Curriculum Outcomes:

(SS1) Solve problems and justify the solution strategy using circle properties, including: the perpendicular from the centre of a circle to a chord bisects the chord; the measure of the central angle is equal to twice the measure of the inscribed angle subtended by the same arc; the inscribed angles subtended by the same arc are congruent; a tangent to a circle is perpendicular to the radius at the point of tangency.

Student Friendly:
How we can use the tangent properties to solve for unknown lengths. (Tangent properties go hand and hand with Pythagorean theorem)

Feb 6-7:53 AM

Warm Up

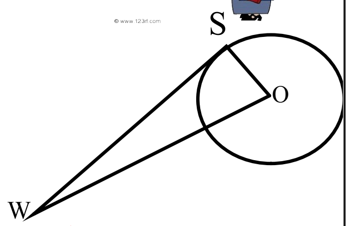
Fill in the blanks

1) The Tangent is __SW__

2) The center is labled with the letter __O__

3) The point of tangency is labled with the letter __S__

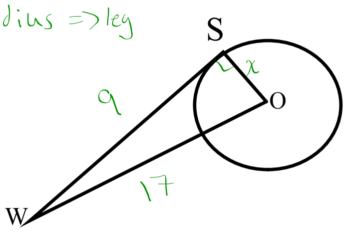
4) The radius is the line __OS__



SHOW YOUR WORK

5) Find the length of the radius if OW = 17 and SW = 9

OS => radius => leg



$\angle OSW = 90^\circ$ (Tang P)

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

$a^2 = 17^2 - 9^2$

$a^2 = 289 - 81$

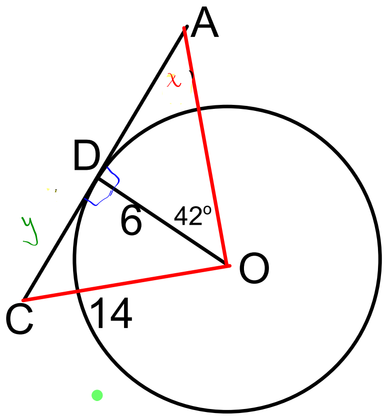
$a^2 = 208$

$a = 14.4$

May 8-9:55 PM

Warm Up

Determine the unknowns:



$\angle ADO = 90^\circ$
$\angle CDO = 90^\circ$ } (Tang P)

$x^\circ = 180 - 90 - 42$
$x^\circ = 48^\circ$ (SATT)

$y \Rightarrow$ leg

$a^2 = c^2 - b^2$
$a^2 = 14^2 - 6^2$
$a^2 = 196 - 36$
$a^2 = 160$
$a = 12.6$

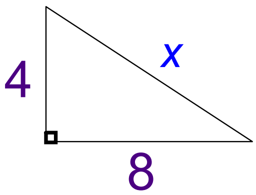
$y = 12.6$

Apr 29-8:09 AM

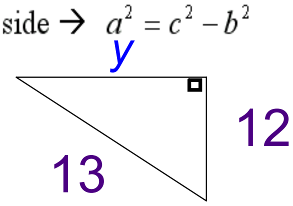
Calculating with <u>Tangents</u> We Only Use ...

