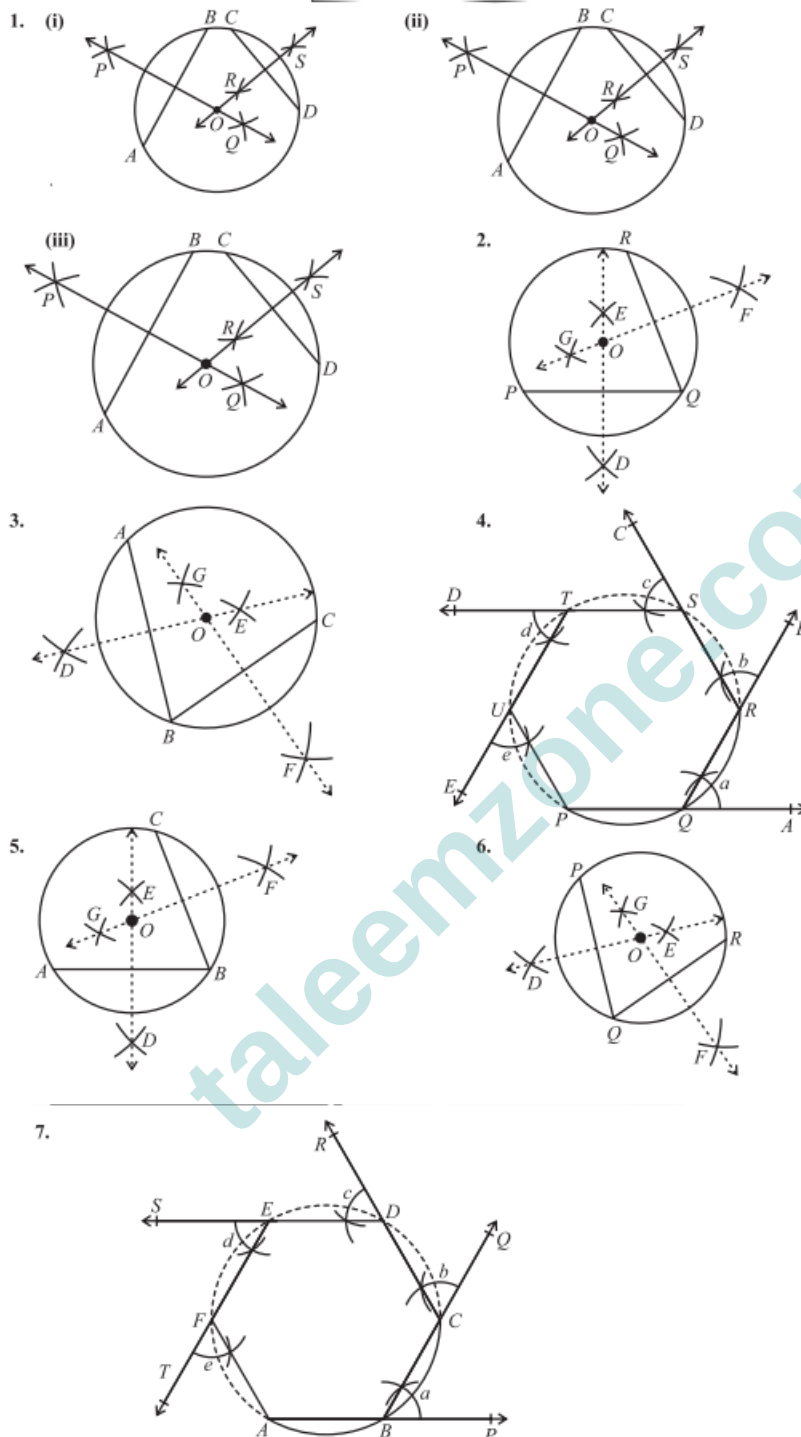


EXERCISE 10.1

1. Construct a circle with the help of given radius and verify its centre by construction:
(i) $r = 1.5$ cm (ii) $r = 1.7$ cm (iii) $r = 2$ cm
2. Take any three non-collinear points P, Q, R and construct a circle passing through these points.
3. Draw an arc ABC and complete a circle by finding its centre.
4. Draw an arc PQR and complete a circle without finding its centre.
5. Take any three non-collinear points (locations of the lamp posts in the park), construct a circle passing through all these points.
6. A part of the Ferris wheel rim is visible as an arc. Using any three points on the arc, construct the circle by finding its centre.
7. ABC an arc of a fountain, complete a circle without finding its centre.

EXERCISE 10.1



EXERCISE 10.1 - Practical Geometry (Construction of Circles)

Question 1: Construct a Circle with Given Radius and Verify its Centre

General Construction Steps:

Materials Needed: Compass, ruler, pencil, protractor (for verification)

1(i) $r = 1.5$ cm

Construction Steps:

1. Mark a point O on the paper as the centre.
2. Set the compass to a radius of 1.5 cm.
3. Place the compass pointer at point O and draw a complete circle.

Verification of Centre:

4. Draw any two chords AB and CD in the circle.
5. Draw perpendicular bisectors of both chords.
6. The point where these perpendicular bisectors intersect is the centre O .

