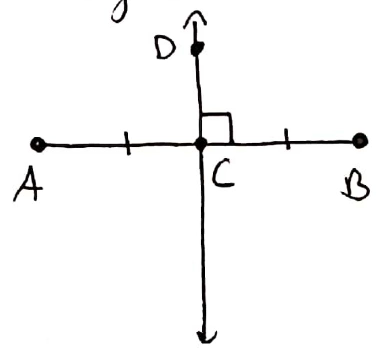
1/31/19

objective: To introduce and apply the Perpendicular Bisector Theorem and the Angle Bisector Theorem.

<u>Perpendicular Bisector</u>: a line, segment, or ray that cuts a line segment into two congruent parts at a 90° angle.



Facts:

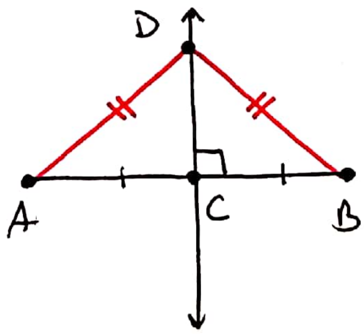
$m\angle DCB = 90°$

$m\angle DCA = 90°$

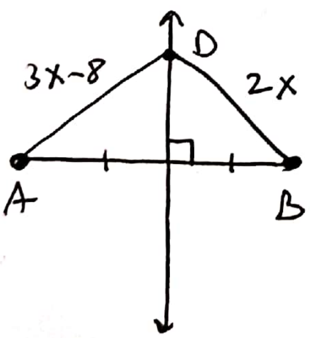
$\overline{AB} \cong \overline{CB}$

<u>Equidistant</u>: of equal distance from a point to two other points.

<u>Perpendicular Bisector Theorem</u>: If a point is on the perpendicular bisector of a segment, then it is equidistant from the endpoints of the segment.



<u>Example</u>:



$3x - \cancel{8} = 2x$

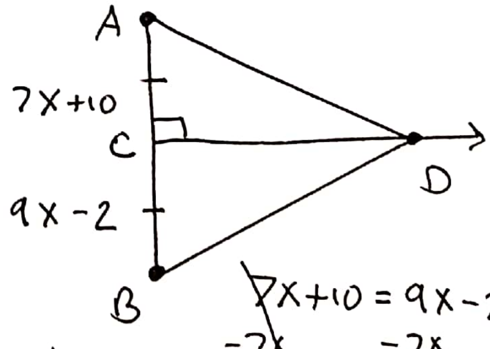
$\quad \cancel{+8} \qquad +8$

$3x = \cancel{2x} + 8$

$-2x \quad \cancel{-2x}$

$\boxed{x = 8}$

<u>Example</u>:



$\cancel{7x} + 10 = 9x - 2$

$\cancel{-7x} \qquad -7x$

$10 = 2x \cancel{-2}$

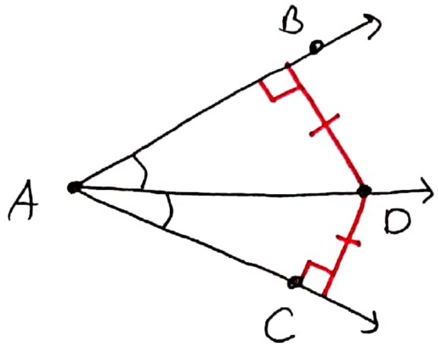
$+2 \qquad \cancel{+2}$

$12 = 2x$

$\frac{12}{2} = \frac{\cancel{2}x}{\cancel{2}}$

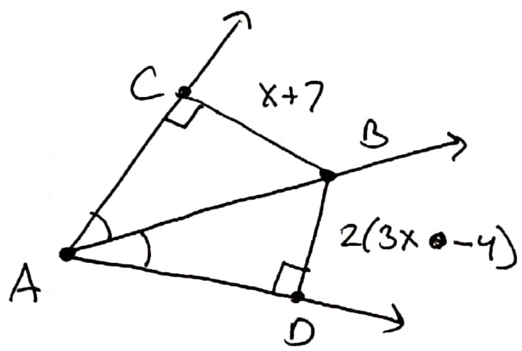
$\boxed{x = 6}$

Angle Bisector Theorem: If a point is on the bisector of an angle, then the point is equidistant from the side of the angles.



$\angle BAD \cong \angle DAC$

Example:



$$x+7 = 2(3x-4)$$

$$\cancel{x}+7 = 6x-8$$
$$\cancel{-x} \qquad -x$$

$$7 = 5x\cancel{-8}$$
$$+8 \qquad \cancel{+8}$$

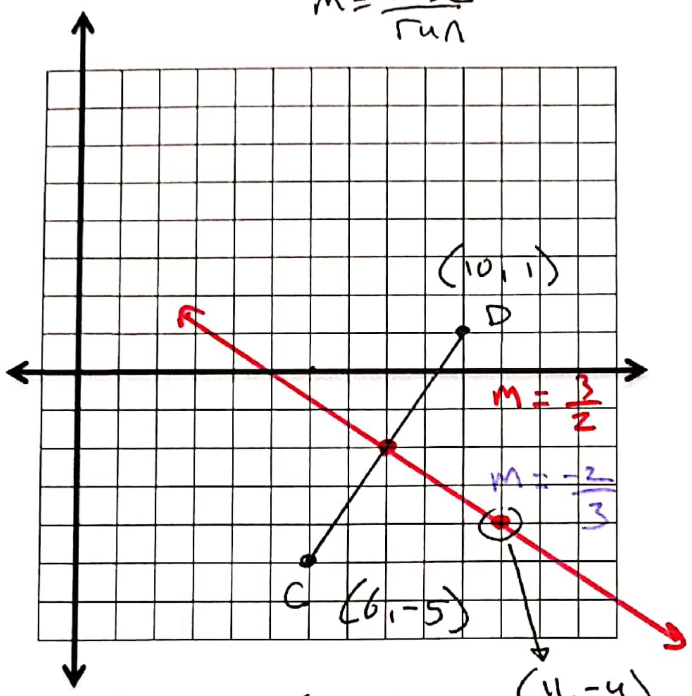
$$\frac{15}{5} = \frac{5x}{5}$$

$$\boxed{x = 3}$$

Problem 9

Write an equation in point-slope form for the perpendicular bisector of the segment with endpoints $C(6,-5)$ and $D(10,1)$.

$m = \frac{\text{rise}}{\text{run}}$



$(11, -4)$
(x_1, y_1)
$m = -\frac{2}{3}$

$y - (-4) = -\frac{2}{3}(x - 11)$

$\boxed{y + 4 = -\frac{2}{3}(x - 11)}$

point-slope form of a line:

$y - y_1 = m(x - x_1)$

perpendicular slopes:

slopes are opposite reciprocals.

$m_1 = \frac{2}{3} \quad m_2 = -\frac{3}{2}$

Midpoint Formula:

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$M = \left(\frac{10 + 6}{2}, \frac{1 + -5}{2}\right)$

$\boxed{M = (8, -2)}$

Problem 10

Write an equation in point-slope form for the perpendicular bisector of the segment with endpoints *P*(5, 2) and *Q*(1, –4).