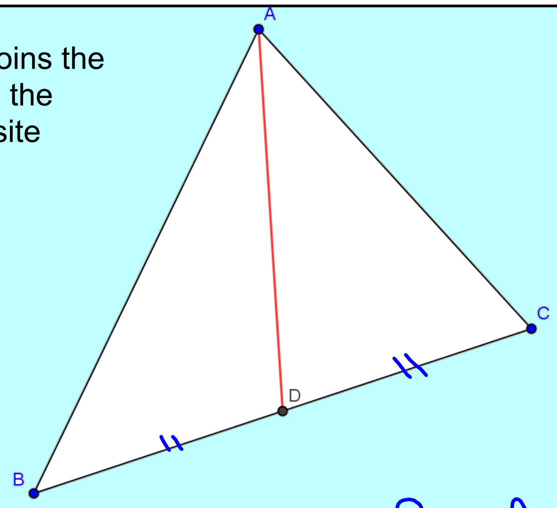
Median: A line that joins the vertex of a triangle to the midpoint of the opposite side.



① midpoint of BC

② slope of AD

③ y-intercept of line

median from A

D is midpoint of BC

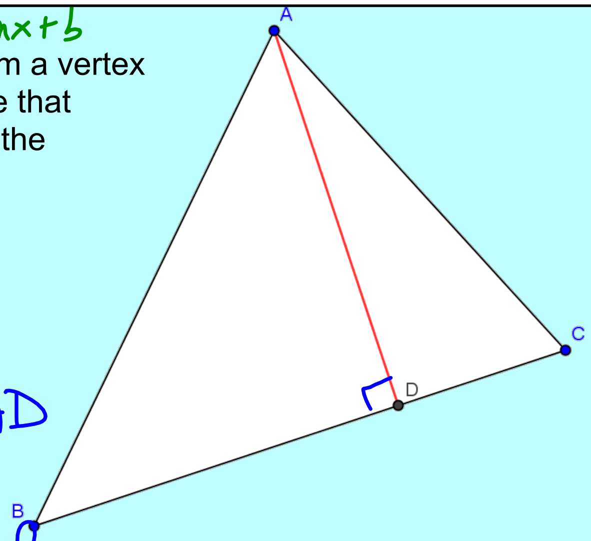
$y = \underline{m}x + b$

$y = mx + \underline{b}$

Feb 28-11:11 AM

$y = mx + b$

Altitude: A line from a vertex to the opposite side that is perpendicular to the opposite side.



① slope BC

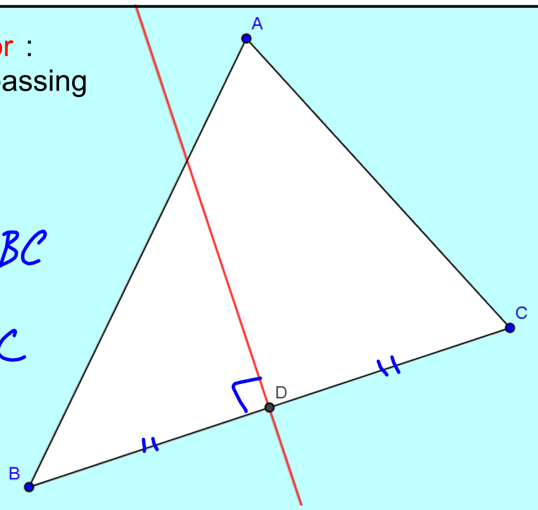
② slope of AD is neg. reciprocal of m_{BC}

③ y-int of AD using point A

$y = m_{AD}x + \underset{?}{b}$

Feb 28-11:11 AM

Perpendicular Bisector :
A perpendicular line passing through the midpoint of a line segment.



① midpoint of BC

② slope of BC

③ slope of red line using neg. recip.

④ y-int of red line using $y = mx + b$?

Sub point D

Feb 28-11:11 AM

Special Lines in Triangles

March 4/2016

Refer to hand-out for the characteristics of special lines.

Ex. 1 Triangle STU has vertices at S(-2,-3), T(9,4) and U(11, -4).

a. Find the equation of the median from S.

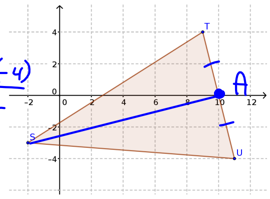
b. Find the equation of the altitude from U.

c. Find the equation of the perpendicular bisector of side TU.

Mar 2-8:32 PM

Ex. 1 Triangle STU has vertices at S(-2,-3), T(9,4) and U(11, -4).

a. Find the equation of the median from S.



