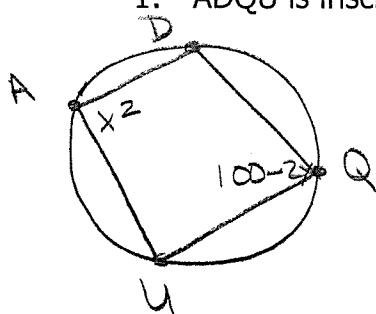


1. ADQU is inscribed in a circle.  $m\angle A = x^2$  and  $m\angle Q = 100 - 2x$ . Find  $m\angle Q$ .



$$x^2 + 100 - 2x = 180$$

$$x^2 - 2x - 80 = 0$$

$$(x - 10)(x + 8) = 0$$

$$x = 10, -8$$

$$m\angle Q = 80, 116$$

2. Prove: A trapezoid inscribed in a circle is isosceles.

Given: ABCD trap w/ base  $\overline{AB}, \overline{DC}$

① ABCD trap  $\Rightarrow \overline{AB} \parallel \overline{DC} \Rightarrow \widehat{AD} \cong \widehat{BC} \Rightarrow \overline{AD} \cong \overline{BC} \Rightarrow$  ABCD isos trap



① Given

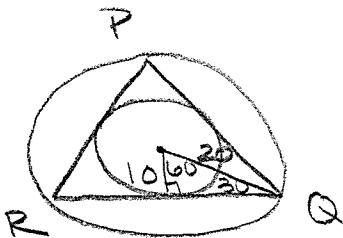
② Def trap

④  $\cong$  arcs have  $\cong$  chords

③  $\parallel$  lines cut off  $\cong$  arcs

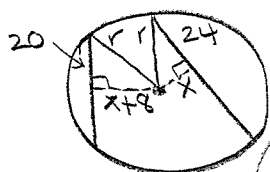
⑤ Def isos trap

3. Equilateral triangle PQR is inscribed in one circle and circumscribed about another circle. The circles are concentric. If the radius of the smaller circle is 10, find the radius of the larger circle.



$$\text{radius } 190 = 20$$

4. Find the radius of a circle in which a 48 cm chord is 8 cm closer to the center than a 40 cm chord.



$$(x+8)^2 + (20)^2 = r^2$$

$$- x^2 + (24)^2 = r^2$$

$$x^2 + 16x + 64 - x^2 - 176 = 0$$

$$16x = 112$$

$$x = 7$$

$$7^2 + (24)^2 = r^2$$

$$25 = r$$

and  $m\widehat{CD} = 50$

5.  $m\widehat{AB} = 30$ ,  $m\widehat{BC} = 40$  and  $m\widehat{CD} = 50$ . Find  $m\angle X$ ,  $m\angle Y$  and  $m\angle Z$ .

$$m\angle X = \frac{1}{2}(320 - 40)$$

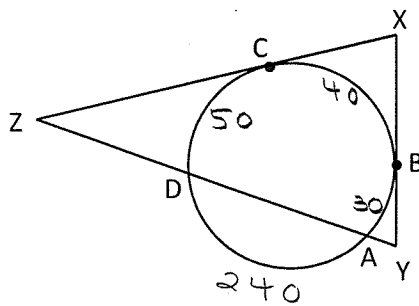
$$= \boxed{140}$$

$$m\angle Y = \frac{1}{2}(90 - 30)$$

$$= \boxed{30}$$

$$m\angle Z = \frac{1}{2}(70 - 50)$$

$$= \boxed{10}$$

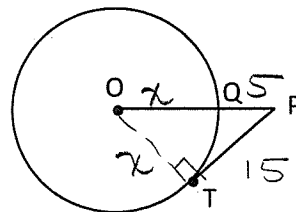


6. Find the radius of  $\odot O$  given  $TP = 15$  and  $PQ = 5$ .  $\overline{TP}$  is a tangent segment.

$$r^2 + 225 = r^2 + 10r + 25$$

$$200 = 10r$$

$$\boxed{20 = r}$$



7.  $m\widehat{AD} + m\widehat{BC} = 200$ ;  $m\angle P = 30$ . Find  $m\widehat{AB}$  and  $m\widehat{CD}$ .

