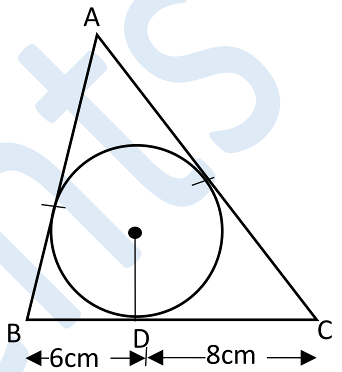
Grade 10th CBSE

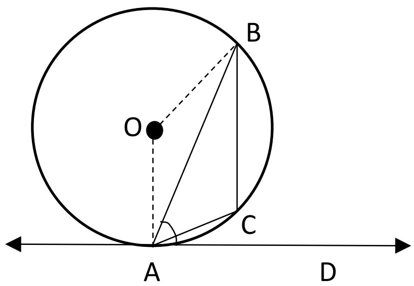
Mathematics : CIRCLES

Q1) Prove that the length of tangents drawn from an external point to a circle are equal.

Q2) Triangle ABC is drawn to circumscribe a circle of radius 3cm, such that side BC is Tangent to circle meeting it at D and length of BD and DC is 6cm and 8cm respectively. Find the length of side AB and AC if area of triangle is 63cm^2.



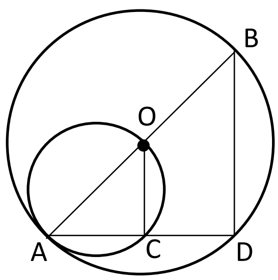
Q3) In given figure, AB is a chord of a circle with centre O and AD is a tangent. If ∠BAD = 60°, find ∠ACB



Q4) If the angle between two tangents drawn from an external point P to a circle of radius a and centre O is 60° then find the length of OP.

Q5) In a circle with centre O, a diameter AB and a chord AD are drawn. Another circle is drawn with AO as diameter to cut AD at C.

Prove that: BD = 2 x OC



Q6)Prove that the angle between a tangent and a chord through the point of contact is equal to the angle in the alternate segment.

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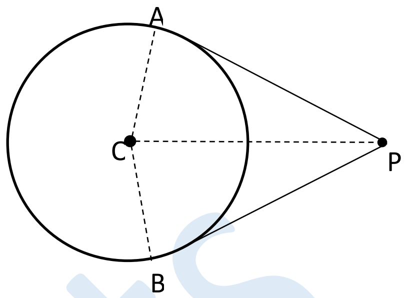
Solutions

Grade 10th : Circles

Sol.1) To Prove AP = BP



Proof:

In triangle ΔAOP and ΔBOP

$\angle OAP = \angle OBP = 90°$ [tangents subtend 90° at the center]

OA = OB [radius of same circle]

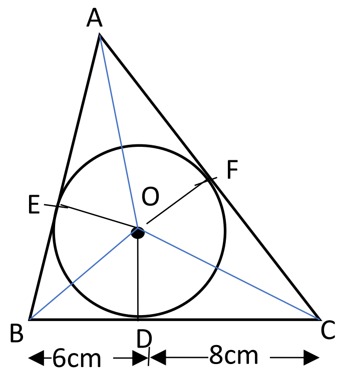
OP = OP [Common]

∴ ΔAOP ≅ ΔBOP

Hence AP = BP [by CPCT]

Hence proved.

Sol. 2)



BD = BE = 6cm [tangents to a circle from an exterior point]

II^{ly} CD = CF= 8cm and AE = AF

ar(ΔABC) = ar(ΔAOB)+ ar(ΔAOC) + ar(ΔBOC)

ar(ΔAOB) = $\frac{1}{2} OE \times AB = \frac{1}{2} \times OE \times (AE + EB) = \frac{1}{2} \times 3 \times (AE + 6)$

ar(ΔAOC) = $\frac{1}{2} OF \times AC = \frac{1}{2} \times OF \times (AF + FC) = \frac{1}{2} \times 3 \times (AF + 8)$

ar(ΔBOC) = $\frac{1}{2} OD \times BC = \frac{1}{2} \times OD \times (BD + DC) = \frac{1}{2} \times 3 \times (6 + 8)$

ar(ΔABC) = ar(ΔAOB)+ ar(ΔAOC) + ar(ΔBOC)

ar(ΔABC) = $\frac{1}{2} \times 3 \times (AE + 6) + \frac{1}{2} \times 3 \times (AF + 8)$ +)= $\frac{1}{2} \times 3 \times (6 + 8)$

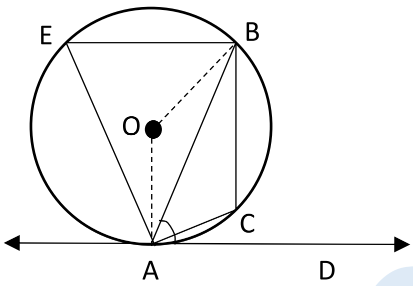
AE = AF

ar(ΔABC) = $\frac{1}{2} \times 3(AE + 6 + AE + 8 + 6 + 8)$

63 = $\frac{1}{2} \times 3(2AE + 28)$

AE = 7

Sol. 4)



$\angle ABD = 60°$

$\therefore \angle AEB = 60°$ [*alternate segment subtend equal angle*]

$Now, \angle AEB$ + ∠ ACB = 180° [ACBE is a cyclic quadrilateral]

∴ ∠ ACB = 120°

Sol.5)

OA = $\frac{1}{2}AB \implies O$ *is a mid point of* AB $\because AB$ *is diameter.*

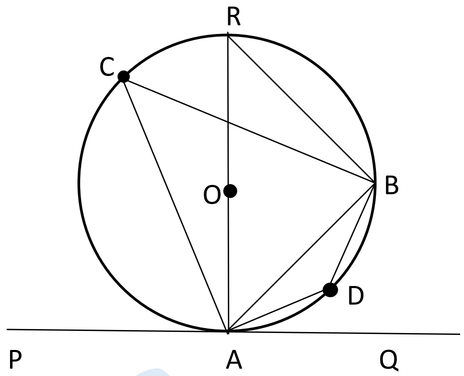
$AC = \frac{1}{2}AD$ $\because \perp OC$ *Bisect chord* AD

In $\Delta ABD, OC = \frac{1}{2}BD$

$\because$ *Line joining the mid point of two sides of a triangle is half of the third side.*

Hence proved.

Sol. 6)



RA is a diameter, hence ∠RBA = 90°

$\Longrightarrow \angle ARB + \angle RAB = 90°$ ….. (1)

Now, ∠BAQ +∠RAB = 90° …….(2)

∵OA ⊥ tangent PQ

By (1) and (2) $\angle ARB = \angle BAQ$ …… (3)

Now $\angle ARB$ = $\angle ACB$ ………(4)

$[Angles\ of\ the\ same\ segment]$

By (3) and (4)

$\angle ACB = \angle BAQ$

Hence proved.

Now,

$\angle BAP + \angle BAQ = 180°\ and\ \angle ACB + \angle ADB = 180°$

$\therefore \angle BAP = \angle ADB$

Hence Proved.