MAY 6, 2019

UNIT 8: CIRCLE GEOMETRY

8.2: PROPERTIES OF CHORDS IN A CIRCLE

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MATH 9

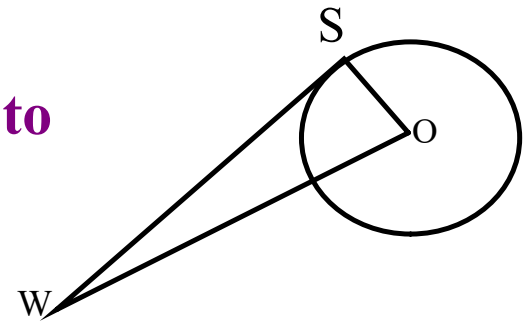
WHAT'S THE POINT OF TODAY'S LESSON?

We will continue working on the Math 9 Specific Curriculum Outcome (SCO) "Shape and Space 1" OR "SS1" which states:

"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."**

WARM UP QUIZ:
(sketch and use the diagram to the right)

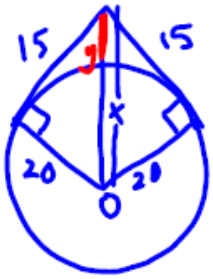


COPY AND ANSWER:

1. The tangent is line _____.
2. The centre of the circle is labeled _____.
3. The point of tangency is labeled _____.
4. The radius is line _____.
5. If OW is 17 cm and SW is 9 cm, what is the length of the radius to the nearest tenth?

HOMEWORK QUESTIONS?
(Pages 388/89/90/91, #3, 5, 6, 7, 9, 11, 12, 13, 14, 17, 18, 19, 20 & 22)

#17



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

$x^2 = 15^2 + 20^2$

$= 225 + 400$

$= 625$

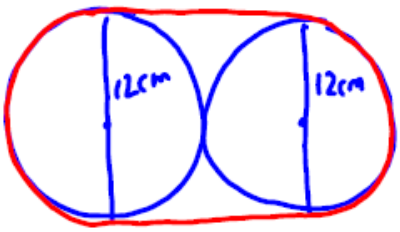
$x = \sqrt{625}$

$= 25\text{cm}$

$y = 25\text{cm} - 20\text{cm}$

$= 5\text{cm}$

19.



$C = \pi d$

Strap $= \pi d + 2d$

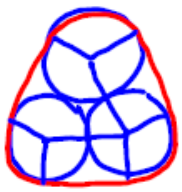
$= \pi(12) + 2(12)$

$= 12\pi + 24$

$= 61.7\text{ cm}$

Pg 391

22.



Corners

$C = 2\pi r$

$= 2\pi(0.5)$

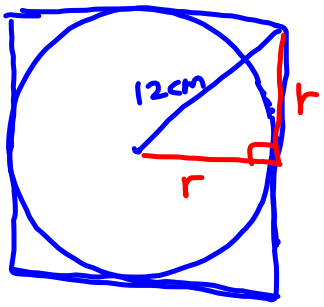
$= \pi$

ADD Straight portion

length $= \pi + 3$

$= 6.14$

20.



$r^2 + r^2 = 12^2$

$\frac{2r^2}{2} = \frac{144}{2}$

$r^2 = 72$

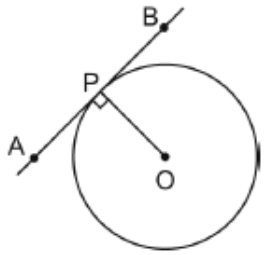
$r = \sqrt{72}$

$= 8.5\text{cm}$

Extra Practice 1 solutions

Lesson 8.1

1. Point O is the centre of the circle.

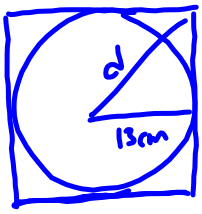


2. $x° = 67°$; $y = 12$

3. $x \doteq 9.8$

4. The distance between the tack and the closest point on the circumference is about 35.3 cm.

5. The distance from the centre of the plate to the corner of the frame is about 18.4 cm.

5. 