1) Pythagorean Theorem

finding the hypotenuse → $c^2 = a^2 + b^2$



finding a side → $a^2 = c^2 - b^2$

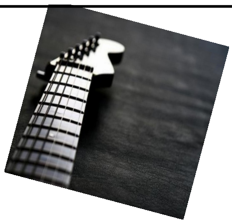


or

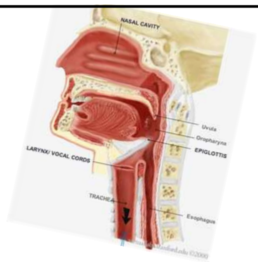
2) Angle Sum of Triangle

Unknown Angle= 180° - 90° - known angle

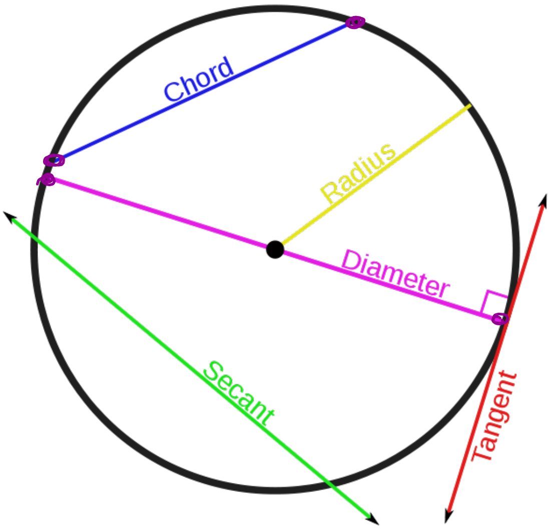
Oct 3-9:02 AM



Section 8.2



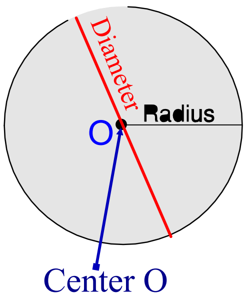
Properties of Chords in Circles

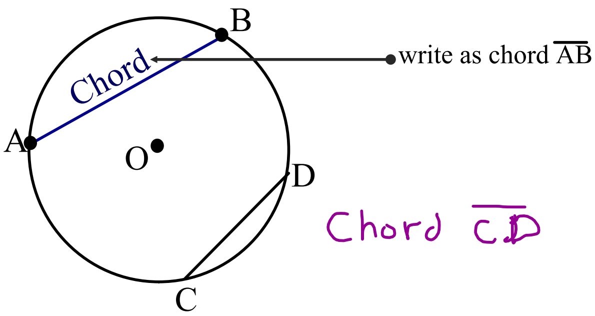


May 2-9:17 AM

Properties of Circles & Terminology:

Circle - the set of all points that are equidistant from a fixed point.



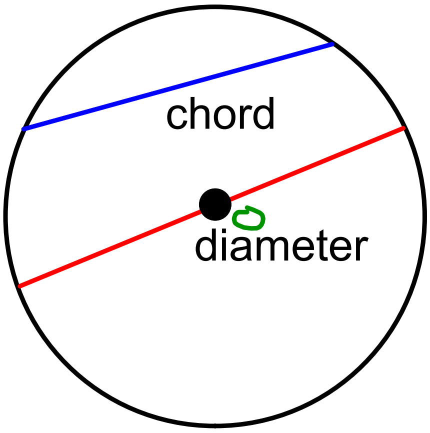


Chord $\overline{CD}$

Oct 3-9:26 AM

- 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.

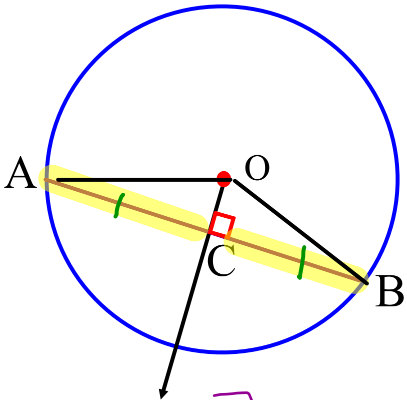


May 2-9:18 AM

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.)

If OC is perpendicular to AB
Then AC = CB (Chord P1)



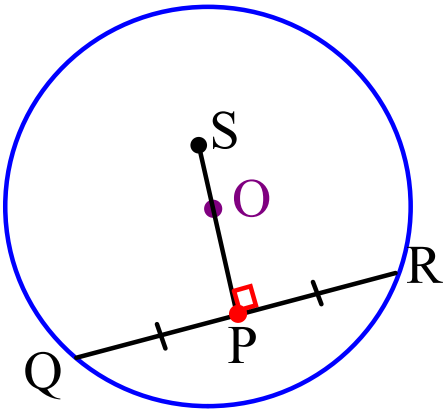
Perpendicular bisector:
→ cuts a cord into two equal pieces at 90° angle

May 2-9:22 AM

Perpendicular to a Chord Property 2

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

A perpendicular bisector of a chord must go through the centre.

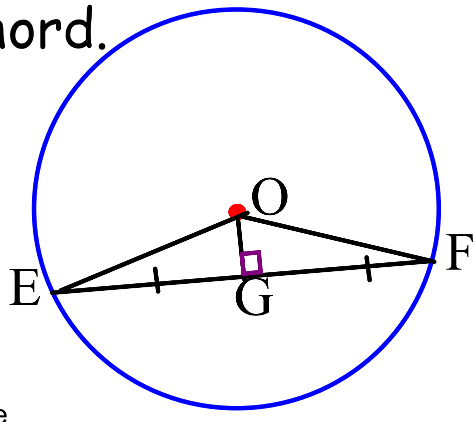


May 2-2:50 PM

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.

