MAY 12, 2016

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?

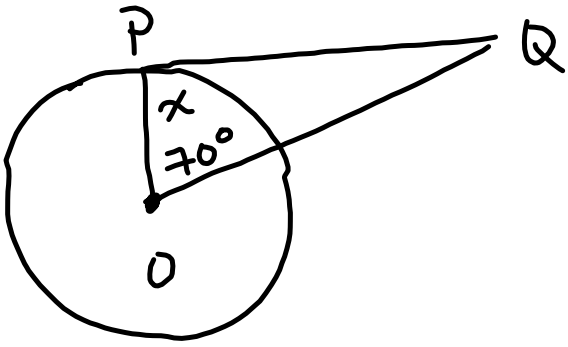
We will continue working on the Math 9 Specific Curriculum Outcome (SCO) "Shape and Space 1" OR "SS1" which states:

"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."**

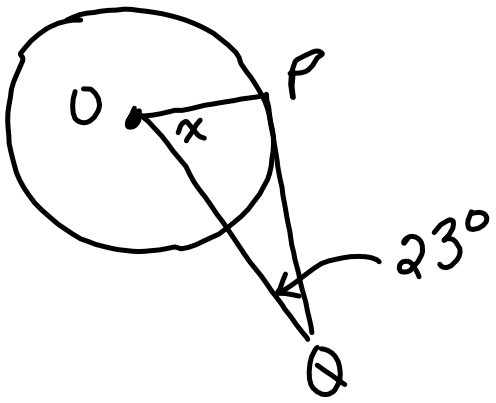
HOMEWORK QUESTIONS?
(Pages 388/89/90, #3, 5, 6, 7, 9, 13, 14 & 17)

5. a)



$x = 90°$ (TRP)

b)



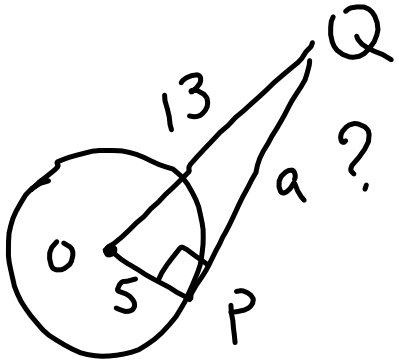
$\angle OQP = 23°$ (GIVEN)

$\angle OPQ = 90°$ (TRP)

$x = 67°$ (SATT)

HOMEWORK QUESTIONS?
(Pages 388/89/90, #3, 5, 6, 7, 9, 13, 14 & 17)

6.b)



$\angle OPQ = 90°$ (TRP)

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

$a^2 + 5^2 = 13^2$

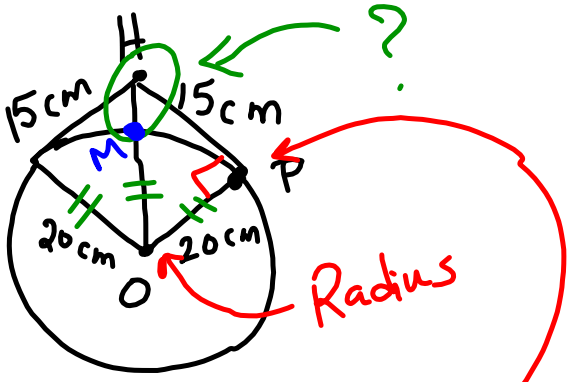
$a^2 + 25 = 169$

$\sqrt{a^2} = \sqrt{144}$

$a = 12$

HOMEWORK QUESTIONS?
(Pages 388/89/90, #3, 5, 6, 7, 9, 13, 14 & 17)

17.



