Geometry
Special Segments in Triangles - Equations of Lines

Name KEY
Date________________ Period _____

There are *four* special segments that we can draw and use in any type of triangle. We can write the equation for three of them. Here are examples for each of the *three*:

Given: A(3, -1), B(2, 5), and C (4, -3)			
Special Segment	Description	Given Information	Equation
Perpendicular Bisector	Goes through the *midpoint* of a side, and is *perpendicular* to the side. (does *not* have to go through the opposite vertex)	Point (midpoint of side AB) $(\frac{5}{2}, 2)$ $\left(\frac{3+2}{2}, \frac{-1+5}{2}\right)$ Slope $\frac{5-{-1}}{2-3} = \frac{6}{-1} = -6$ Slope of side AB = -6 Slope of perpendicular bisector = $1/6$ ☆ opposite reciprocal slope for ⊥.	Write the equation of the perpendicular bisector of side AB. $m = 1/6$ $(\frac{5}{2}, 2)$ x_1 y_1 (Use point-slope form of the equation.) $y - y_1 = m(x - x_1)$ $\boxed{y - 2 = \frac{1}{6}(x - \frac{5}{2})}$ point-slope form ☆ standard or slope-intercept from here.
Median	Goes through the *midpoint* of a side and connects to the opposite *vertex*	Point C (4, -3) Midpoint of side AB $(\frac{5}{2}, 2)$ Slope of Median $(\frac{5}{2}, 2)(4, -3)$ $m = \frac{-3-2}{4-2.5} = \frac{-10}{3}$	Write the equation of the median to side AB. (Use the two points to write the equation of the median.) $m = \frac{-10}{3}$ $(4, -3)$ x_1 y_1 $\boxed{y + 3 = -\frac{10}{3}(x - 4)}$ ☆ standard or slope-intercept from here.
Altitude	Must be *perpendicular* to a side, *and* go through the opposite vertex	Point C (4, -3) x_1 y_1 Slope Slope of side AB = -6 Slope of Altitude = $1/6$ ☆ opp. reciprocal slope for ⊥	Write the equation of the altitude to side AB. $m = 1/6$ $(4, -3)$ x_1 y_1 (Use the point-slope form of the equation of the line.) $\boxed{y + 3 = \frac{1}{6}(x - 4)}$ ☆ standard or slope-intercept from here.