① MP_{TU}

$x_{mp} = \frac{9+11}{2} = \frac{20}{2} = 10$ $\quad y_{mp} = \frac{4+(-4)}{2} = \frac{0}{2} = 0$

$MP_{TU} = (10,0)$

② $m_{SA} = \frac{0-(-3)}{10-(-2)} = \frac{3}{12} = \frac{1}{4}$

③ $y = \frac{1}{4}x + b$

④ Sub A : $0 = \frac{1}{\cancel{4}_{2}}(\cancel{10}^{5}) + b$

$0 = \frac{5}{2} + b$

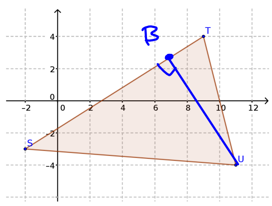
$-\frac{5}{2} = b$

$\therefore y = \frac{1}{4}x - \frac{5}{2}$ is the median from S.

Mar 2-8:32 PM

Ex.1 continues...
Triangle STU has vertices at S(-2,-3), T(9,4) and U(11, -4).

b. Find the equation of the altitude from U.



① $m_{ST} = \frac{4-(-3)}{9-(-2)} = \frac{7}{11}$

② $m_{UB} = m_{\perp} = \frac{-11}{7}$

$-\frac{11}{7}(11) = -\frac{11}{7}\left(\frac{11}{1}\right) = \frac{-121}{7}$

③ $y = \frac{-11}{7}x + b$

④ Sub $U(11,-4)$: $-4 = \frac{-11}{7}(11) + b$

$-4 = \frac{-121}{7} + b$

$-\frac{4}{1} + \frac{121}{7} = b$

$b = \frac{-28}{7} + \frac{121}{7}$

$b = \frac{93}{7}$

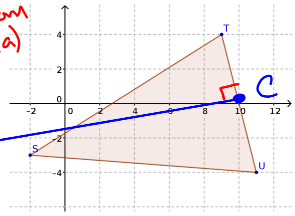
$\therefore$ the altitude from U is $y = \frac{-11}{7}x + \frac{93}{7}$

Mar 4-9:52 AM

Ex.1 continues...
Triangle STU has vertices at S(-2,-3), T(9,4) and U(11, -4).

c. Find the equation of the perpendicular bisector of side TU.

① $MP_{TU} = (10,0)$ from (a)



② $m_{TU} = \frac{y_2-y_1}{x_2-x_1}$

$= \frac{-4-4}{11-9}$

$= \frac{-8}{2}$

$= -4$

③ $m_\perp = \frac{1}{4}$

④ $y = \frac{1}{4}x + b$

⑤ sub $C(10,0)$: $0 = \frac{1}{\cancel{4}_{2}}(\cancel{10}^{5}) + b$

$0 = \frac{5}{2} + b$

$b = -\frac{5}{2}$

∴ the perpendicular bisector of TU is $y = \frac{1}{4}x - \frac{5}{2}$

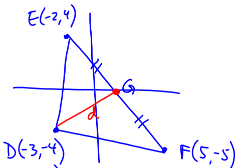
Mar 4-9:52 AM

Assigned Work:

Triangle ABC has vertices A(3, 4), B(-5, 2) and C(1, -4).
Find the equation for the altitude from A to BC.

p.79 #12, 13b, 14
p.102 #4
p.110 #13 a

4.
$D=(-3,-4)$



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

$= \left(\frac{3}{2}, \frac{-1}{2}\right)$

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

$= \sqrt{\left(\frac{3}{2}-(-3)\right)^2 + \left(-\frac{1}{2}-(-4)\right)^2}$

$= \sqrt{\left(\frac{3}{2}+\frac{3}{1}\right)^2 + \left(-\frac{1}{2}+\frac{4}{1}\right)^2}$

$= \sqrt{\left(\frac{3}{2}+\frac{6}{2}\right)^2 + \left(-\frac{1}{2}+\frac{8}{2}\right)^2}$

$= \sqrt{\left(\frac{9}{2}\right)^2 + \left(\frac{-7}{2}\right)^2}$

$= \sqrt{\frac{81}{4} + \frac{49}{4}}$

$= \sqrt{\frac{130}{4}} \longrightarrow \sqrt{\frac{65}{2}}$

$= \frac{\sqrt{130}}{\sqrt{4}}$

$= \frac{\sqrt{130}}{2}$

Feb 28-12:00 PM

p. 110 # 13a $A(-4,3)$ and $B(3,-4)$

$$x^2+y^2=25$$

$$LS = x^2+y^2$$
$$= (-4)^2+(3)^2$$
$$= 16+9$$
$$= 25$$

$$RS = 25$$

$LS = RS$ ✓

Mar 7-2:05 PM