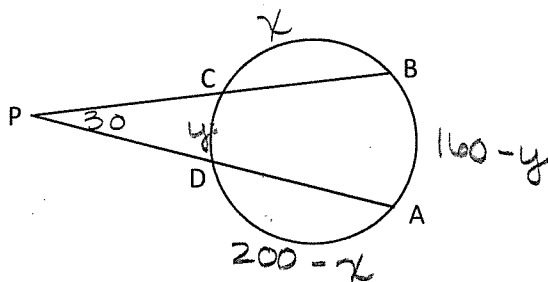
$$30 = \frac{1}{2}(160 - y - y)$$

$$60 = 160 - 2y$$

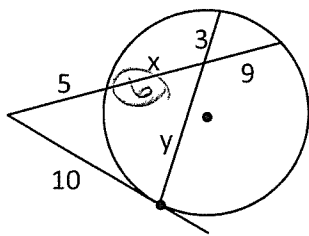
$$100 = -2y$$

$$50 = y$$

$$\boxed{\begin{matrix} m\widehat{AB} = 110 \\ m\widehat{CD} = 50 \end{matrix}}$$



8. Find  $x$  and  $y$ .



$$100 = 5(x + 14)$$

$$100 = 5x + 70$$

$$30 = 5x$$

$$\boxed{6 = x}$$

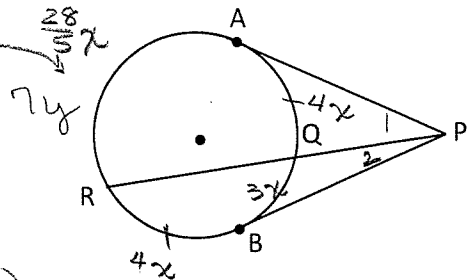
$$3y = 54$$

$$\boxed{y = 18}$$

9.  $\widehat{AQ} \cong \widehat{RB}$ ;  $\overline{PR}$  divides major and minor arc AB in ratio of  $\widehat{AQ} : \widehat{QB} = 4 : 3$  and  $\widehat{AR} : \widehat{RB} = 7 : 5$ . Find the ratio of  $\angle APQ : \angle BPQ$

$$4x = 5y$$

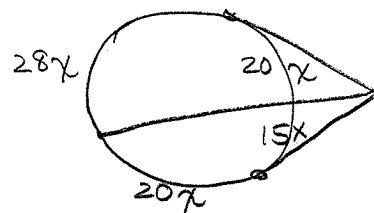
$$\frac{4}{5}x = y$$



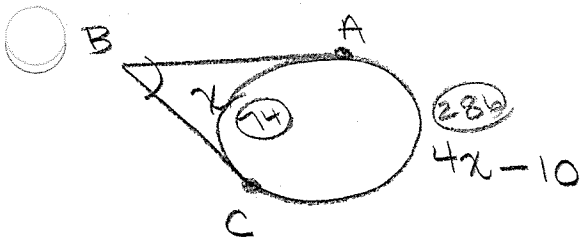
$$m\angle 1 = \frac{1}{2}(28x - 20x) = \frac{1}{2}(8x)$$

$$m\angle 2 = \frac{1}{2}(20x - 15x) = \frac{1}{2}(5x)$$

$$\frac{4x}{\frac{5}{2}x} = \boxed{\frac{8}{5}}$$



10. Find the measure of the tangent-tangent angle if the measure of the major intercepted arc is 10 less than four times the measure of the minor intercepted arc.



$$5x - 10 = 360$$

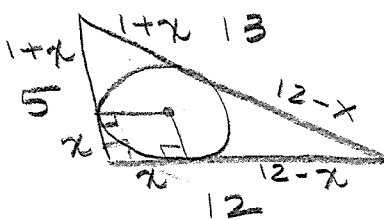
$$5x = 370$$

$$x = 74$$

$$m\angle B = \frac{1}{2}(286 - 74)$$

$$= \boxed{106}$$

11. A circle is inscribed in a triangle with side lengths 5, 12 and 13. Find the diameter of the circle.



$$2x + 1 = 5$$

$$2x = 4$$

$$\boxed{x = 2}$$

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