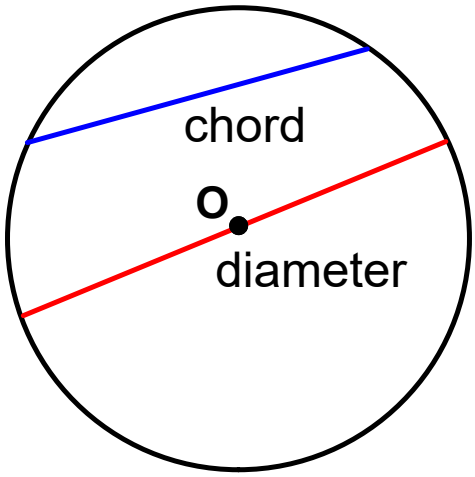
$d^2 = 13^2 + 13^2$
$= 169 + 169$
$= 338$
$d = \sqrt{338}$
$= 18.4\text{cm}$

2. $x = 180 - 90 - 23$
$= 67°$
$y = 12$

VOCABULARY:

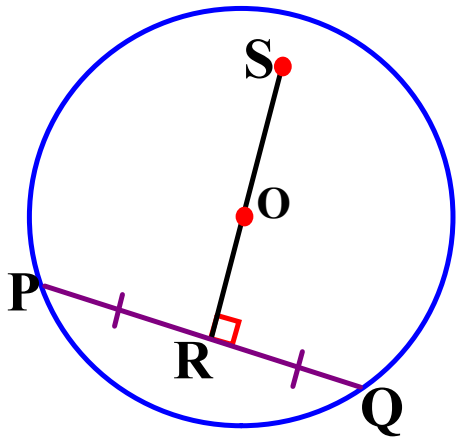
1. CHORD: A line segment that joins two points on a circle. (A diameter of a circle is actually a special chord through the centre of the circle.)

Read pages 392-396



VOCABULARY:

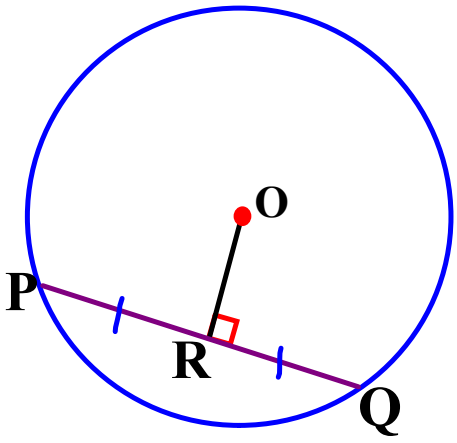
2. PERPENDICULAR BISECTOR: Intersects a line segment at 90° and divides the line segment into two equal parts.



PQ = chord (line segment)
SR = perpendicular bisector of PQ; therefore, PR = QR.

VOCABULARY:

3. PERPENDICULAR TO CHORD PROPERTY 1 (PCP): The perpendicular from the centre of a circle to a chord bisects the chord.



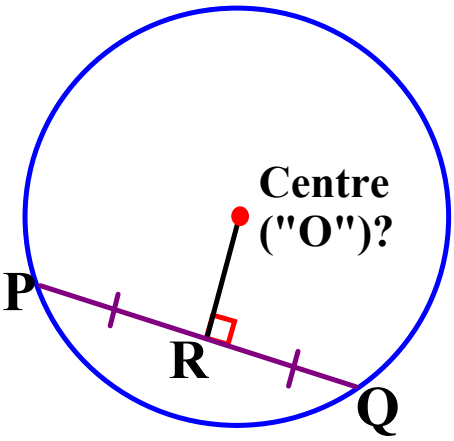
O = centre of the circle (given)

<ORP = <ORQ = 90^{O} (given)

∴ PR = QR (PCP)

VOCABULARY:

4. PERPENDICULAR TO CHORD PROPERTY 2 (PCP): The perpendicular bisector of a chord in a circle passes through the centre of the circle.



PR = QR (given)

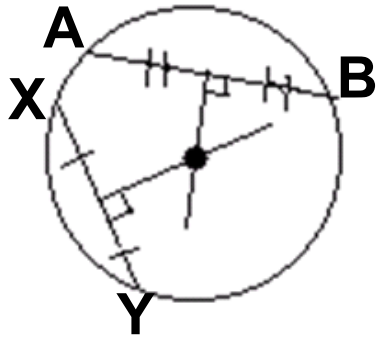
<ORP = <ORQ = 90^{O} (given)

∴ O = centre of the circle (PCP)

PCP 2 - Taking it Further

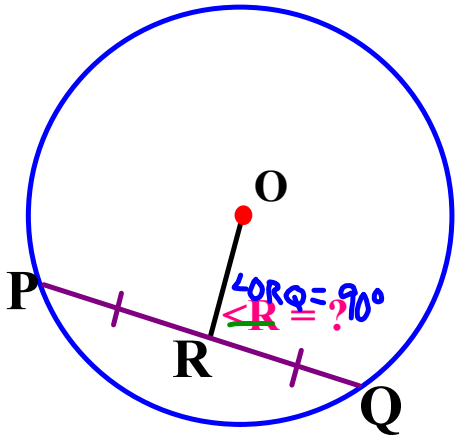
(You do not have to copy this - it is not used in grade 9 math; however, you may have to know this if you take more math courses after high school.)

