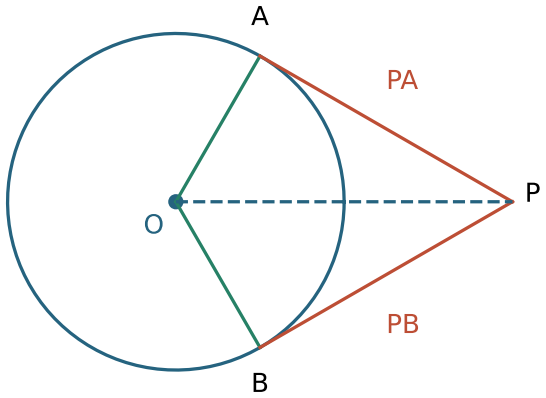
Exercise walk-through

4.2.1 Circle Parts

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Figure: Congruence, similarity and circles (4)

Shared OP and equal radii → RHS → PA = PB



- Equal radii, shared OP and right angles give congruent triangles (RHS), so PA = PB
- Match each part of the diagram to the text.

Perimeter, area and volume

- Triangle: $\frac{1}{2} \times b \times h$, where h is the **perpendicular height** .
- Parallelogram: $b \times h$.
- Trapezium: $\frac{1}{2}(a+b)h$, where a and b are the parallel sides.
- Circle: $A = \pi r^2$, and the **circumference** is $C = 2\pi r = \pi d$.

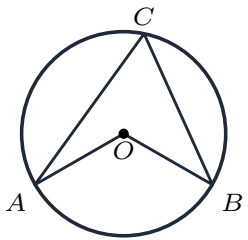
$$\text{arc length} = \frac{\theta}{360} \times 2\pi r \qquad \text{sector area} = \frac{\theta}{360} \times \pi r^2$$

Vectors and coordinate geometry (2)

- Add and subtract vectors by adding and subtracting their parts: with $\mathbf{a} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$, $\mathbf{a} + \mathbf{b} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}$ and $2\mathbf{a} - \mathbf{b} = \begin{pmatrix} 7 \\ -1 \end{pmatrix}$.
- **Vector proofs (H).** If one vector is a number times another, the lines are parallel.

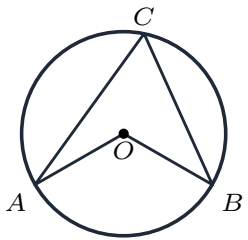
Exercise 2.1

2.1 A circle has diameter 18 cm. Write down its radius. [1]



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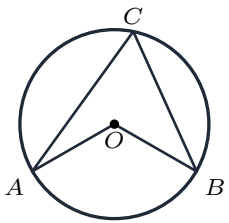


2.1

- $r = 18 \div 2 = \mathbf{9}$ cm

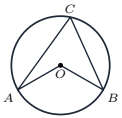
Setup for exercise 2.2

2.2 Name the region bounded by a chord and an arc. [1]

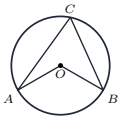


Exercise 2.2

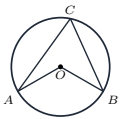
2.3 Name the straight line that touches a circle at exactly one point. [1]



2.4 A circle has radius 10 cm. A chord is 6 cm from the centre. Work out the length of the chord. [3]

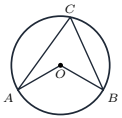


2.5 A tangent touches a circle of radius 5 cm at T. P is on the tangent with $PT = 12$ cm. Work out the distance from P to the centre O. [2]

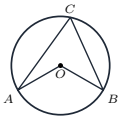


Exercise 2.2

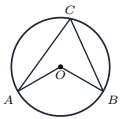
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2.2

- **segment**

2.3

Full solution on next slide

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Full solution 2.2

2.2

- **segment**

2.3

- **tangent**

2.4

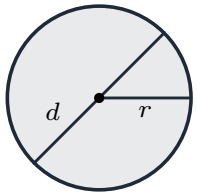
- the perpendicular bisects the chord: right-angled triangle with hypotenuse 10 and side 6
- half-chord $= \sqrt{10^2 - 6^2} = \sqrt{64} = 8$ cm
- chord $=$ **16** cm

2.5

- angle $OTP = 90°$: $OP^2 = OT^2 + PT^2 = 5^2 + 12^2 = 169$
- $OP =$ **13** cm

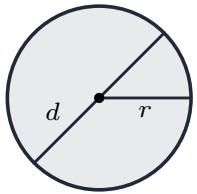
Exercise 3.1

3.1 Kai says a diameter is not a chord. Is he correct? Give a reason. [1]



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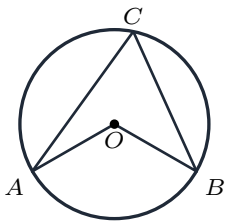


3.1

- **No**: a chord joins two points on the circle, and a diameter does, passing through the centre

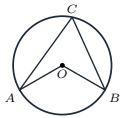
Setup for exercise 3.2

3.2 A chord of length 24 cm is 5 cm from the centre of a circle. Work out the radius. [3]

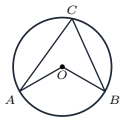


Exercise 3.2

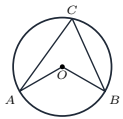
3.3 A circle has radius 13 cm. How far from the centre is a chord of length 10 cm? [3]



3.4 P is 17 cm from the centre O of a circle of radius 8 cm. A tangent from P touches the circle at T. Work out the length PT. [2]

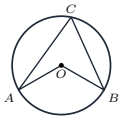


3.5 Explain why triangle OAB is isosceles, where A and B are points on a circle with centre O. If angle $AOB = 50°$, find angle OAB. [2]

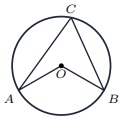


Exercise 3.2

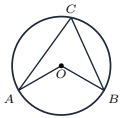
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3.2

- half-chord $= 12$ cm
- $r^2 = 12^2 + 5^2 = 169$
- $r = \mathbf{13}$ cm

Full solution on next slide

Full solution 3.2

3.2

- half-chord $= 12$ cm
- $r^2 = 12^2 + 5^2 = 169$
- $r =$ **13** cm

3.3

- half-chord $= 5$ cm
- distance$^2 = 13^2 - 5^2 = 144$
- distance $=$ **12** cm

3.4

- angle $OTP = 90°$: $PT^2 = OP^2 - OT^2 = 17^2 - 8^2 = 225$
- $PT =$ **15** cm

3.5

- OA and OB are both radii, so they are equal
- base angles: $(180° - 50°) \div 2 =$ **65**°