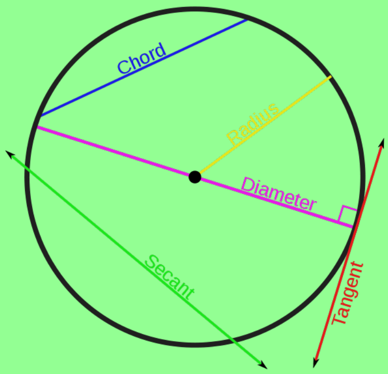
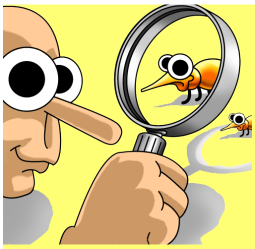
Section 8.2

Properties of Chords in Circles



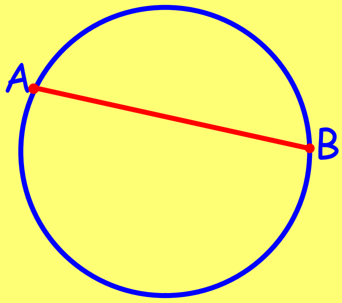


<u>Investigate:</u>

You will need a cut-out of a circle, a protractor and a ruler.

1. Choose 2 points on the circumference of your circle. Label them as A and B, and then connect them with a line segment. Make sure AB does <u>NOT</u> go through the centre of the circle!

2. Fold the circle so that A touches B. Crease the fold, open, and draw a line along the fold. Mark the point C where the fold line intersects AB.

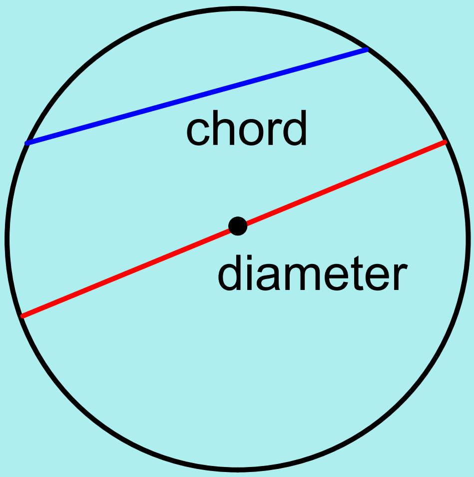


3. What do you notice about the angles at C?
   What do you notice about the line segments AC and CB?

4. Repeat the steps above for 2 other points, D and E.

- A line segment that joins two points on a circle is a **chord**.

- A **diameter** of a circle is a chord through the centre of the circle.

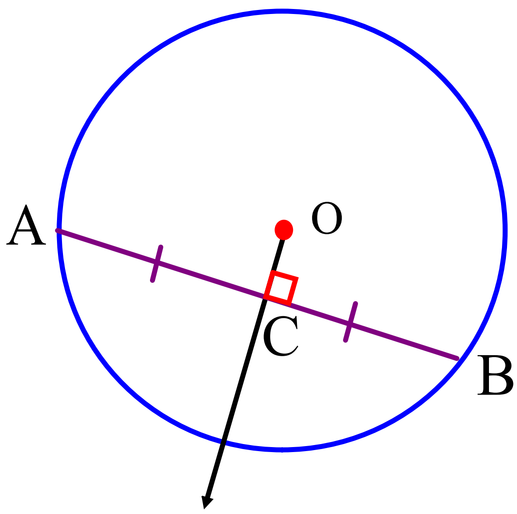


Perpendicular to a Chord Property 1

- A line drawn from the centre of a circle that is perpendicular to a chord bisects the chord. (It cuts the chord into two equal parts.)

