

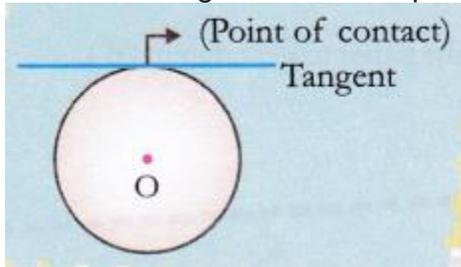
## Tangents drawn from an External Point

### Objective

To verify experimentally that lengths of tangents drawn from an external point to a circle are equal.

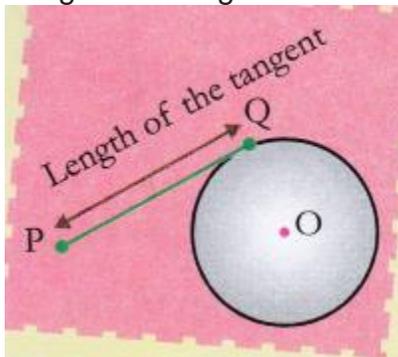
### Tangent

A line touching the circle at a point is called a tangent to the circle.



### Prerequisite Knowledge

1. Tangent to a circle.
2. Length of a tangent.

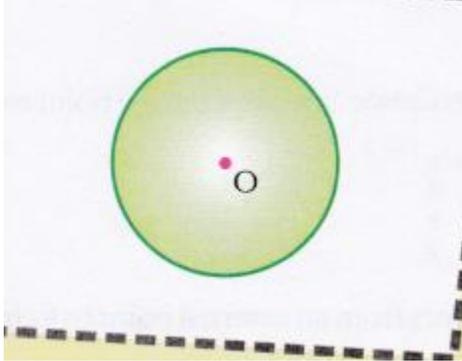


### Materials Required

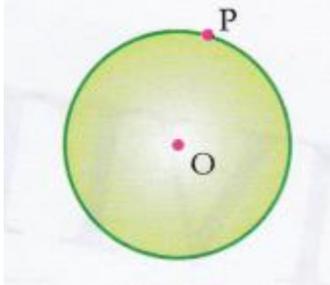
Glazed papers, a white chart paper, sketch pens, a pair of scissors, geometry box, fevicol.

### Procedure

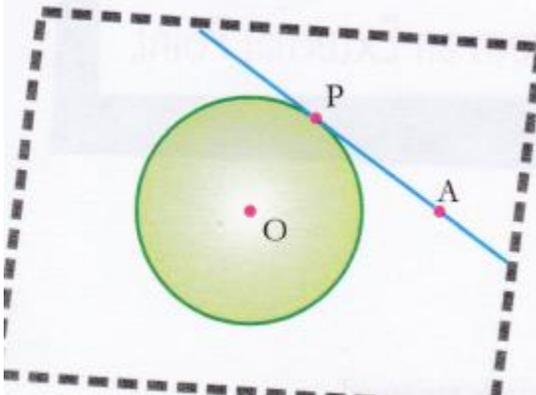
1. Cut a circle of any radius from a glazed paper and paste it on a white chart paper.



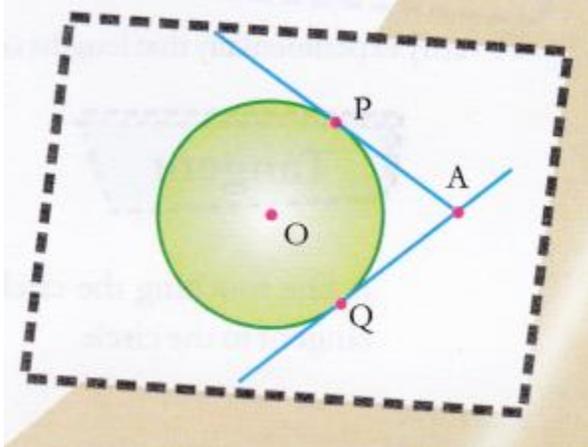
2. Take any point P on the circle.



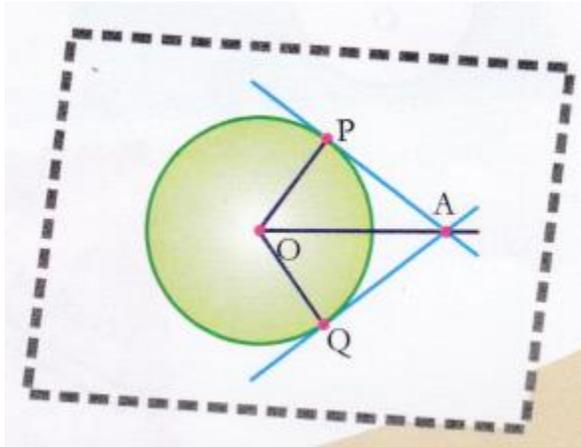
3. From P, fold the paper in such a way that it just touches the circle at P. Press it and unfold to get a tangent PA.



4. From A, fold the paper to get tangent AQ.



5. Fold the circle along OA.
6. Join OP, OA, OQ.



### Observation

Students observe that point P coincide with Q  
 $\therefore AP = AQ$

### Result

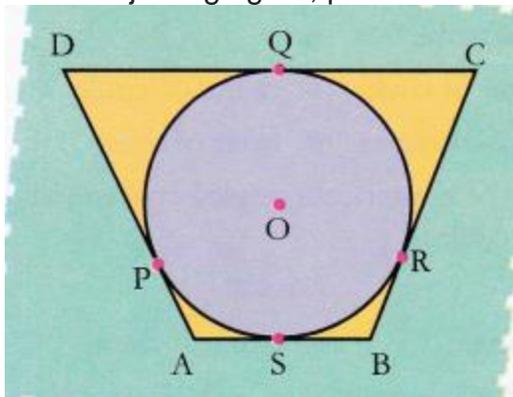
Thus it is verified that lengths of tangents drawn from an external point to a circle are equal.

