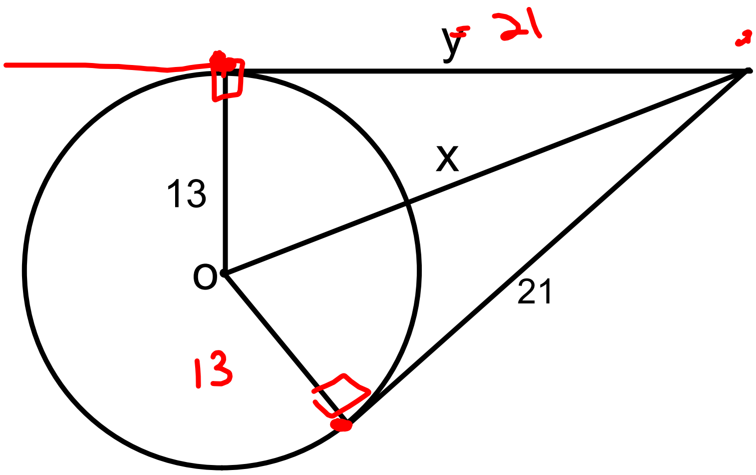
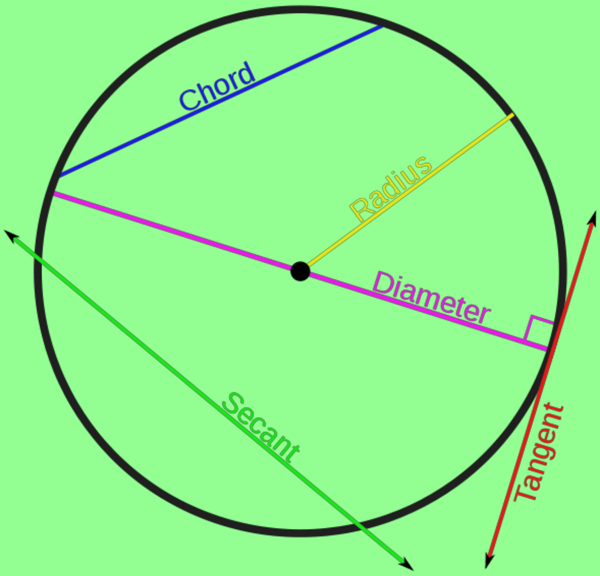
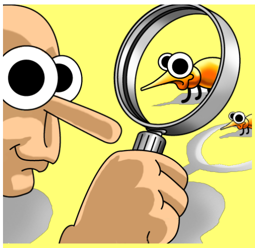
Find x & y



Section 8.2

Properties of Chords in Circles



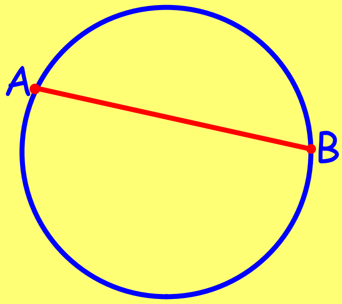


Investigate:

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 NOT 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.

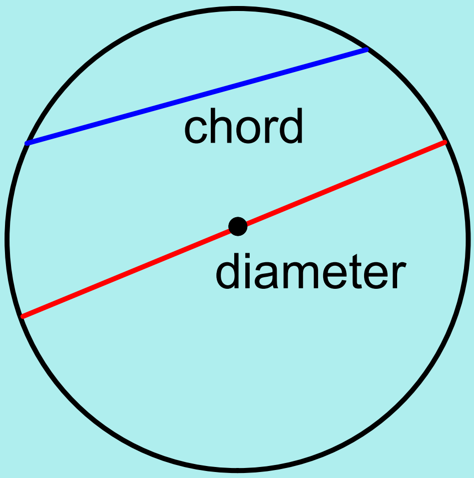


3. What do you notice about the angles at C?
   What do you notice about the line segments AC and CB?

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.

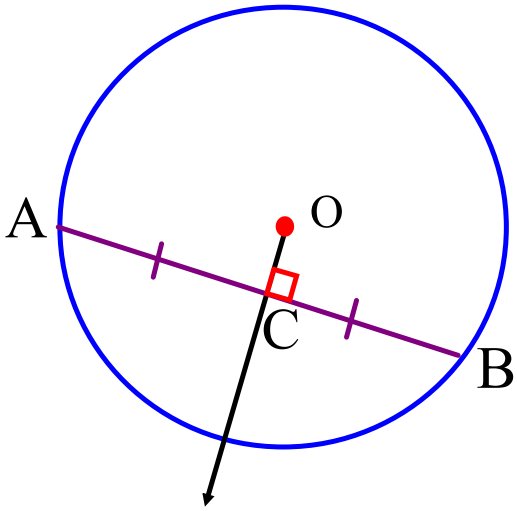


Perpendicular to a Chord Property 1

- 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.)

