I'm Up and Down, and Round and Round

Standard difficulty · 20 questions · 40 marks · Time: 36 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. O is the centre of a circle, and A, B, C are points on it. If ∠AOB = 70°, then ∠ACB (C on the major arc) is:
(a) 70° **(b)** 35° **(c)** 140° **(d)** 145°

2. AB is a diameter of a circle and C is a point on the circle. If ∠CAB = 71°, then ∠CBA is:
(a) 19° **(b)** 161° **(c)** 109° **(d)** 71°

3. ABCD is a cyclic quadrilateral with ∠A = 140°. Then ∠C is:
(a) 40° **(b)** 140° **(c)** 220° **(d)** 50°

4. A chord of length 48 cm is drawn in a circle of radius 25 cm. Its distance from the centre is:
(a) 24 cm **(b)** 8 cm **(c)** 1 cm **(d)** 7 cm

5. The longest chord of a circle is:
(a) any chord **(b)** a radius **(c)** a diameter **(d)** an arc

6. A, B, C, D lie on a circle, with C and D on the same side of AB. If ∠ADB = 63°, then ∠ACB is:
(a) 27° **(b)** 117° **(c)** 63° **(d)** 126°

7. In a circle of radius 20 cm, a chord is 12 cm from the centre. The length of the chord is:
(a) 33 cm **(b)** 32 cm **(c)** 16 cm **(d)** 24 cm

8. Assertion (A): O is the centre of a circle and ∠AOB = 126°. For a point C on the major arc, ∠ACB = 63°. Reason (R): The angle an arc subtends at the centre is double the angle it subtends at any point on the remaining part of the circle.
(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

Section B — Short answer — 8 × 2 = 16 marks

9. In cyclic quadrilateral ABCD, ∠A = (2x − 1)° and ∠C = (5x − 57)°. Find x and both angles.

10. In cyclic quadrilateral ABCD, ∠A = 53° and ∠B = 97°. Find ∠C and ∠D.

11. A chord 36 cm long is drawn in a circle of radius 30 cm. Find its distance from the centre.

12. Two parallel chords of lengths 30 cm and 40 cm are drawn on opposite sides of the centre of a circle of radius 25 cm. Find the distance between them.

13. AB is a diameter of a circle and C is a point on it, with AC = 12 cm and BC = 16 cm. Find the radius of the circle.

14. A, B, C lie on a circle with centre O, and ∠ACB = 74°, with C on the major arc. Find ∠AOB.

15. ABCD is a cyclic quadrilateral. Side BC is extended to E, and ∠DCE = 114°. Find ∠BAD.

16. O is the centre of a circle and AB is a chord. If ∠OAB = 71°, find ∠AOB.

Section C — Word problems — 4 × 4 = 16 marks

17. A straight path 256 m long cuts across a circular park of radius 160 m, with both ends on the boundary. How far is the path from the centre of the park?

18. A garden bed ABCD has all four corners on a circular fence. ∠A = 108° and ∠B = 116°. Find the angles at C and D.

19. Two straight, parallel bridges cross a circular lake of radius 100 m, on opposite sides of its centre. They are 192 m and 160 m long. How far apart are they?

20. Asha, Isha and Rohan stand on a circular track with centre O. Asha and Isha make an angle of 142° at O. What angle do they make at Rohan, who stands on the larger part of the track?

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Answer key

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Q	Answer	Working
1	**(b) 35°**	the angle at the centre is double the angle at the circle: 70 ÷ 2
2	**(a) 19°**	∠ACB = 90° (angle in a semicircle); ∠CBA = 90° − 71°
3	**(a) 40°**	opposite angles of a cyclic quadrilateral add up to 180°
4	**(d) 7 cm**	the perpendicular from the centre bisects the chord: $\sqrt{(25^2 - 24^2)} = 7$
5	**(c) a diameter**	—
6	**(c) 63°**	angles in the same segment are equal
7	**(b) 32 cm**	half-chord = $\sqrt{(20^2 - 12^2)} = 16$; chord = 32
8	**(a) Both A and R are true, and R is the correct explanation of A.**	A is true: ∠ACB = 126° ÷ 2 = 63°. R is true and explains A.
9	**x = 34; ∠A = 67°, ∠C = 113°**	∠A + ∠C = 180°: 7x − 58 = 180
10	**∠C = 127°, ∠D = 83°**	opposite angles add up to 180°
11	**24 cm**	$\sqrt{(30^2 - 18^2)} = 24$
12	**35 cm**	distances from the centre: $\sqrt{(25^2 - 15^2)} = 20$ and $\sqrt{(25^2 - 20^2)} = 15$; sum = 35
13	**10 cm**	∠ACB = 90°, so AB = $\sqrt{(12^2 + 16^2)} = 20$; radius = 20 ÷ 2
14	**148°**	the angle at the centre is double: 2 × 74°
15	**114°**	∠BCD = 180° − 114°, and ∠BAD = 180° − ∠BCD = 114°
16	**38°**	OA = OB (radii), so ∠OBA = 71°; ∠AOB = 180° − 2 × 71°
17	**96 m**	$\sqrt{(160^2 - 128^2)} = 96$
18	**72° and 64°**	ABCD is a cyclic quadrilateral: opposite angles add to 180°
19	**88 m**	their distances from the centre are 28 m and 60 m; the sum is 88
20	**71°**	the angle at the circle is half the angle at the centre