### Learning Outcome

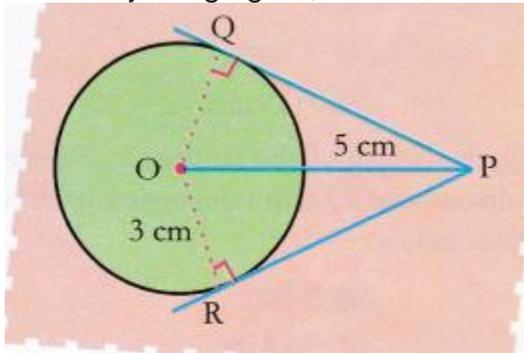
Students will learn how to measure tangents from an external point to a circle by using paper folding.

### Activity Time

1. Draw two tangents from a point P to a circle of radius 3 cm. If its distance from the centre is 10 cm, measure the lengths of the tangents. Are they equal ?
2. In the adjoining figure, prove that  $AD+BC = AB+CD$



3. In the adjoining figure, find PQ and PR.



### Viva Voce

#### Question 1.

Define tangent to a circle.

#### Answer:

A line touching the circle at one point is called a tangent to that circle.

#### Question 2.

Is it possible that a line can touch the circle at more than one point ?

#### Answer:

No

#### Question 3.

How many tangents can be drawn to a circle from a common point outside the circle ?

#### Answer:

Two

#### Question 4.

Is it possible to draw a tangent from a point inside the circle ?

#### Answer:

No

#### Question 5.

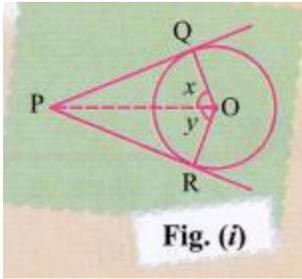
Is it possible to draw two tangents of different lengths from a common external point ?

#### Answer:

No

#### Question 6.

In the fig. (i), is  $\triangle POQ \cong \triangle POR$ ?



**Answer:**

Yes.

**Question 7.**

Is a tangent at any point of a circle perpendicular to the radius through the point of contact ?

**Answer:**

Yes.

**Question 8.**

In the fig. (i), is  $\sqrt{x} = \sqrt{y}$  ?

**Answer:**

Yes

**Multiple Choice Questions**

**Question 1.**

The distance between two parallel tangents drawn to a circle is equal to the

- (a) diameter of circle
- (b) radius of circle
- (c) twice of diameter
- (d) none of these

**Question 2.**

At the point of contact, the angle between radius and tangent to a circle is

- (a)  $180^\circ$
- (b)  $90^\circ$
- (c) acute angle
- (d) none of these

**Question 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

- (a) 12 cm
- (b) 13 cm

- (c) 8.5 cm
- (d)  $\sqrt{119}$  cm

**Question 4.**

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

- (a) 7 cm
- (b) 12 cm
- (c) 15 cm
- (d) 24.5 cm

**Question 5.**

TP and TQ are two tangents to a circle with centre O, so that  $\angle POQ = 110^\circ$ , then  $\angle PTQ$  is equal to

- (a)  $60^\circ$
- (b)  $70^\circ$
- (c)  $80^\circ$
- (d)  $90^\circ$

**Question 6.**

If tangent PA and PB from a point P to a circle with centre O are inclined to each other at an angle of  $80^\circ$ , then  $\angle POA$  is equal to

- (a)  $50^\circ$
- (b)  $60^\circ$
- (c)  $70^\circ$
- (d)  $80^\circ$

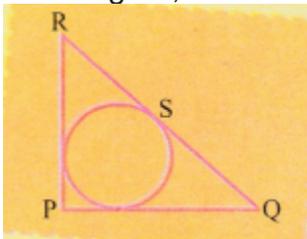
**Question 7.**

Two concentric circles are of radii 5 cm and 3 cm. The length of the chord of the larger circle which touches the smaller circle is

- (a) 5 cm
- (b) 4 cm
- (c) 6 cm
- (d) 8 cm

**Question 8.**

In the figure, If  $PQ = PR$ , then which is correct



- (a)  $QS = SR$

- (b)  $QS = 2RS$
- (c)  $QS \neq RS$
- (d) none of these

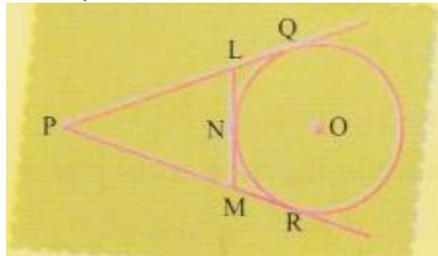
**Question 9.**

AB and AC are two tangents drawn to the circle with centre O. If  $\angle BAC = 85^\circ$  then  $\angle BOC$  is

- (a)  $95^\circ$
- (b)  $85^\circ$
- (c)  $90^\circ$
- (d)  $80^\circ$

**Question 10.**

PQ and PR are tangents from point P to the circle with centre O. N is a point on the circle, then choose the correct-relation



- (a)  $PL + MN = PM - LN$
- (b)  $PL + MN = PM + LN$
- (c)  $PL + PM = LN + MN$
- (d)  $PL + LN = PM + MN$

**Answers**

- 1. (a)
- 2. (b)
- 3. (d)
- 4. (a)
- 5. (b)
- 6. (a)
- 7. (d)
- 8. (a)
- 9. (a)
- 10. (d)