$\angle OCA = \angle OCB = 90^0$

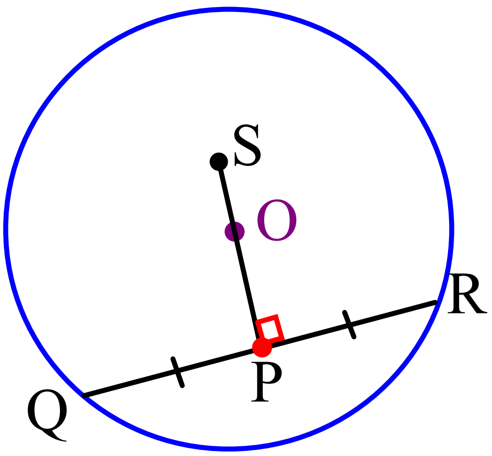
$AC = CB$



Perpendicular to a Chord Property 2

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

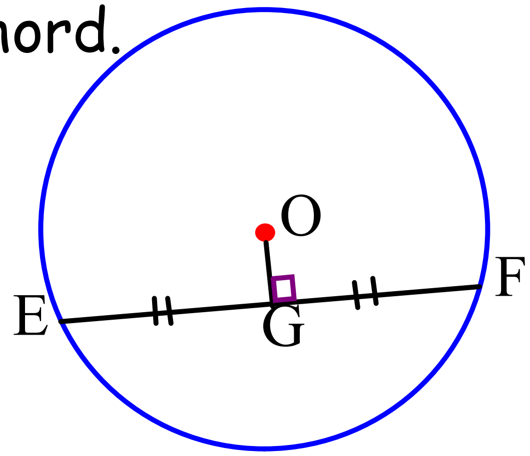
When ∠SPR = ∠SPQ = 90^0 and RP = PQ, then SP passes through the centre.



Perpendicular to a Chord Property 3

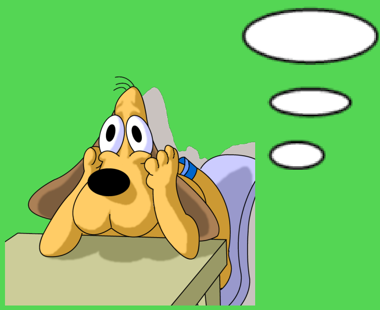
- A line that joins the centre of a circle and the midpoint of a chord is perpendicular to the chord.

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

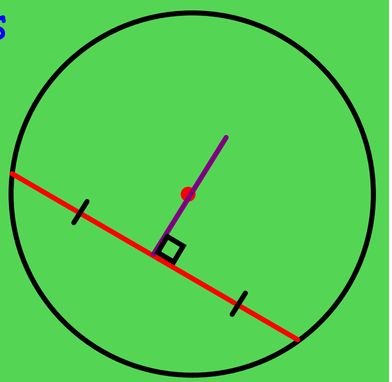


STOP!

Aren't they all saying the same thing?

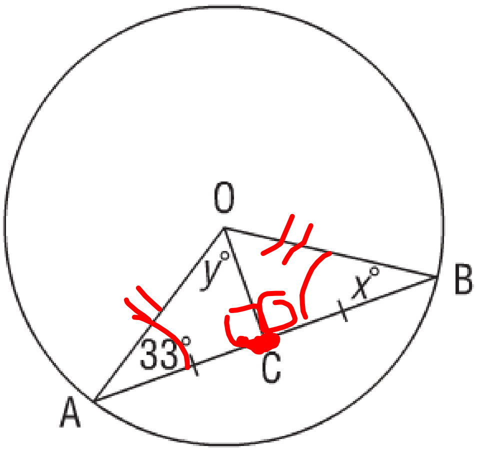


Yes!
When we see diagrams like this, we know that the lines are perpendicular, and the chord is cut in two equal pieces.



Determining the Measure of Angles in a Triangle

Example #1. Determine the values of x^o and y^o if O is the center.



Think: What do I know about angle C?

Use angle sum of a triangle:

$180^0 - 90^0 - 33^0 = 57^0$

Therefore, y^o = 57^o

To find angle x:

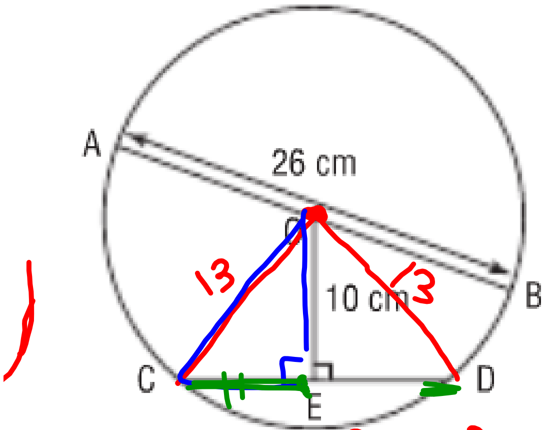
We know the radii are equal, so $\triangle AOB$ is isosceles.

