**Tools**

- Triangle Area: \( A = \frac{1}{2}ab\sin\theta \)
- Sector Area: \( A = \frac{1}{2}r^2\theta \)
- Arc Length: \( L = r\theta \)
- Cosine Rule: \( a^2 = b^2 + c^2 - 2bc\cos A \)
- Sine Rule: \( \frac{\sin A}{a} = \frac{\sin B}{b} \)

**Radial Words**

- 3 and a bit radians = 180°
- 1° = 57.3°

\[ \text{Degrees} \times \frac{\pi}{180} = \text{Rads} \]

**Circle Words**

- 1 chord makes 2 segments
- 2 radii make 2 sectors

**Geometry**

**Triangles & Sectors**

The point D lies on CB such that AD is an arc of a circle with centre A, radius 8cm.

The area of the triangle ABC is 20cm².

Find the area & perimeter of the shaded region.
A model of the path of two asteroids following a collision is given in terms of vectors.
The velocity of asteroid \( R \) is given by \( \mathbf{r} = 5\mathbf{i} + 3\mathbf{j} - z \mathbf{k} \text{ m/s} \)
The velocity of asteroid \( S \) is given by \( \mathbf{r} = -2\mathbf{i} - 2\mathbf{j} + 7z \mathbf{k} \text{ m/s} \)

(a) Calculate the exact speed of each asteroid
(b) After 5 seconds, how much further (to the nearest metre) has \( S \) travelled than \( R \)?
(c) Calculate the angle between the asteroids' paths to the nearest degree
(d) Comment on the suitability of the model.