



ACHIEVE ACADEMY

GCSE Maths — Higher Tier

Circle Theorems · Practice Booklet

NAME: _____

CLASS: _____

DATE: _____

☐ Developing

☒ Secure

☐ Greater Depth

Answer every question in the working space provided. Method marks are available for correct working even if the final answer is wrong. Check the time allowed with your tutor before you start.

Circle Theorems

Total marks available: 89

● Circle Theorems

✓35°

Q1 · ● Developing · 2 marks

METHOD

Angle ADB = angle ACB (angles in the same segment, subtended by the same arc AB)

Angle ADB = 35°

✓120°

Q2 · ● Developing · 3 marks

METHOD

The angle at the centre is twice the angle at the circumference (same arc AB)

Angle AOB = $2 \times 60^\circ = 120^\circ$

✓40°

Q3 · ● Developing · 3 marks

METHOD

The angle at the centre is twice the angle at the circumference (same arc AB)

Angle AOB = $2 \times 20^\circ = 40^\circ$

✓30°

Q4 · ● Developing · 2 marks

METHOD

Angle ADB = angle ACB (angles in the same segment, subtended by the same arc AB)

Angle ADB = 30°

✓60°

Q5 · ● Developing · 2 marks

METHOD

Angle ADB = angle ACB (angles in the same segment, subtended by the same arc AB)

Angle ADB = 60°

✓60°

Q6 · ● Developing · 3 marks

METHOD

The angle at the centre is twice the angle at the circumference (same arc AB)

$$\text{Angle AOB} = 2 \times 30^\circ = 60^\circ$$

✓150°

Q7 · ● Developing · 3 marks

METHOD

The angle at the centre is twice the angle at the circumference (same arc AB)

$$\text{Angle AOB} = 2 \times 75^\circ = 150^\circ$$

✓80°

Q8 · ● Developing · 3 marks

METHOD

The angle at the centre is twice the angle at the circumference (same arc AB)

$$\text{Angle AOB} = 2 \times 40^\circ = 80^\circ$$

✓65°

Q9 · ● Developing · 2 marks

METHOD

Angle ADB = angle ACB (angles in the same segment, subtended by the same arc AB)

$$\text{Angle ADB} = 65^\circ$$

✓110°

Q10 · ● Developing · 3 marks

METHOD

The angle at the centre is twice the angle at the circumference (same arc AB)

$$\text{Angle AOB} = 2 \times 55^\circ = 110^\circ$$

✓75°

Q11 · ● Secure · 3 marks

METHOD

Opposite angles of a cyclic quadrilateral sum to 180°

$$\text{Angle BCD} = 180^\circ - 105^\circ = 75^\circ$$

✓40°

Q12 · ● Secure · 3 marks

METHOD

$OA = OB$ (radii), so triangle OAB is isosceles

$$\text{Base angles: } (180^\circ - 100^\circ) \div 2 = 40^\circ$$

✓105°

Q13 · ● Secure · 3 marks

METHOD

Opposite angles of a cyclic quadrilateral sum to 180°

$$\text{Angle BCD} = 180^\circ - 75^\circ = 105^\circ$$

✓130°

Q14 · ● Secure · 3 marks

METHOD

$OA = OB$ (radii), so triangle OAB is isosceles, and angle $OBA = \text{angle } OAB = 25^\circ$

$$\text{Angle AOB} = 180^\circ - 25^\circ - 25^\circ = 130^\circ$$

✓100°

Q15 · ● Secure · 3 marks

METHOD

Opposite angles of a cyclic quadrilateral sum to 180°

$$\text{Angle BCD} = 180^\circ - 80^\circ = 100^\circ$$

✓90°

Q16 · ● Secure · 3 marks

METHOD

$OA = OB$ (radii), so triangle OAB is isosceles, and angle $OBA = \text{angle } OAB = 45^\circ$

Angle $AOB = 180^\circ - 45^\circ - 45^\circ = 90^\circ$

✓20°

Q17 · ● Secure · 3 marks

METHOD

$OA = OB$ (radii), so triangle OAB is isosceles, and angle $OBA = \text{angle } OAB = 80^\circ$

Angle $AOB = 180^\circ - 80^\circ - 80^\circ = 20^\circ$

✓50°

Q18 · ● Secure · 3 marks

METHOD

$OA = OB$ (radii), so triangle OAB is isosceles, and angle $OBA = \text{angle } OAB = 65^\circ$

Angle $AOB = 180^\circ - 65^\circ - 65^\circ = 50^\circ$

✓140°

Q19 · ● Secure · 3 marks

METHOD

$OA = OB$ (radii), so triangle OAB is isosceles, and angle $OBA = \text{angle } OAB = 20^\circ$

Angle $AOB = 180^\circ - 20^\circ - 20^\circ = 140^\circ$

✓90°

Q20 · ● Secure · 3 marks

METHOD

Opposite angles of a cyclic quadrilateral sum to 180°

Angle $BCD = 180^\circ - 90^\circ = 90^\circ$

✓50°

Q21 · ● Greater Depth · 3 marks

METHOD

By the alternate segment theorem, the angle between the tangent and chord AB equals the angle in the alternate segment, angle ACB

$$\text{Angle ACB} = 50^\circ$$

✓150°

Q22 · ● Greater Depth · 4 marks

METHOD

Angles of quadrilateral OAPB sum to 360°

Angle OAP = angle OBP = 90° (tangent perpendicular to radius)

$$\text{Angle AOB} = 360^\circ - 90^\circ - 90^\circ - 30^\circ = 150^\circ$$

✓45°

Q23 · ● Greater Depth · 3 marks

METHOD

By the alternate segment theorem, the angle between the tangent and chord AB equals the angle in the alternate segment, angle ACB

$$\text{Angle ACB} = 45^\circ$$

✓30°

Q24 · ● Greater Depth · 3 marks

METHOD

By the alternate segment theorem, the angle between the tangent and chord AB equals the angle in the alternate segment, angle ACB

$$\text{Angle ACB} = 30^\circ$$

✓90°

Q25 · ● Greater Depth · 4 marks

METHOD

Angles of quadrilateral OAPB sum to 360°

Angle OAP = angle OBP = 90° (tangent perpendicular to radius)

$$\text{Angle AOB} = 360^\circ - 90^\circ - 90^\circ - 90^\circ = 90^\circ$$

✓70°

Q26 · ● Greater Depth · 4 marks

METHOD

Angles of quadrilateral OAPB sum to 360°

Angle OAP = angle OBP = 90° (tangent perpendicular to radius)

Angle AOB = $360^\circ - 90^\circ - 90^\circ - 110^\circ = 70^\circ$

✓60°

Q27 · ● Greater Depth · 3 marks

METHOD

By the alternate segment theorem, the angle between the tangent and chord AB equals the angle in the alternate segment, angle ACB

Angle ACB = 60°

✓75°

Q28 · ● Greater Depth · 3 marks

METHOD

By the alternate segment theorem, the angle between the tangent and chord AB equals the angle in the alternate segment, angle ACB

Angle ACB = 75°

✓70°

Q29 · ● Greater Depth · 3 marks

METHOD

By the alternate segment theorem, the angle between the tangent and chord AB equals the angle in the alternate segment, angle ACB

Angle ACB = 70°

✓40°

Q30 · ● Greater Depth · 3 marks

METHOD

By the alternate segment theorem, the angle between the tangent and chord AB equals the angle in the alternate segment, angle ACB

Angle ACB = 40°