To actually determine the location of the centre of a circle using PCP 2, two chords are drawn as well as their perpendicular bisectors. The point at which the two perpendicular bisectors intersect is the centre of the circle.



VOCABULARY:

5. PERPENDICULAR TO CHORD PROPERTY 3 (PCP): A line that joins the centre of a circle to the midpoint of a chord is perpendicular to the chord.



PR = QR (given)

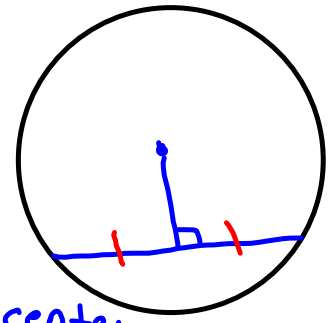
O = centre of the circle (given)

∴ $\angle ORP = \angle ORQ = 90^{O}$ (PCP)

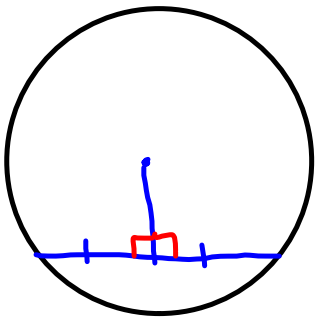
Perpendicular Chord Property

1. center
2. Meets at 90^0 perpendicular
3. Bisects

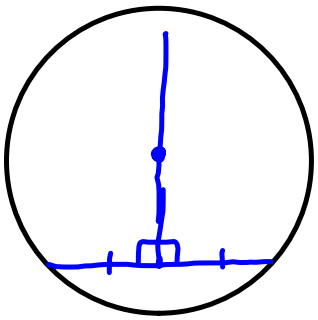
If you have 2 then you automatically have the third.



center
perpendicular
∴ bisects



Cente
bisects
∴ Perpendicular



Perpendicular
Bisects
∴ Center

STOP!

YES!!!

There are 3 pieces to the Perpendicular to Chord Property puzzle:

The perpendicular bisector of a chord in a circle passes through the centre of the circle, intersects with the chord at a 90° angle and cuts the chord into two equal pieces.

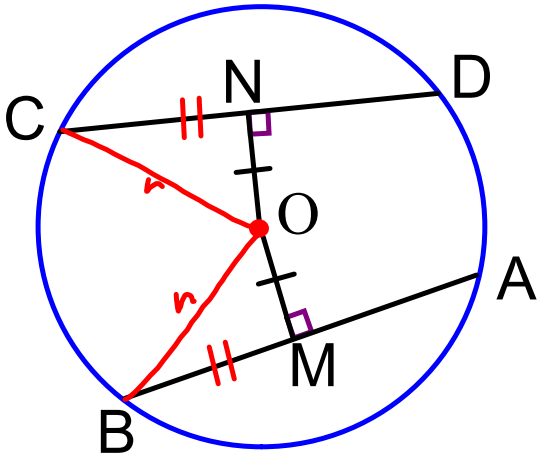
As long as you have 2 of the pieces of the puzzle, you automatically know the third.

VOCABULARY:

PERPENDICULAR TO CHORD PROPERTY 4 (PCP):

(Again, you do not have to copy this - it is not used in grade 9 math; however, you may have to know this if you take more math courses after high school.)

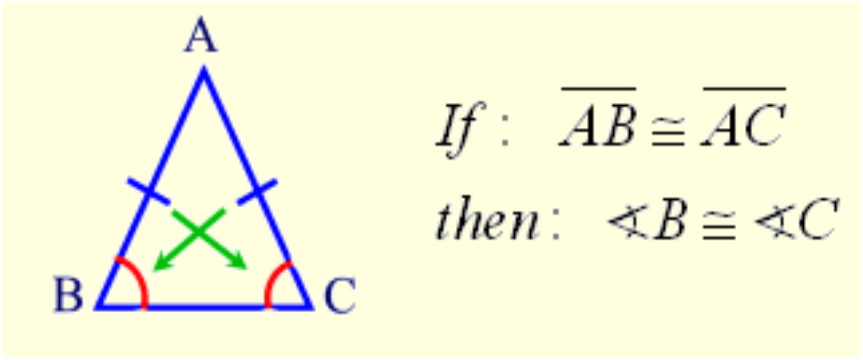
Two chords that are an equal distance from the centre of a circle are congruent.



