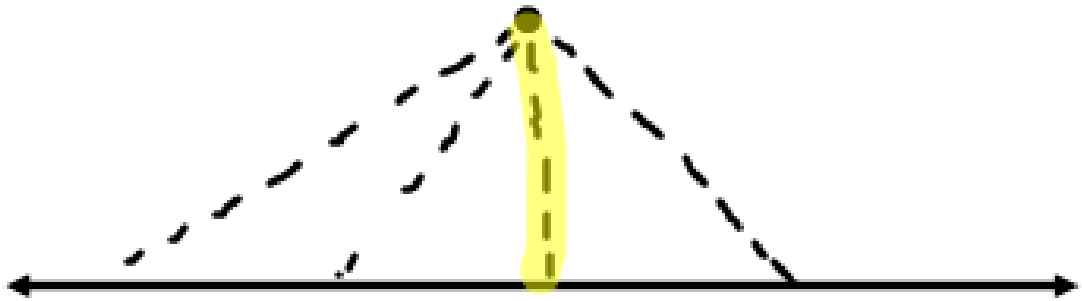
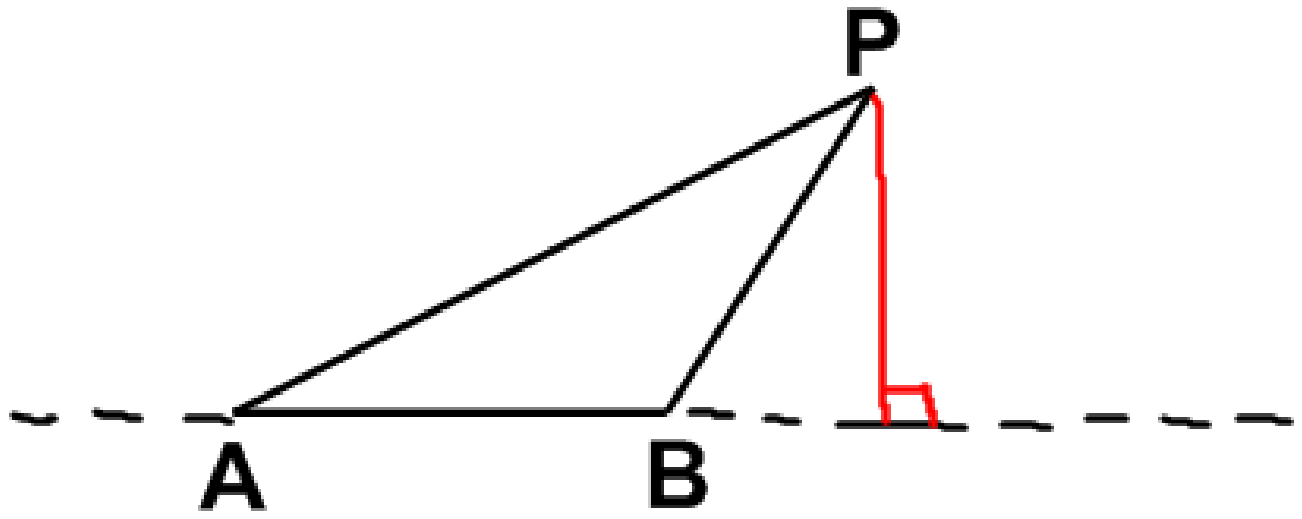
3 - 6
Perpendiculars and Distance

the distance from a point to a line



The distance from a line to a point not on the line is the length of the segment perpendicular to the line from the point.

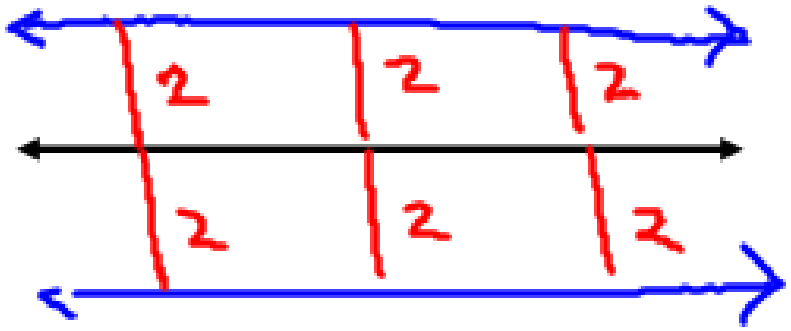
Ex: Draw the segment that represents the distance from P to $\overleftrightarrow{AB}$.



Two lines are parallel if they are *equidistant*.

Theorem 3.9

In a plane, if two lines are equidistant from a third line, then the two lines are parallel to each other.



Find the distance between two parallel lines

$y = -\frac{1}{3}x - 3$ (l) $y = -\frac{1}{3}x + \frac{1}{3}$ (m)

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

Need to find equation of a line $\perp$ to them... (p)

Y-intercept: -3 $(0, -3)$ $l \cdot p$

Slope: 3

Equation: $y = 3x - 3$

Find second point of intersection

$m \perp p$

(1,0)

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

$+\frac{1}{3}x \qquad +\frac{1}{3}x$

$$3(1) - 3$$

$$0$$

$$\frac{1}{3} = \frac{10}{3}x - 3$$

$+3 \qquad +3$

$$\frac{10}{3} = \frac{10}{3}x$$

$x = 1$

Use distance formula and those two points

$(0,-3)$ $(1,0)$

$$d=\sqrt{(0-1)^2+(-3-0)^2}$$

$$=\sqrt{1+9}$$

$$=\sqrt{10}\approx 3.16$$

In Class Tomorrow:

3 - 6 WS