Solutions

2.1

- they are both **radii** of the same circle

2.2

- angle $OCA = x$: base angles of an isosceles triangle ($OA = OC$, radii)
- $AOC = 180° - 2x$: angles in a triangle add to 180°

2.3

- a diameter makes an angle of 180° at the centre (a straight line)
- the angle at the circumference is half of it: $180° \div 2 = 90°$

2.4

- two angles at the circumference on the same arc AB are each half of the same centre angle AOB
- so they are equal

2.5

- the centre angle on the arc opposite A is $2A$, and the centre angle on the arc opposite C is $2C$ (angle at the centre is twice the angle at the circumference)
- the two centre angles make a full turn: $2A + 2C = 360°$ (angles around a point)
- so $A + C = 180°$

3.1

- a diagram may not be accurate, and a measurement shows only this one case; a proof must use reasons that hold for every case

3.2

- $OA = OB$ (radii), so $OBA = x$ (base angles of an isosceles triangle)
- $AOB = 180° - 2x$ (angles in a triangle)
- $ACB = \frac{1}{2}(180° - 2x) = 90° - x$ (angle at the centre is twice the angle at the circumference)

3.3

- $OB = OC$ (radii) and $BM = MC$, with OM common, so triangles OMB and OMC are congruent (SSS) and $OMB = OMC = 90°$ (angles on a straight line)
- $ACB = 90°$: angle in a semicircle
- OM and AC both meet BC at 90° (equal corresponding angles), so they are parallel

3.4

- $ABC + ADC = 180°$: opposite angles of a cyclic quadrilateral
- $ABC + CBE = 180°$: angles on a straight line
- so $CBE = 180° - ABC = ADC$

3.5

- draw the diameter AD; $TAD = 90°$ (tangent meets radius)
- $ABD = 90°$ (angle in a semicircle), so $ADB = 90° - BAD$ (angles in a triangle)
- $TAB = TAD - BAD = 90° - BAD$, so $TAB = ADB$
- $ADB = ACB$ (angles in the same segment), so $TAB = ACB$