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

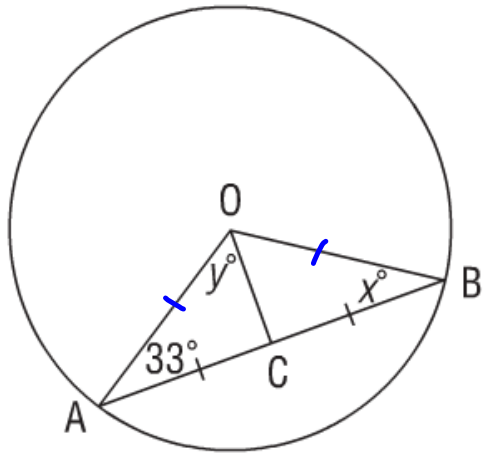
VOCABULARY:

6. ISOSCELES TRIANGLE THEOREM (ITT) : The two angles that are opposite to the two congruent sides in an isosceles triangle are also congruent.



Determining the Measure of Angles in a Triangle

Example: Determine the values of x° and y° in the diagram below.



AO = OB radii

$\angle x = 33^\circ$ (ITT)

$\angle A = 33^\circ$ (given)

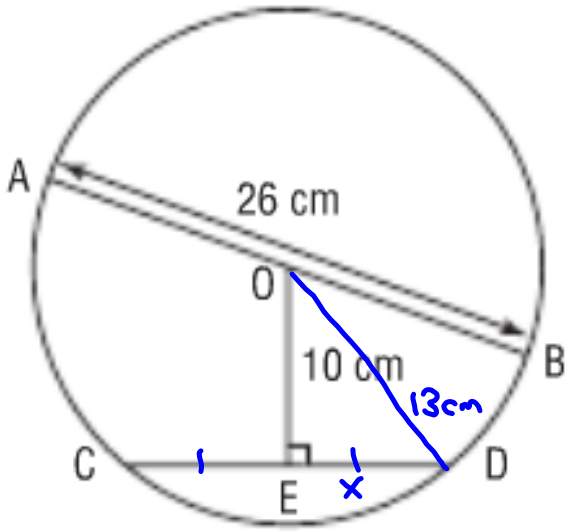
$\angle ACO = 90^\circ$ (PCP)

$\angle y = 57^\circ$ (SATT)

= 180-90-33

Using the Pythagorean Theorem in a Circle

Example: What is the length of chord CD to the nearest tenth?



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

$= 169 - 100$

$= 69$

$x = \sqrt{69}$

$= 8.3\text{cm}$

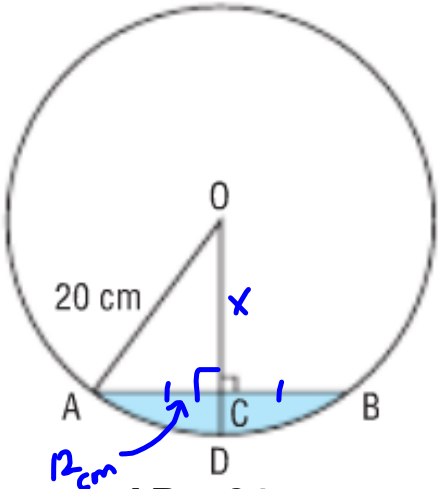
$CD = 2(8.3)$

$= 16.6\text{cm}$

ANSWER:

Solving Problems Using the Property of a Chord and its Perpendicular

Example: Determine the length of CD in the diagram below.



AB = 24 cm

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

$= 400 - 144$

$= 256$

$x = \sqrt{256}$

$= 16$

$CD = 20 - 16$

$= 4\text{cm}$

ANSWER:

CONCEPT REINFORCEMENT:

MMS9:

PAGE 397: #3 TO #6
PAGE 398: #7 TO #12 [10(a) = 3.5]
PAGE 399: #13, 14, 15, 17, 18 & 19
PAGE 403: #4 TO #7
PAGE 419: #5 TO #8