If O is the centre and EG = GF, then $\angle OGE = \angle OGF = 90^0$.
(chord P3)

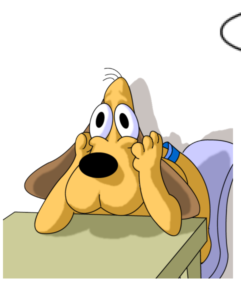


A line that comes from the centre of the circle and cuts the chord into two equal pieces is the perpendicular bisector

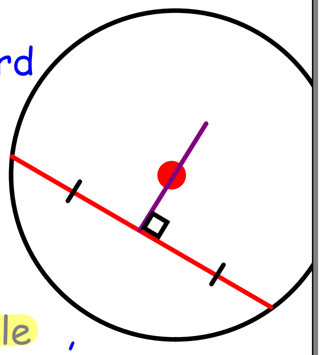
May 2-3:12 PM

STOP!

Aren't they all saying the same thing?



Yes!
We know
that a
perpendicular bisector of a cord



hits the cord at a 90 degree angle ,

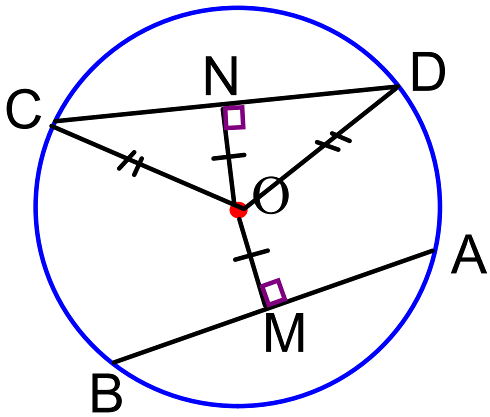
the chord is cut in two equal pieces,

and passes through the centre.

May 3-9:13 AM

Perpendicular to a Chord Property 4

- Two chord that are equal distance from the center must be the same



If $OM = ON$,
then $AB = CD$
OR
If $AB = CD$,
then $OM = ON$

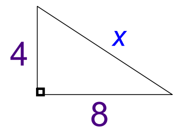
Apr 25-2:29 PM

Working With Chords Lengths We Only Use ...

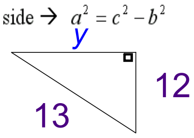
Note: the only reason they give you diameter is so you can use the radius

1) Pythagorean Theorem

finding the hypotenuse → $c^2 = a^2 + b^2$



finding a side → $a^2 = c^2 - b^2$



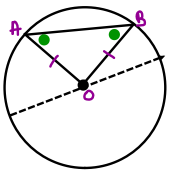
or

2) Angle Sum of Triangle (SATT)

Unknown Angle= 180° - 90° - known angle

or

3) Isosceles Triangle (ITT)

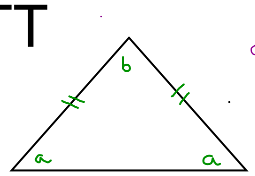


OA=0B⇒ radii

<OAB = <OBA (Iso∆)

Oct 3-9:02 AM

ITT



$2a + b = 180°$

$\overbrace{a + a} + b = 180°$

$b = 180 - a - a$

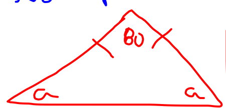
$\boxed{b = 180 - 2a}$

$\boxed{2a} + b = 180°$

$\frac{\cancel{2}a}{\cancel{2}} = \frac{180 - b}{2}$

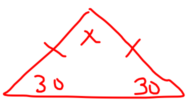
$\boxed{a = \frac{180 - b}{2}}$

Example



$a = 50°$ (ITT)

$a = \frac{180 - 80}{2}$

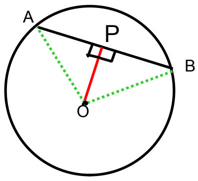


$x = 120°$ (IT

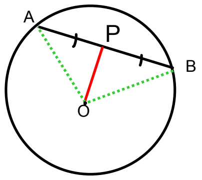
$180 - 30 - 30$

May 9-9:35 AM

Chord Properties:

