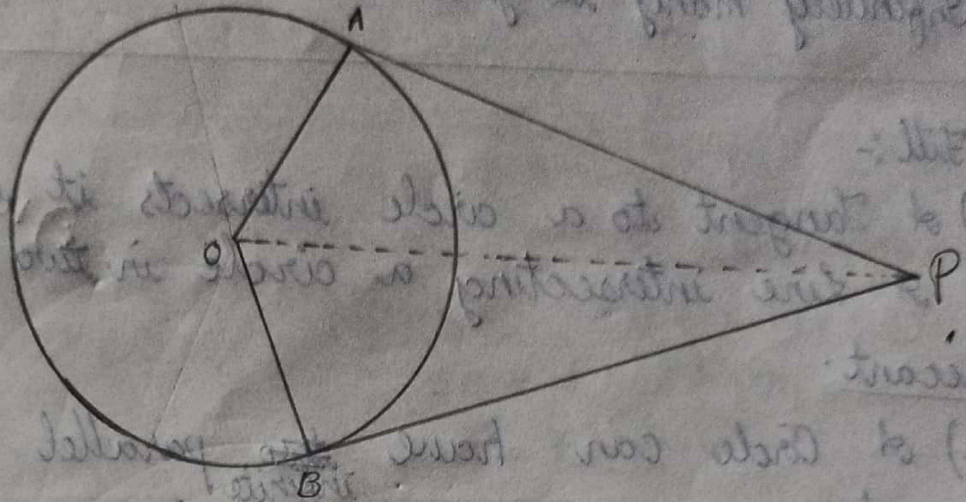
same circle)

Statement :- The Tangents drawn from external point to the ~~Tang~~ circle are equal.



Data :- 'O' is the centre of a circle.
PA and PB are tangents to the circle from external point 'P'.

To Prove :- PA = PB

Construction :- Join OA, OB and OP

Proof :- In ΔAOP and ΔBOP

$\angle A = \angle B = 90^\circ$ [Radius $\perp$ Tangent].

OA = OB [same radii of circle]

OP = OP [Common side].

$\therefore \Delta AOP \cong \Delta BOP$ [RHS theorem].

PA = PB (CPCT)

Hence, it is proved.

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EXERCISE 4.1

1. How many tangents can a circle have? Infinite
2. Fill in the blanks :
   - (i) A tangent to a circle intersects it in ___one___ point (s).
   - (ii) A line intersecting a circle in two points is called a ___Secant___
   - (iii) A circle can have ___Infinite___ parallel tangents at the most.
   - (iv) The common point of a tangent to a circle and the circle is called ___point of___. contact
3. A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm. Length PQ is :

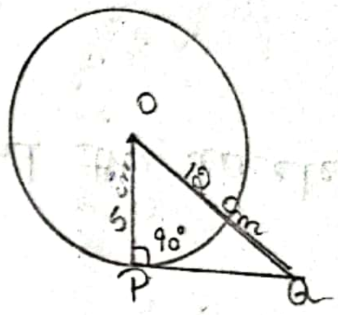
   (A) 12 cm (B) 13 cm (C) 8.5 cm (D) $\sqrt{119}$ cm.
4. Draw a circle and two lines parallel to a given line such that one is a tangent and the other, a secant to the circle.

3) A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q. So that OQ = 12 cm length of PQ is

Given :- OP be the radius of a circle, OP = 5 cm

OQ = 12 cm.

PQ = ?



In $\triangle$ $\angle OPQ = 90°$ [$\because$ Theorem 10.1]

In $\triangle OPQ$

$OQ^2 = OP^2 + PQ^2$

$12^2 = 5^2 + PQ^2$

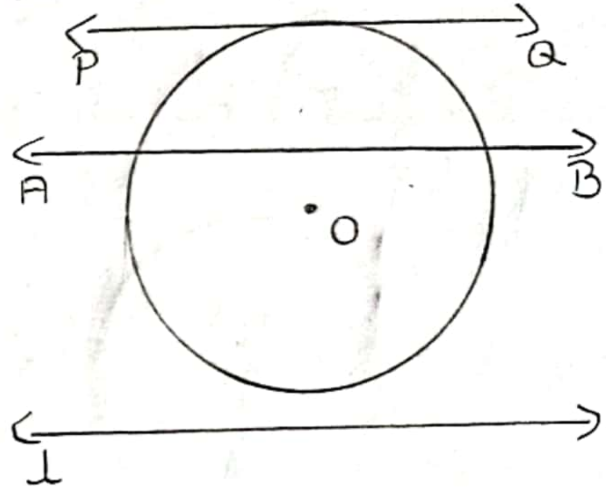
$144 = 25 + PQ^2$

$PQ^2 = 144 - 25$

$PQ^2 = 119$

$PQ = \sqrt{119}$ cm.