Diagram:

text

A

/ \

/ \

/ \

B-----C

\ /

\ /

\ /

O (Centre)

- Perpendicular bisectors of chords intersect at O
- O is the centre of the circle

1(ii) $r = 1.7$ cm

Construction Steps:

1. Mark point O as the centre.
2. Set compass to 1.7 cm.
3. Draw the circle.

Verification:

- Draw two chords and their perpendicular bisectors
- The intersection point should be O

1(iii) $r = 2$ cm

Construction Steps:

1. Mark point O as the centre.
2. Set compass to 2 cm.
3. Draw the circle.

Verification:

- Use the chord perpendicular bisector method to confirm the centre

Question 2: Construct a Circle Passing Through Three Non-Collinear Points

Given: Points P, Q, R (non-collinear)

Task: Construct a circle passing through all three points

Construction Steps:

1. **Draw lines:** Join points P and Q to get chord PQ .
Join points Q and R to get chord QR .
2. **Draw perpendicular bisector of PQ :**
 - Place compass pointer at P and Q , draw arcs that intersect.
 - Draw the perpendicular bisector line.
3. **Draw perpendicular bisector of QR :**
 - Repeat for chord QR .
4. **Locate the centre:**
 - The intersection of the two perpendicular bisectors is the centre O .
5. **Draw the circle:**
 - Set compass to radius OP (or OQ or OR).
 - Draw the circle passing through P, Q, R .

Diagram:

text

P

/ \

/ \

/ \

Q-----R

\ /

\ /

\ /

O (Centre)

- Perpendicular bisectors of PQ and QR meet at O
- O is the circumcentre of triangle PQR
- Circle passes through P, Q, R

Question 3: Draw an Arc ABC and Complete a Circle by Finding its Centre

Given: Arc ABC

Task: Find centre and complete the circle

Construction Steps:

1. **Draw two chords:**

- Join A to B (chord AB)
 - Join B to C (chord BC)
2. **Draw perpendicular bisectors:**
 - Bisect chord AB perpendicularly
 - Bisect chord BC perpendicularly
 3. **Find centre:**
 - The intersection of the two bisectors is the centre O
 4. **Complete the circle:**
 - Set compass to radius OA
 - Draw the full circle

Diagram:

text

A

/ \

/ \

/ \

B-----C

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\ /

\ /

O (Centre)

- Arc ABC is part of the circle
- O is the centre found using perpendicular bisectors

Question 4: Draw an Arc PQR and Complete a Circle Without Finding its Centre

Given: Arc PQR

Task: Complete the circle without finding the centre

Alternative Method:

1. **Use the arc as a guide:**
2. **Trace the arc onto another paper** and use a compass to extend it.
3. **Method using compass only:**
 - Place the compass at point Q (middle point of arc).
 - Adjust compass to any radius greater than half the arc length.
 - Draw arcs from points P and R with the same radius.
 - The intersection of these arcs helps to complete the circle.
4. **Complete by drawing:**
 - Using the determined radius, draw the full circle extending beyond the arc.

Note: This method uses the arc's curvature to determine the circle without explicitly finding the centre first.

Question 5: Lamp Posts in the Park (Three Non-Collinear Points)

Given: Three lamp post locations (non-collinear points)

Task: Construct a circle passing through all three

Construction Steps:

Same as Question 2:

1. **Join the three points** to form a triangle.
2. **Draw perpendicular bisectors** of two sides.
3. **Locate the intersection** (circumcentre).
4. **Draw the circle** with that centre through all three points.

Real-World Application: This ensures a circular path passing through all three lamp posts.

Question 6: Ferris Wheel Rim (Arc with Three Points)

Given: Any three points on the visible arc of the Ferris wheel

Task: Construct the circle by finding its centre

Construction Steps:

1. **Mark three points** A, B, C on the visible arc.
2. **Draw chords:** AB and BC .
3. **Draw perpendicular bisectors** of both chords.
4. **Find the centre:** The intersection point O is the centre of the Ferris wheel.
5. **Complete the circle:** Set compass to OA and draw the full circle.

Diagram:

text

A

/ \

/ \

/ \

B-----C

\ /

\ /

\ /

O (Centre)

- This identifies the missing centre of the Ferris wheel

Question 7: Fountain Arc ABC - Complete Circle Without Finding Centre

Given: Arc ABC of a fountain

Task: Complete the circle without finding centre

Alternative Construction Method:

1. Use tracing method:

- Place transparent paper over the arc.
- Trace the arc onto the paper.
- Flip or rotate the paper to extend the arc.

2. Use compass method:

- Choose three points A, B, C on the arc.
- Draw circles with centres at these points with appropriate radii.
- The common intersection points determine the circle's position.

3. Practical method:

- Use a flexible curve or French curve to connect and extend the arc.
- Complete the circle by following the curvature.

Note: This method is useful when the centre is inaccessible (e.g., in construction or art).

Summary Table

	Construction Method	Key Steps
1	Given radius	Set compass, draw circle, verify using chord bisectors
2	Three non-collinear points	Perpendicular bisectors of chords $\rightarrow$ centre $\rightarrow$ circle
3	Arc ABC	Chords AB, BC $\rightarrow$ perpendicular bisectors $\rightarrow$ centre $\rightarrow$ complete circle
4	Arc PQR	Complete without centre using tracing or compass extension
5	Three lamp post points	Same as Q2 (circumcircle of triangle)
6	Ferris wheel arc	Same as Q3 (find centre using chord bisectors)
7	Fountain arc	Complete without centre using tracing/compass method

Key Theorems Used

1. Perpendicular Bisector Theorem:

- The perpendicular bisector of a chord passes through the centre of the circle.

2. Circumcentre of a Triangle:

- The point of intersection of perpendicular bisectors of the sides.

3. Unique Circle Through Three Points:

- Through any three non-collinear points, exactly one circle passes.

Quick Reference: Construction Symbols

Symbol	Meaning
$\perp$	Perpendicular
$\parallel$	Parallel
$\cong$	Congruent
$\approx$	Approximately
$\overline{AB}$	Line segment AB
$\overline{AB} \cap$	Arc AB