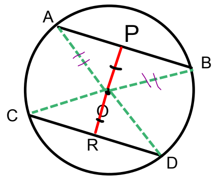


AP = PB (Chord P 1)



<APO = 90° (Chord P 3)

<BPO = 90° (Chord P 3)



AB = CD (Chord P 4)

To Solve use:

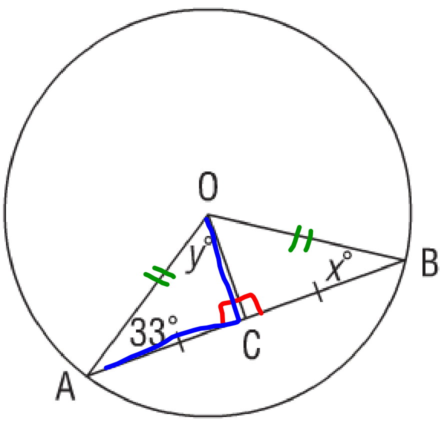
Angle= ___° (SATT) or (ITT)

Side= ___ cm (Pythagorean theorem)

May 11-8:07 AM

Determining the Measure of Angles in a Triangle

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



$\angle OCB = 90°$ (Chord P3)

$\angle OCA = 90°$

OB = OA (radii)

$x° = 33°$ (Itt)

$y° = 180 - 90 - 33$

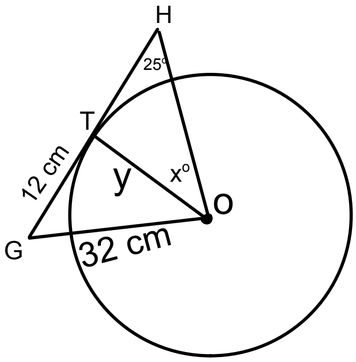
$y° = 57°$ (SATT)

May 2-3:17 PM

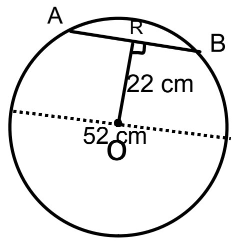
Warm Up

Day 2

Determine the unknowns:



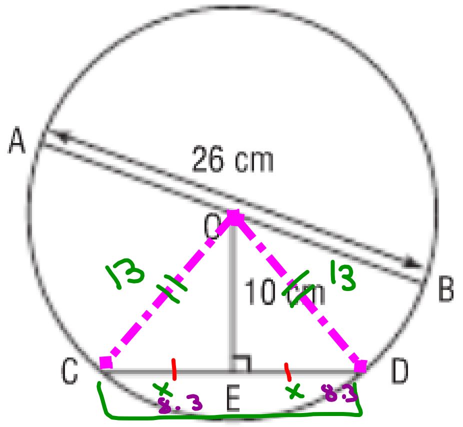
What is the length of the cord AB?



Apr 29-8:09 AM

Using the Pythagorean Theorem in a Circle

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



CE = DE (chord PL)

ED => leg

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

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

$a^2 = 169 - 100$

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

$a = 8.3$

$CD = 8.3 + 8.3$

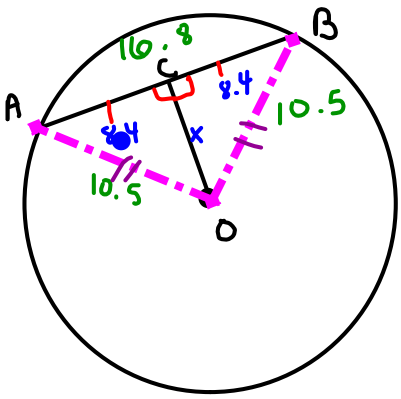
$= 16.6$

May 2-4:05 PM

EXAMPLE...

A chord that is 16.8 cm in length, is drawn in a circle that has a ~~diameter of 21 cm~~. How far is the chord from the center of the circle?

↳ radius = 10.5



$AB = CB$
$\angle ACO = 90$
$\angle BCO = 90$
$\}$ CP 1,3

$x \Rightarrow$ leg

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

$a^2 = 10.5^2 - 8.4^2$

$\sqrt{a^2} = \sqrt{39.69}$

$a = 6.3$

Oct 3-9:02 AM