* ① $\angle HPO = 90^\circ$ (TRP)

② $a^2 + b^2 = c^2$

$15^2 + 20^2 = c^2$

$225 + 400 = c^2$

$\sqrt{625} = \sqrt{c^2}$

$25 = c$ (HO)

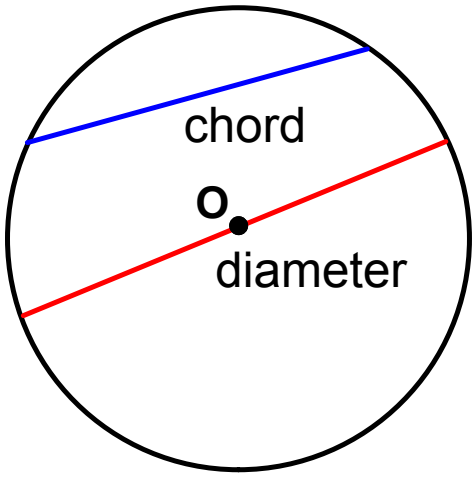
$HM = HO - MO$ (radius)

$HM = 25 - 20$

$HM = 5\text{cm}$

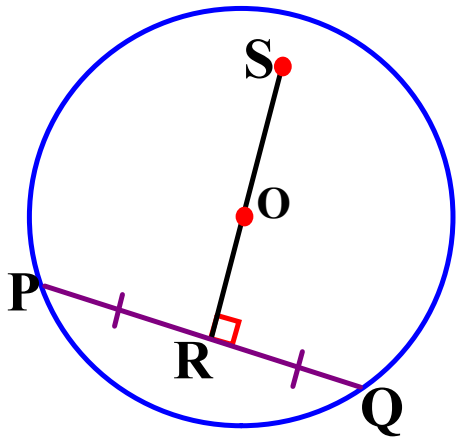
VOCABULARY:

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.)**



VOCABULARY:

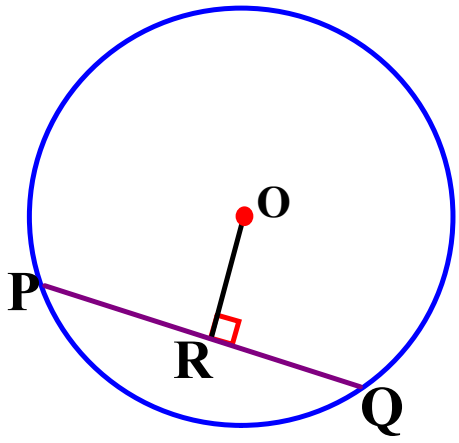
2. PERPENDICULAR BISECTOR: Intersects a line segment at 90^o and divides the line segment into two equal parts.



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.



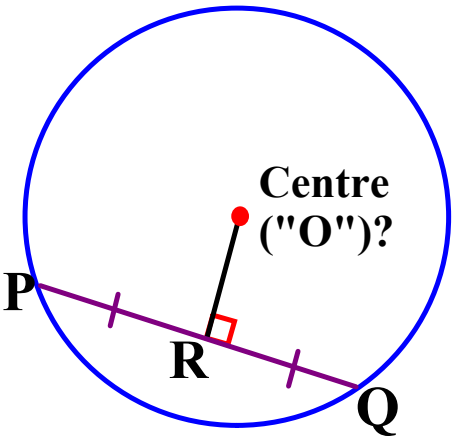
O = centre of the circle (given)

$\angle R = \angle R = 90^{o}$ (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.



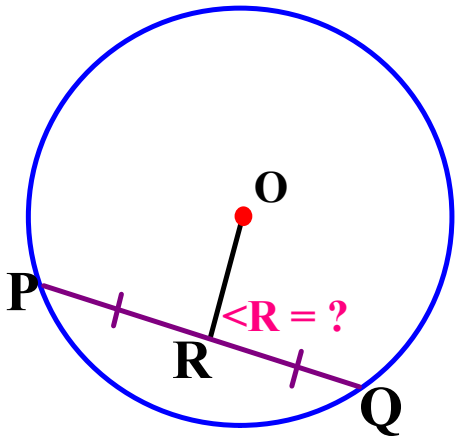
PR = QR (given)

<R = <R = 90° (given)

∴ O = centre of the circle (PCP)

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)

∴ <R = <R = 90° (PCP)

Aren't they all saying the same thing?