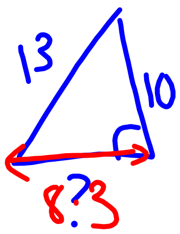
Then, $\angle OBA = \angle OAB$

Therefore, x^o = 33^o

Using the Pythagorean Theorem in a Circle

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





$a^2 = c^2 - b^2$

$a^2 = 13^2 - 10^2$

$a^2 = 169 - 100$

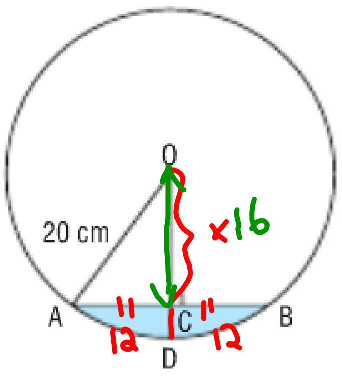
$\sqrt{a^2} = \sqrt{69}$

$a = 8.3 \times 2$

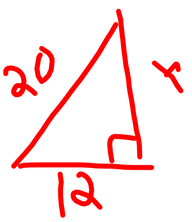
$CD = 16.6$

Solving Problems Using the Property of a Chord and its Perpendicular

Example #3. Determine the length of CD if O is the center.



AB = 24 cm



$a^2 = c^2 - b^2$

$a^2 = 20^2 - 12^2$

$a^2 = 400 - 144$

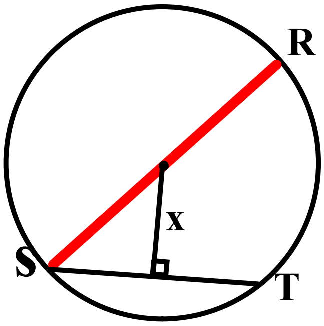
$\sqrt{a^2} = \sqrt{256}$

$a = 16$

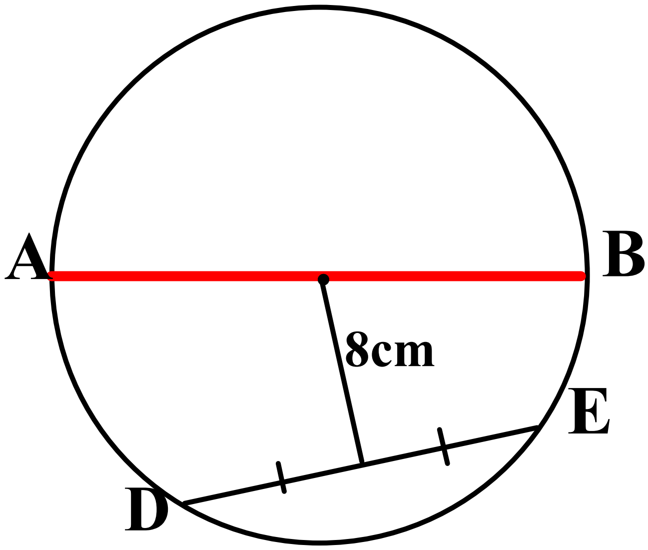
$20 - 16 = 4$

$CD = 4$

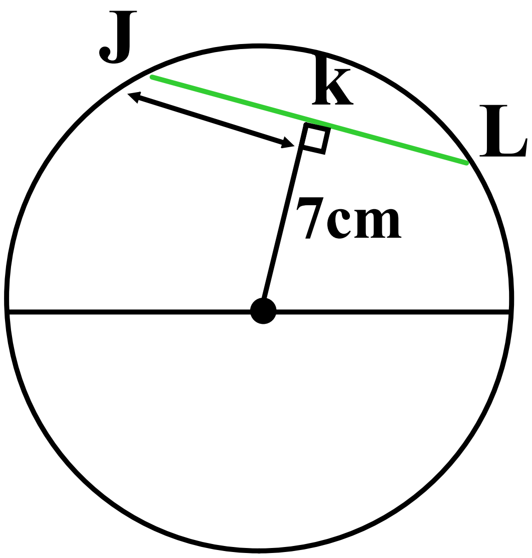
3. If the radius of the circle is 12cm and the chord ST is 10 cm, find x



1. **If the length of the diameter is 20cm. Calculate the length of DE.**



2. If the length of JK
   is 8cm calculate the
   length of the diameter



Homework:

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