W2 – Median, Right Bisector, Altitude Unit 2

MPM2D

Jensen

1) ΔABC has vertices $A(3,4)$, $B(-5,2)$, and $C(1,-4)$. Determine an equation for

a) the median from C to AB

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

slope of median $= \frac{3-(-4)}{-1-1} = \frac{7}{-2} = -\frac{7}{2}$

y-int CD: $y = mx+b$

$-4 = \left(-\frac{7}{2}\right)(1)+b$

$-\frac{8}{2}+\frac{7}{2} = b$

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

Eqn of median: $y = -\frac{7}{2}x - \frac{1}{2}$

b) the altitude from A to BC

slope BC $= \frac{-4-2}{1-(-5)} = \frac{-6}{6} = -1$

slope of altitude $= 1$

y-int of altitude:

$y = mx+b$

$4 = 1(3)+b$

$b = 4-3$

$b = 1$

Eqn of altitude: $y = x+1$

c) the right bisector of AC

$mid_{AC} = \left(\frac{3+1}{2}, \frac{4+(-4)}{2}\right) = (2,0)$

$slope_{AC} = \frac{-4-4}{1-3} = 4$

slope of right bisector $= -\frac{1}{4}$

y-int of right bisector:

$y = mx+b$

$0 = \left(-\frac{1}{4}\right)(2)+b$

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

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

Eqn of right bisector: $y = -\frac{1}{4}x + \frac{1}{2}$

2) Draw △JKL with vertices J(–6, 4), K(–4, –5), and L(6, 1).

a) Draw the median from vertex J. Then, find an equation in slope *y*-intercept form for this median.

$mid_{KL} = \left(\frac{-4+6}{2}, \frac{-5+1}{2}\right) = (1,-2)$

slope of median $= \frac{-2-4}{1-(-6)} = \frac{-6}{7}$

y-int of median:

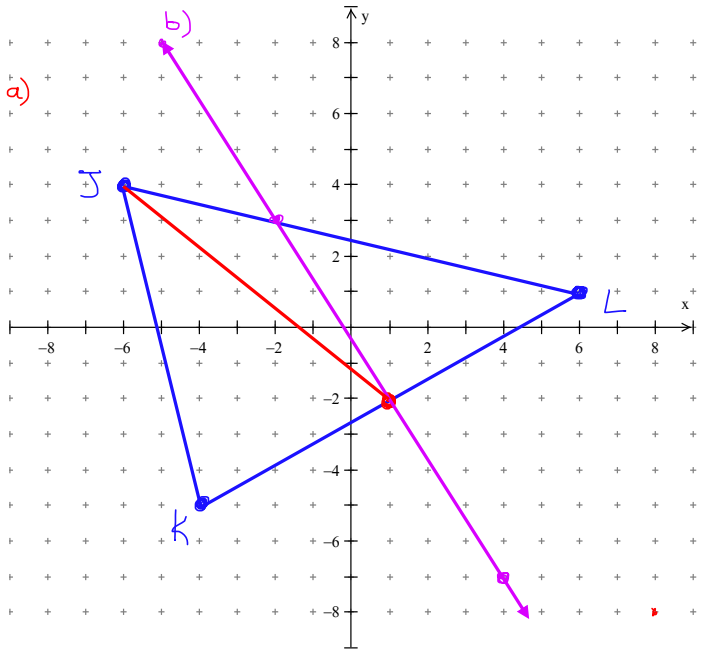
$y = mx+b$

$-2 = \left(\frac{-6}{7}\right)(1)+b$

$-\frac{14}{7}+\frac{6}{7} = b$

$b = \frac{-8}{7}$

Eqn: $y = -\frac{6}{7}x - \frac{8}{7}$



b) Draw the right bisector of KL. Then, find an equation in slope *y*-intercept form for this right bisector.

$slope_{KL} = \frac{1-(-5)}{6-(-4)} = \frac{6}{10} = \frac{3}{5}$

slope of right bisector $= -\frac{5}{3}$

$mid_{KL} = (1,-2)$

y-int of right bisector:

$y = mx+b$

$-2 = \left(\frac{-5}{3}\right)(1)+b$

$-\frac{6}{3}+\frac{5}{3} = b$

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

Eqn: $y = -\frac{5}{3}x - \frac{1}{3}$

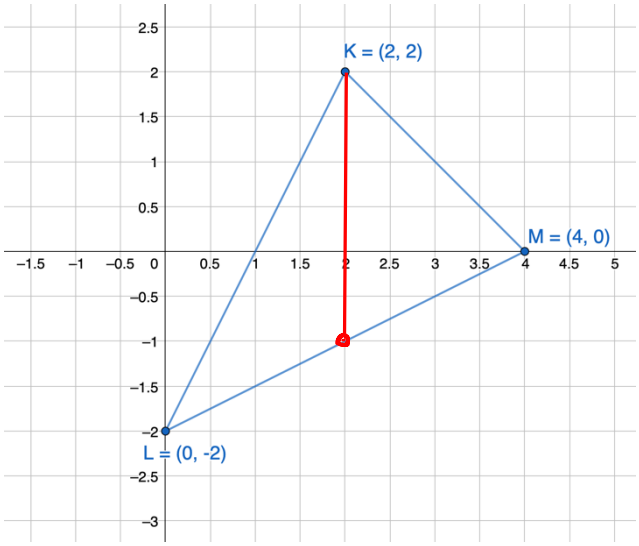
3) ΔKLM has vertices $K(2,2)$, $L(0,-2)$, and $M(4,0)$. Draw and determine the equation of…

