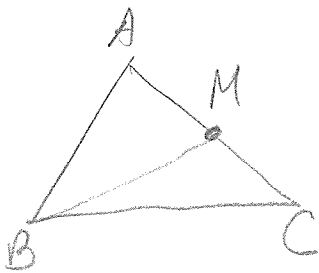


Geometry Honors  
 Chapter: Special Parts of the Triangle  
**The Altitude**

Date: *KEY*

**Warm Up**

1. Find the median of  $\triangle ABC$  drawn from point B. A (1,4) B (-1, -3), C (4, -5)



① midpoint  
 $M(\frac{5}{2}, -\frac{1}{2})$

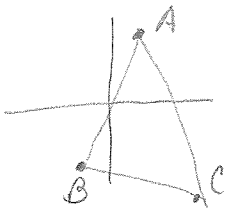
②  $m_{BM} = \frac{-3 + \frac{1}{2}}{-1 - \frac{5}{2}} = \frac{-\frac{5}{2}}{-\frac{7}{2}} \rightarrow \frac{5}{2} \cdot \frac{2}{7} = \frac{5}{7} = m$

③  $-3 = \frac{5}{7}(-1) + b$   
 $-3 + \frac{5}{7} = b$   
 $-2\frac{2}{7} = b$

$y = \frac{5}{7}x - 2\frac{2}{7}$   
 OR  
 $y = \frac{5}{7}x - \frac{16}{7}$

\*\*\*\*\*

2. Find the altitude of  $\triangle ABC$  drawn from point A. A (1,4) B (-1, -3), C (4, -5)



① slope of  $\overline{BC} = \frac{-3+5}{-1-4} = \frac{2}{-5}$

② y-int:  
 A (1,4)  $m = \frac{5}{2}$

slope of ALT =  $\frac{5}{2}$

$4 = \frac{5}{2}(1) + b$   
 $4 - 2\frac{1}{2} = b$   
 $1\frac{1}{2} = b$

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

3. Find the altitude of  $\triangle ABC$  drawn from point B in the triangle in #2.

① slope of  $\overline{AC} = \frac{4+5}{1-4} = \frac{9}{-3} = -3$   
 slope of  $\perp = \frac{1}{3}$

② y-int:  
 B(-1, -3)  
 $-3 = \frac{1}{3}(-1) + b$   
 $-3 + \frac{1}{3}$   
 $-2\frac{2}{3} = b$

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

4. Find the altitude of  $\triangle ABC$  drawn from point C in the triangle in #2.

① slope of  $\overline{AB} = \frac{4+3}{1+1} = \frac{7}{2}$   
 $m_{\perp} = -\frac{2}{7}$

②  $-5 = -\frac{2}{7}(4) + b$   
 $-5 + \frac{8}{7} = b$   
 $-\frac{27}{7} = b$

$y = -\frac{2}{7}x - \frac{27}{7}$

5. For the same triangle, find the median of  $\triangle ABC$  drawn from point A.

① Midpt of  $\overline{BC} = \left(\frac{-1+4}{2}, \frac{-3-5}{2}\right)$   
 $M\left(\frac{3}{2}, -4\right)$

② Slope of Median =  $\frac{4+4}{1-\frac{3}{2}} = \frac{8}{-\frac{1}{2}} = -16$   
 $A(1, 4)$

③  $4 = -16(1) + b$   
 $20 = b$

$y = -16x + 20$

6. For the same triangle, find the median of  $\triangle ABC$  drawn from point C.

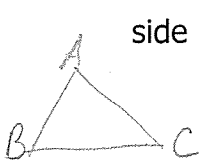
① Midpt of  $\overline{AB} = \left(\frac{1-1}{2}, \frac{4-3}{2}\right)$   
 $= \left(0, \frac{1}{2}\right)$

② Slope of Median =  $\frac{-5-\frac{1}{2}}{4-0} = \frac{-\frac{11}{2}}{4} = -\frac{11}{8}$   
 $C(4, -5)$

③  $-5 = -\frac{11}{8}(4) + b$   
 $-5 = -\frac{11}{2} + b$   
 $-5 + 5\frac{1}{2} = b$   
 $\frac{1}{2} = b$

$y = -\frac{11}{8}x + \frac{1}{2}$

7. For the same triangle, find the perpendicular bisector of each side. Be sure to label which side it is for.



$A(1, 4)$   $B(-1, -3)$   $C(4, -5)$

$\perp$  bis of  $\overline{AB}$

① Midpt of  $\overline{AB} = \left(\frac{1-1}{2}, \frac{4-3}{2}\right)$   
 $= \left(0, \frac{1}{2}\right)$

②  $M_{\overline{AB}} = \frac{4+3}{1+1} = \frac{7}{2}$   
 $M_{\perp} = -\frac{2}{7}$

③  $\frac{1}{2} = -\frac{2}{7}(0) + b$   
 $\frac{1}{2} = b$

$y = -\frac{2}{7}x + \frac{1}{2}$

$\perp$  bis of  $\overline{BC}$

① M.P. of  $\overline{BC} = \left(\frac{-1+4}{2}, \frac{-3-5}{2}\right)$   
 $= \left(\frac{3}{2}, -4\right)$

②  $M_{\overline{BC}} = \frac{-3+5}{-1-4} = \frac{2}{-5}$   
 $M_{\perp} = \frac{5}{2}$

③  $-4 = \frac{5}{2}\left(\frac{3}{2}\right) + b$   
 $-4 - \frac{15}{4} = b$   
 $-\frac{31}{4} = b$

$y = \frac{5}{2}x - \frac{31}{4}$

$\perp$  bis. of  $\overline{AC}$

① M.P. of  $\overline{AC} = \left(\frac{1+4}{2}, \frac{4-5}{2}\right)$   
 $= \left(\frac{5}{2}, -\frac{1}{2}\right)$

②  $M_{\overline{AC}} = \frac{4+5}{1-4} = \frac{9}{-3} = -3$   
 $M_{\perp} = \frac{1}{3}$

③  $-\frac{1}{2} = \frac{1}{3}\left(\frac{5}{2}\right) + b$   
 $-\frac{1}{2} - \frac{5}{6} = b$   
 $-\frac{4}{3} \Leftarrow -\frac{8}{6} = b$

$y = \frac{1}{3}x - \frac{4}{3}$