STOP!

YES!!!

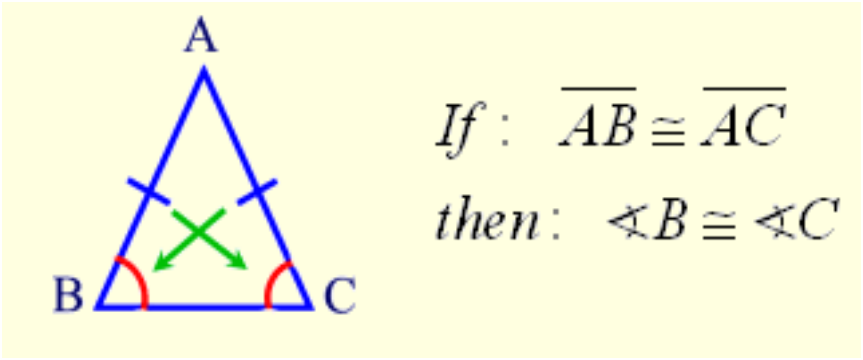
There are 3 pieces to the Perpendicular to Chord Property puzzle:

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.

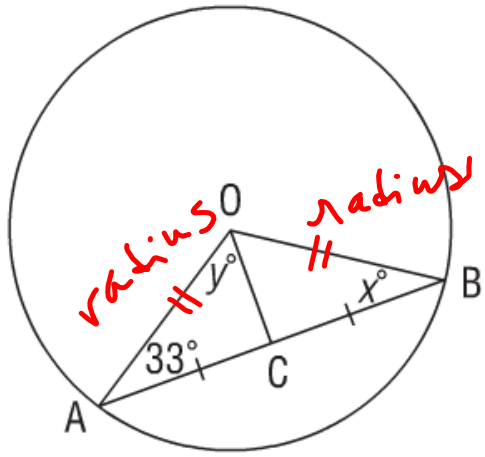
VOCABULARY:

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^o and y^o in the diagram below.

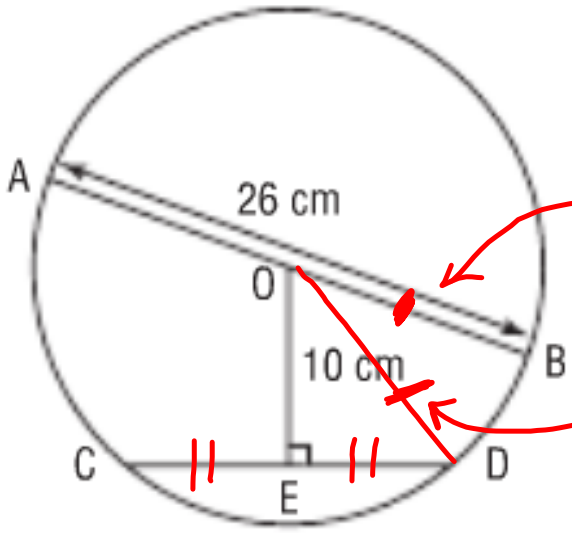


$\angle x = 33^o$ (ITT)

$\angle A = 33^o$ (given)
$\angle C = 90^o$ (PCP)
$\angle y = 57^o$ (SATT)

Using the Pythagorean Theorem in a Circle

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



Radius BO = 13 cm

13 cm (DO - another radius)

CE = DE (PCP)

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

$a^2 + 10^2 = 13^2$

$a^2 + 100 = 169$

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

$a \doteq 8.3066$ (DE)

Since DE = CE, CD = 2(DE)

$\doteq 2(8.3066)$

$\doteq 16.6132$

$\doteq 16.6$ cm