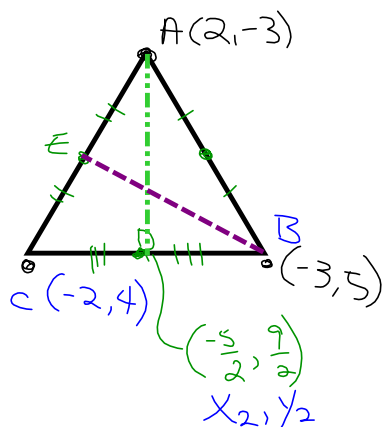


2.8 Verifying Properties of Triangles

1. A triangle has vertices $A(2, -3)$, $B(-3, 5)$, and $C(-2, 4)$.

Find the centroid. median AD



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

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

$$= \left(-\frac{5}{2}, \frac{9}{2} \right)$$

$$m_{AD} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{\frac{9}{2} - (-3)}{-\frac{5}{2} - 2}$$

$$= \frac{\frac{9}{2} + \frac{6}{2}}{-\frac{5}{2} - \frac{4}{2}}$$

$$= \frac{\frac{15}{2}}{-\frac{9}{2}}$$

$$= \frac{15}{2} \div \left(-\frac{9}{2} \right)$$

$$= \frac{15}{2} \cdot \left(-\frac{2}{9} \right)$$

$$= -\frac{5}{3}$$

Median AD

pt $(-\frac{5}{2}, \frac{9}{2})$

$$m = -\frac{5}{3}$$

$$y = mx + b$$

$$\frac{9}{2} = -\frac{5}{3} \left(-\frac{5}{2} \right) + b$$

$$\frac{9}{2} = \frac{25}{6} + b$$

$$\frac{9 \cdot 3}{2 \cdot 3} - \frac{25}{6} \leq b$$

$$\frac{27}{6} - \frac{25}{6} = b$$

$$b = \frac{2}{6}$$

$$= \frac{1}{3}$$

$$\therefore y = -\frac{5}{3}x + \frac{1}{3} \text{ median AD}$$

Median BE

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

$$M_E = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right) \quad A(2,-3) \quad B(-3,5) \\ C(-2,4)$$

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

$$= \left(0, \frac{1}{2} \right)$$

x
 y

$$m_{BE} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\frac{1}{2} - \frac{-3}{2}}{0 - (-3)} = \frac{\frac{1-(-3)}{2}}{\frac{1}{2}} = \frac{4}{2} = 2$$

$$y = mx + b$$

$$\frac{1}{2} = \left(\frac{-3}{2} \right) \cdot 0 + b$$

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

$$\therefore y = mx + b$$

$$y = -\frac{3}{2}x + \frac{1}{2} \quad \textcircled{2}$$

$$y = -\frac{5}{3}x + \frac{1}{3} \quad \textcircled{1}$$

Substitute ① into ②

$$y = y$$

$$-\frac{5}{3}x + \frac{1}{3} = -\frac{3}{2}x + \frac{1}{2}$$

$$-10x + 2 = -9x + 3$$

$$-10x + 9x = 3 - 2$$

$$-1x = 1$$

$$x = -1$$

subst $x = -1$ into ①

$$(-1, 2)$$

LS	RS	$y = -\frac{5}{3}x + \frac{1}{3}$	Centroid is $(-1, 2)$
y	$-\frac{5}{3}x + \frac{1}{3}$	$= -\frac{5(-1)}{3} + \frac{1}{3}$	
$= 2$	$= -\frac{5(-1)}{3} + \frac{1}{3}$	$= \frac{5}{3} + \frac{1}{3}$	
	$= 2$	$= \frac{6}{3}$	

$$= 2$$

LS	RS	$A(2,-3) \quad B(-3,5) \quad C(-2,4)$
y	$-\frac{3}{2}x + \frac{1}{2}$	Centroid: $\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3} \right)$
$= 2$	$= 2$	$= \left(\frac{2+(-3)+(-2)}{3}, \frac{-3+5+4}{3} \right)$
		$= \left(-\frac{3}{3}, \frac{6}{3} \right)$
		$= (-1, 2)$

check