a) the median from vertex K

$mid_{LM} = \left(\frac{0+4}{2}, \frac{-2+0}{2}\right) = (2,-1)$

slope of median $= \frac{-1-2}{2-2} =$ undefined

Eqn of median: $x = 2$



b) the right bisector of KL

$mid_{KL} = \left(\frac{2+0}{2}, \frac{2+(-2)}{2}\right) = (1, 0)$

$slope_{KL} = \frac{-2-2}{0-2} = \frac{-4}{-2} = 2$

slope of right bisector $= -\frac{1}{2}$

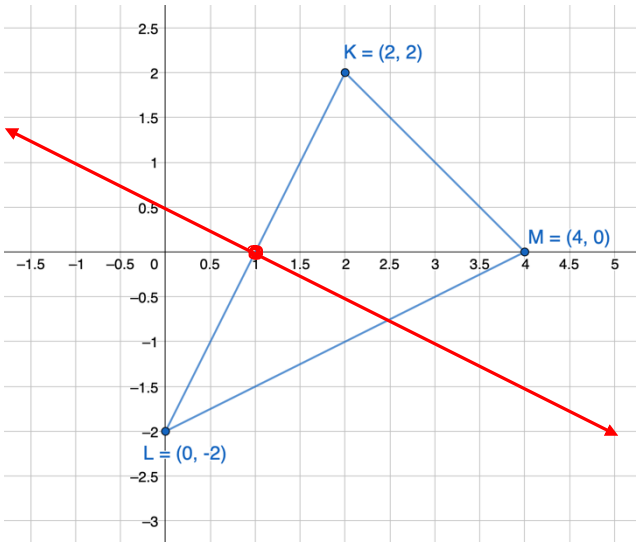
y-int of right bisector:

$y = mx+b$

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

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

Eq^n: $y = -\frac{1}{2}x + \frac{1}{2}$



c) The altitude from vertex K

$slope_{LM} = \frac{0-(-2)}{4-0} = \frac{2}{4} = \frac{1}{2}$

slope of altitude $= -2$

y-int of altitude:

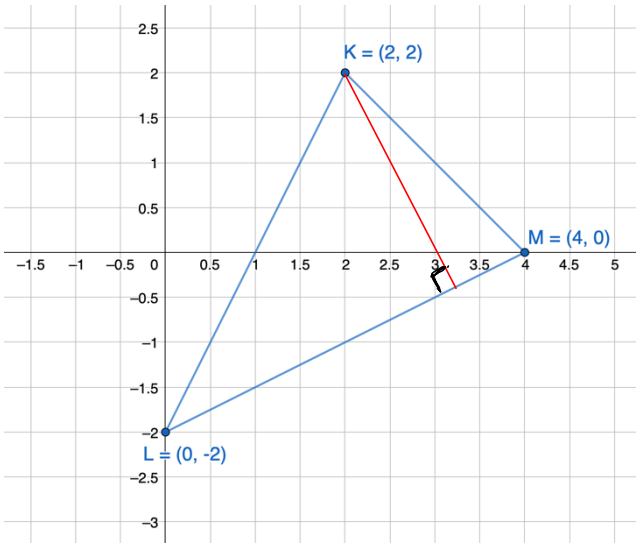
$y = mx+b$

$2 = -2(2)+b$

$2 = -4+b$

$b = 6$

Eq^n: $y = -2x+6$



4) A triangle has vertices A(–4, 2), B(–2, –6), and C(6, –2).

a) Determine the length of the median from vertex A.

$mid_{BC} = \left(\frac{-2+6}{2}, \frac{-6+(-2)}{2}\right) = (2, -4)$

length from $(-4,2)$ to $(2,-4) = \sqrt{[2-(-4)]^2 + (-4-2)^2} = \sqrt{72} = \sqrt{36} \times \sqrt{2} = 6\sqrt{2}$

b) Determine an equation in the form $y = mx + b$ for the median from vertex A.

slope from $(-4,2)$ to $(2,-4) = \frac{-4-2}{2-(-4)} = \frac{-6}{6} = -1$

y-int of median:

$y = mx+b$

$2 = -1(-4)+b$

$2 = 4+b$

$b = -2$

Eq^n: $y = -x-2$

5) Determine an equation for the right bisector of the line segment with endpoints D(–3, 5) and M(7, –9).

$\text{mid}_{DM} = \left(\frac{-3+7}{2}, \frac{5+(-9)}{2}\right) = (2, -2)$

$\text{slope}_{DM} = \frac{-9-5}{7-(-3)} = \frac{-14}{10} = \frac{-7}{5}$

slope of right bisector $= \frac{5}{7}$

y-int of right bisector:

$y = mx + b$

$-2 = \left(\frac{5}{7}\right)(2) + b$

$\frac{-14}{7} - \frac{10}{7} = b$

$b = \frac{-24}{7}$

Eq^n: $y = \frac{5}{7}x - \frac{24}{7}$

Answers

1)a) $y = -\frac{7}{2}x - \frac{1}{2}$ **b)** $y = x + 1$ **c)** $y = -\frac{1}{4}x + \frac{1}{2}$

2)a) $y = -\frac{6}{7}x - \frac{8}{7}$ **b)** $y = -\frac{5}{3}x - \frac{1}{3}$

3)a) $x = 2$ **b)** $y = -\frac{1}{2}x + \frac{1}{2}$ **c)** $y = -2x + 6$

4)a) $\sqrt{72} = 6\sqrt{2}$ **b)** $y = -x - 2$

5) $y = \frac{5}{7}x - \frac{24}{7}$