4) Draw a circle and two lines parallels to a given line. Such that one is tangent and the other, a secant to the circle.



* Let 'l' be a given line, 'PQ' be the tangent to a circle, and 'AB' is the secant to the circle.

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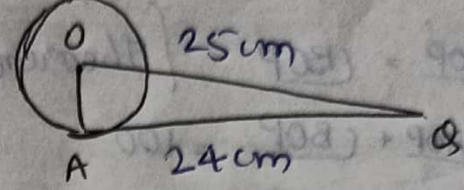
Ex 4.2

1) From a point Q, the length of the Tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. The radius of the circle is.



$d^2 = r^2 + t^2$

$(25)^2 = r^2 + 24^2$

$625 - 576 = r^2$

$r^2 = 49$

$r = \sqrt{49}$

$\boxed{r = 7 cm}$

Given,

$OQ = d = 25 cm$

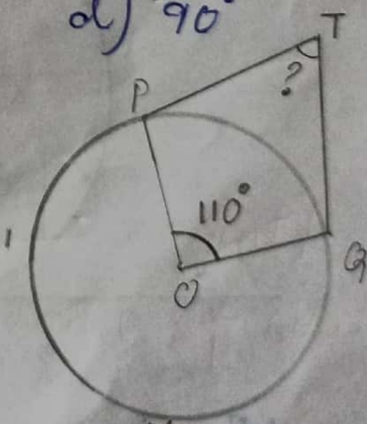
$OA = \cancel{t} = ?$

$AQ = t = 24 cm$

~~a) 7 cm~~ b) 12 cm c) 15 cm d) 24.5 cm

2) In Fig. if TP and TQ are the 2 Tangents to a circle with centre O so that ∠POQ = 110°, then ∠PTQ is equal to

a) 60° ~~b) 70°~~ c) 80° d) 90°



In Quadrilateral OQTP,

$\angle O + \angle T = 180°$

$110° + \angle T = 180$

$\boxed{\angle PTQ = 70°}$

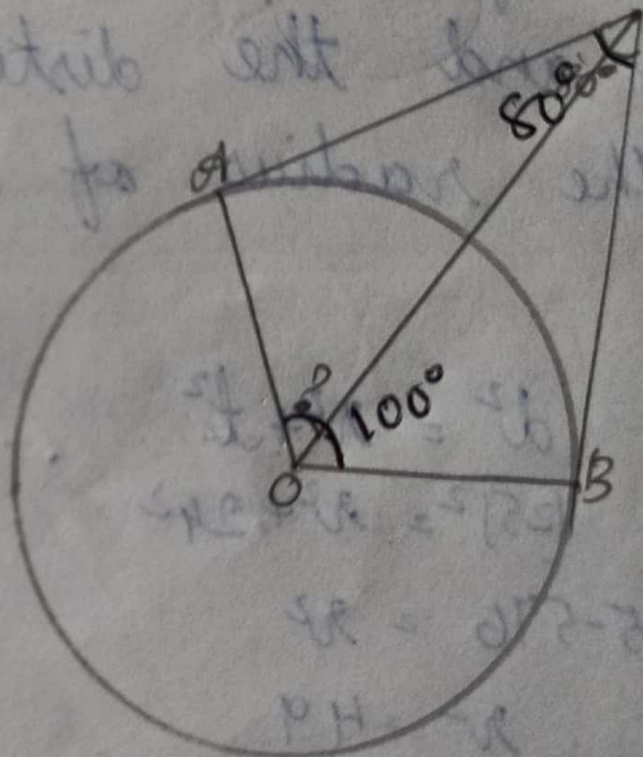
3) If Tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 80°, then ∠POA is equal to

a) 50° b) 60° c) 70° d) 80°

$\angle APB + \angle AOB = 180^\circ$

$\angle AOB = 180 - 80^\circ$

$\angle AOB = 100^\circ$



$\angle AOP = \angle BOP$ (Theorem).

$\angle AOP + \angle BOP = 100$

$\angle AOP + \angle AOP = 100$

$2\angle AOP = 100$

$\angle AOP = \frac{\cancel{100}^{50}}{\cancel{2}_1}$

$\boxed{\angle AOP = 50^\circ}$