$\angle OCA = \angle OCB = 90^o$

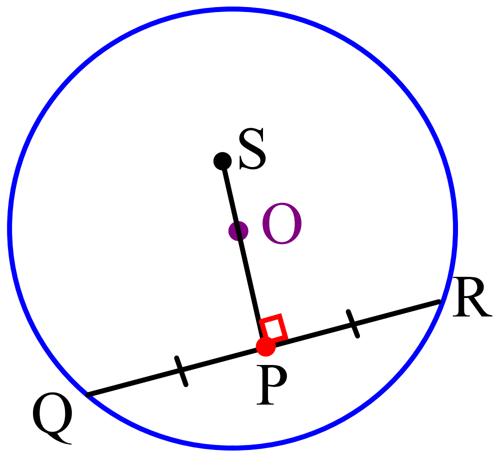
$AC = CB$



Perpendicular to a Chord Property 2

- The perpendicular bisector of a chord in a circle passes through the centre of the circle.

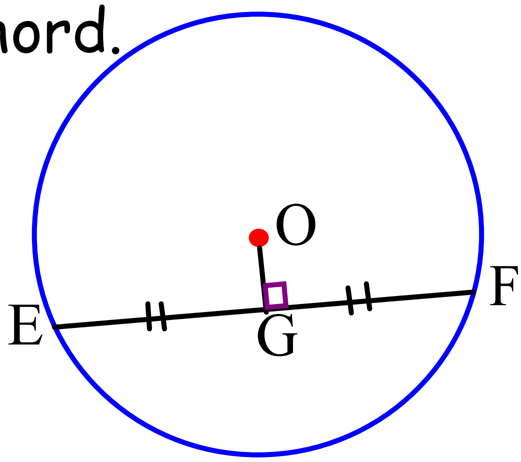
When $\angle SPR = \angle SPQ = 90^0$ and $RP = PQ$, then SP passes through the centre.



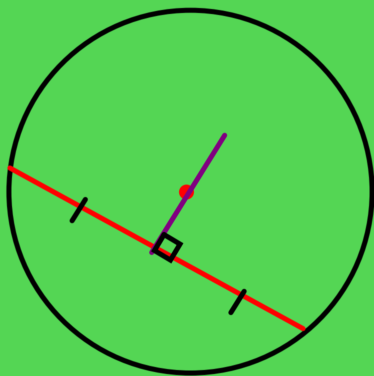
Perpendicular to a Chord Property 3

- A line that joins the centre of a circle and the midpoint of a chord is perpendicular to the chord.

When O is the centre and EP = PF, then
$\angle OGE = \angle OGF = 90^0$.



STOP!

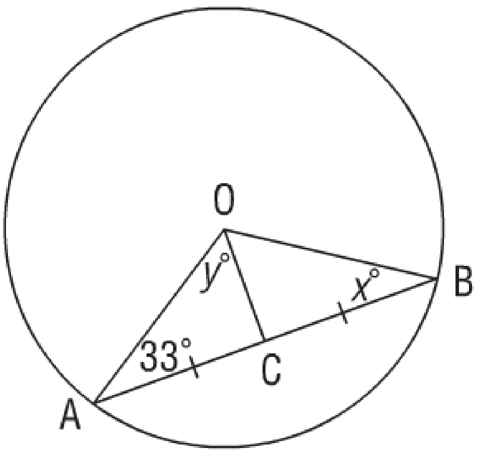


Yes!

When we see diagrams like this, we know
that the lines are perpendicular, and
the chord is cut in
two equal pieces.

Determining the Measure of Angles in a Triangle

Example #1. Determine the values of x° and y°.



Think: What do I know about angle C?

The angles formed at C are 90°.

