4}{10} = \frac{2}{5}$$

$$\therefore \underline{\perp} \; m = \frac{-5}{2}$$

$$y - 1 = -\frac{5}{2}(x+1)$$

Given triangle ABC, with vertices A(4,3), B(2,-7) and C(-6,-1), find:

4. The **x-intercept** of the altitude drawn from B



$M_{AC} = \frac{2}{5}$ Point $(2,-7)$

$\rightarrow m_{\perp} = -\frac{5}{2}$

$y + 7 = -\frac{5}{2}(x-2)$

$2y + 14 = -5x + 10$

$5x + 2y + 4 = 0$

X-Int: $(y=0)$

$5x + 4 = 0$

$5x = -4$

$x = -\frac{4}{5}$

Given triangle ABC, with vertices A(4,3), B(2,-7) and C(-6,-1), find:

5. The length of the median drawn from B

$M_{p}AC = (-1,1)$ from #3

Point B $(2,^-7)$ — distance

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

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

$$= \sqrt{9+64}$$

$$d \boxed{= \sqrt{73}}$$