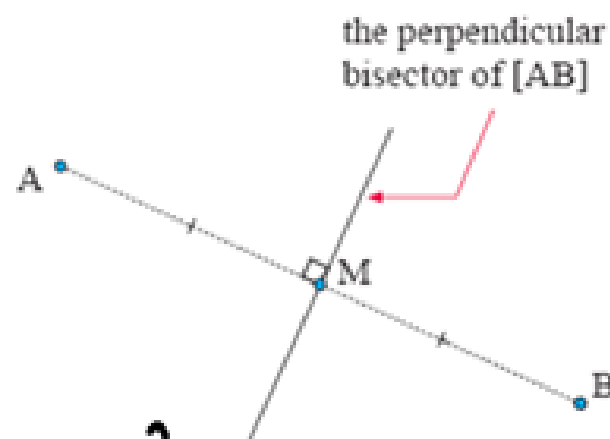


Perpendicular Bisectors-

A perpendicular bisector is a line that cuts another into two equal parts and forms a line that is perpendicular to the original line.



perpendicular
slope and goes through
Midpoint of original line.

Example: Find the equation of the perpendicular bisector of [AB] for A(3,2) and B(-5,6)

Step 1- Find the slope of [AB]

$$A(3,2) \quad B(-5,6)$$

$$m = \frac{6-2}{-5-3} = \frac{4}{-8} = -\frac{1}{2}$$

perpendicular slope = 2

Step 2- Find the midpoint of [AB]

$$M = \left(\frac{3+(-5)}{2}, \frac{2+6}{2} \right) = (-1, 4)$$

Step 3- Use the perpendicular slope of [AB] and the midpoint to find the equation of the perpendicular bisector.

Eqn of Perpendicular Bisector has Slope of 2 and goes through the point $(-1, 4)$

$$y = mx + c$$

$$4 = 2(-1) + c$$

$$4 = -2 + c$$

$$6 = c$$

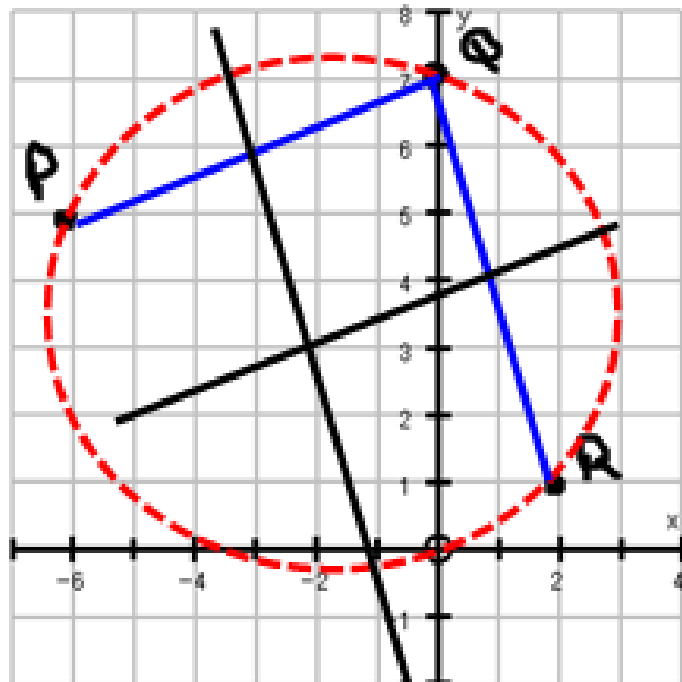
$$y = 2x + 6$$

Example:

One way to find the centre of a circle is to find the perpendicular bisectors of two chords – the perpendicular bisector of a chord passes through the centre. **of a circle**

→ symbol \perp

A circle passes through the point P(-6, 5), Q(0, 7) and R(2, 1). Find the perpendicular bisectors of [PQ] and [QR] then find the centre of the circle.



$$PQ \quad P(-6, 5) \quad Q(0, 7)$$

$$m = \frac{7-5}{0-(-6)} = \frac{2}{6} = \frac{1}{3}$$

$$\perp \text{ slope} = -3$$

$$M = \left(\frac{-6+0}{2}, \frac{5+7}{2} \right) = (-3, 6)$$

$$y = mx + c$$

$$6 = -3(-3) + c$$

$$6 = 9 + c$$

$$-3 = c$$

$$y = -3x - 3$$

$$QR \quad Q(0,7) \quad R(2,1)$$

$$m = \frac{7-1}{0-2} = \frac{6}{-2} = -3 \quad \perp \text{ slope} = \frac{1}{3}$$

$$M = \left(\frac{0+2}{2}, \frac{7+1}{2} \right) = (1, 4)$$

$$y = mx + c$$

$$4 = \frac{1}{3}(1) + c$$

$$4 = \frac{1}{3} + c$$

$$4 - \frac{1}{3} = c$$

$$\frac{12}{3} - \frac{1}{3} = c \rightarrow$$

$$\frac{11}{3} = c$$

$$y = \frac{1}{3}x + \frac{11}{3}$$

Centre of circle is where the two perpendicular bisectors meet (P.O.I)

$$y = \underline{-3x - 3} \quad \textcircled{y} = \frac{1}{3}x + \frac{11}{3}$$

Substitution or elimination

$$-3x - 3 = \frac{1}{3}x + \frac{11}{3}$$

$$-3x - \frac{1}{3}x = \frac{11}{3} + 3$$

$$-\frac{9}{3}x - \frac{1}{3}x = \frac{11}{3} + \frac{9}{3}$$

$$\cancel{\frac{-10}{3}x} = \frac{20}{3} \cancel{+ 3}$$

$$\frac{-10x = 20}{-10} \quad \frac{20}{-10}$$

$$\textcircled{x = -2}$$

$$y = -3x - 3$$

$$y = -3(-2) - 3$$

$$\textcircled{y = 3} \quad (-2, 3)$$

HOMWORK: Pg 126 #1-5