Use angle sum of a triangle:

$180^\circ - 90^\circ - 33^\circ = 57^\circ$

Therefore, $y^\circ =$ 57°

To find angle x:

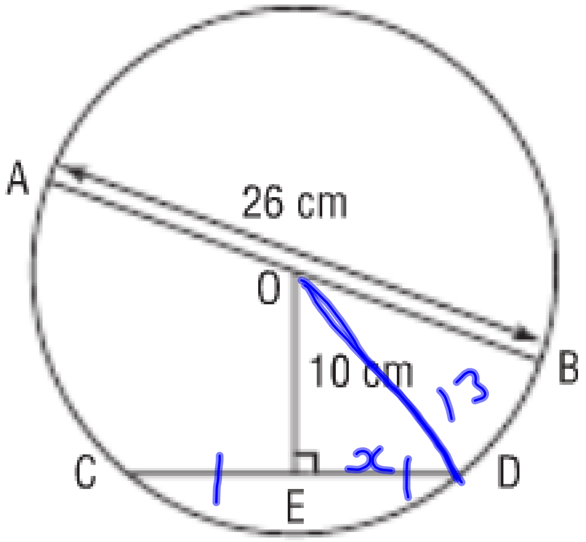
We know the radii are equal, so ΔAOB is isosceles.

Then, $\angle OBA = \angle OAB$

Therefore, $x^\circ =$ 33°

Using the Pythagorean Theorem in a Circle

Example #2. What is the length of chord CD, to the nearest tenth?



$$x^2 = 13^2 - 10^2$$

$$x^2 = 169 - 100$$

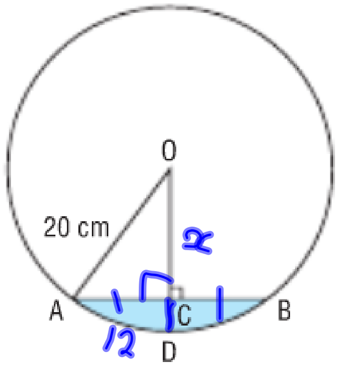
$$x = \sqrt{69}$$

$$x = 8.3\text{cm}$$

$$\boxed{CD = 16.6\text{cm}}$$

Solving Problems Using the Property of a Chord and its Perpendicular

Example #3. Determine the length of CD.



AB = 24 cm

OD = Radius = 20cm

CD = OD − OC

Find OC, called x

$x^2 = 20^2 - 12^2$

$x^2 = 400 - 144$

$x^2 = 256$

$x = \sqrt{256}$

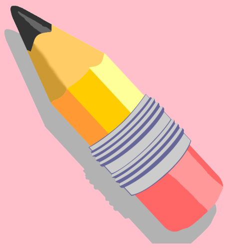
$x = 16\text{cm}$

$CD = 20 - 16$

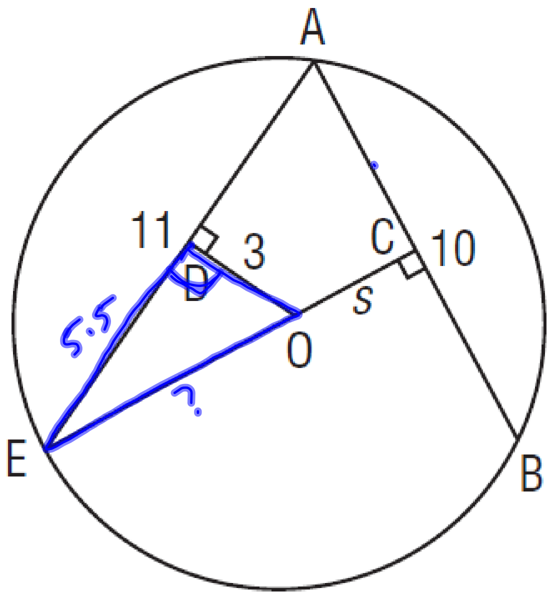
$\boxed{= 4\text{cm}}$

Homework:

p.397 - 398
4,5,6,10



a)



Find EC the subtract EO !

$EC = \sqrt{11^2 - 5^2}$

$= \sqrt{121 - 25}$

$= \sqrt{96}$

$= \underline{\underline{9.7}}$

$EO = 5.5^2 + 3^2$

$= \sqrt{30.25 + 9}$

$= \underline{\underline{6.3}}$

$s = 9.7 - 6.3 = \boxed{3.4}$