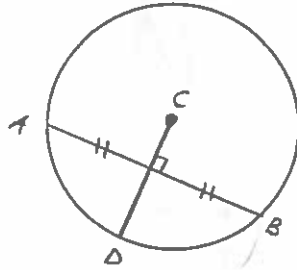


B: Chord Properties

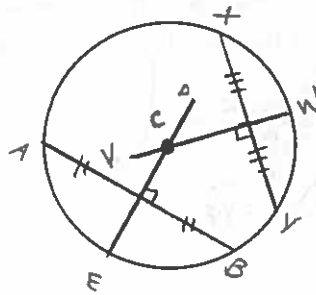
Perpendicular Bisector of a Chord

A line that passes through the centre of a circle and is perpendicular to a chord bisects the chord.



\overline{AB} is a chord
 \overline{CD} is a perpendicular bisector
 to \overline{AB} .

The perpendicular bisectors of two distinct chords intersect at the centre of the circle.



\overline{AB} : \overline{XY} are chords.

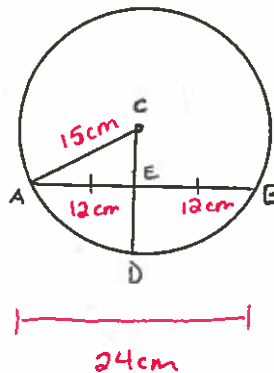
\overline{DE} is a perpendicular bisector to \overline{AB} .

\overline{VW} is a perpendicular bisector to \overline{XY} .

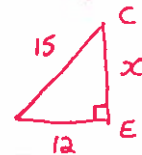
∴ Their intersection point is the centre of the circle!
 (C)

Examples:

1. CD bisects chord AB. The radius of the circle is 15 cm long. Chord AB measures 24 cm. What is the length of CE? Explain your reasoning.



\overline{CD} is a perpendicular bisector.



$$a^2 + b^2 = c^2$$

$$12^2 + x^2 = 15^2$$

$$144 + x^2 = 225$$

$$-144 \quad -144$$

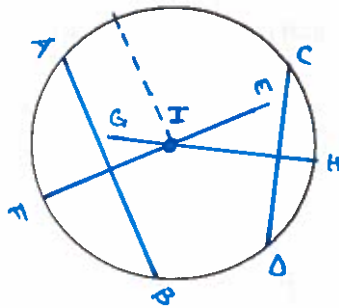
$$x^2 = 81$$

$$\sqrt{x^2} = \sqrt{81}$$

$$x = 9 \text{ cm}$$

$$\overline{CE} = 9 \text{ cm}$$

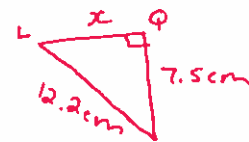
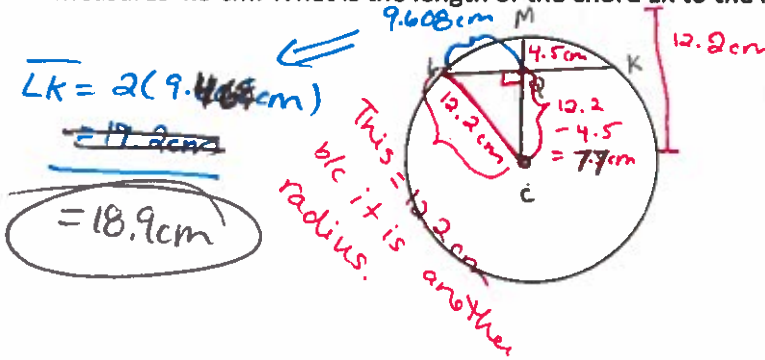
2. Determine the centre of the circle provided. How long is its radius?



I is the centre.
Dotted line is the radius, (1.8cm).

1. Draw two chords any where
2. Draw a perpendicular bisector on each chord. [Use a compass!]
3. Mark the intersection point as the centre.
4. Draw a line from the centre to the circumference of the circle and measure it. (This is the radius)

3. The radius of the circle is 12.2 cm, the radius CM is perpendicular to the chord LK, and MQ measures 4.5 cm. What is the length of the chord LK to the nearest tenth of a centimeter?



$$a^2 + b^2 = c^2$$

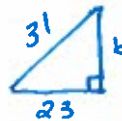
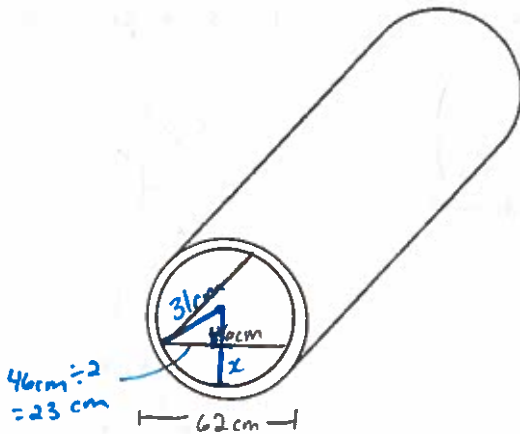
$$x^2 + 7.7^2 = 12.2^2$$

$$x^2 + 59.25 = 148.84$$

$$x^2 = 89.59$$

$$x = 9.46$$

4. The circular cross section of a water pipe contains some water in the bottom. The horizontal distance across the surface of the water is 46 cm. The inner diameter of the pipe is 62 cm. What is the maximum depth of the water? Express your answer to the nearest centimeter.



$$a^2 + b^2 = c^2$$

$$23^2 + b^2 = 31^2$$

$$529 + b^2 = 961$$

$$b^2 = 432$$

$$\sqrt{b^2} = \sqrt{432}$$

$$b = 20.7846 \text{ cm}$$

