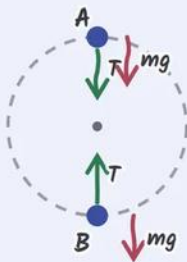




chords and arcs, the perpendicular from the centre, and the circle through three points

The parts of a circle

- a **circle** is the set of all points at a fixed distance, the **radius**, from a fixed point, the **centre**
- a **chord** joins any two points of the circle, and the longest chord is the **diameter**, which passes through the centre
- an **arc** is a piece of the circle itself, the **minor arc** being the shorter of the two a chord cuts off and the **major arc** the longer
- a **segment** is the region between a chord and its arc, while a **sector** is the region between two radii and their arc
- so a segment is cut off by a **chord** and a sector by **two radii**, which is the distinction most often confused
- concentric circles** share a centre but have different radii



a circle with a chord drawn across it and two radii drawn to the chord's ends: the region between the chord and the arc is the segment, while the region enclosed by the two radii and the arc is the sector

The chord theorems *

- the **perpendicular** drawn from the centre to a chord **bisects the chord**, and this is the workhorse of the chapter
- the **converse** is also true: the line from the centre to the **midpoint of a chord** is **perpendicular** to it
- equal chords** are **equidistant** from the centre, and chords equidistant from the centre are equal
- so the **longer the chord, the closer it lies to the centre**, and the diameter passes through the centre itself
- equal chords **subtend equal angles at the centre**, and the converse holds
- equal chords also cut off **equal arcs**, and equal arcs subtend equal angles at the centre



chords drawn at different distances from one common centre: the nearer a chord lies to the centre the longer it is, and two chords the same distance out are bound to be the same length. The diameter is the limiting case, passing through the centre itself

one congruence does it

Why the perpendicular bisects the chord

let AB be a chord of a circle with centre O, and let OM be perpendicular to AB

join OA and OB, which are both radii

compare $\triangle OMA$ and $\triangle OMB$

OA = OB, both being radii of the same circle

$\angle OMA = \angle OMB = 90^\circ$, since OM is perpendicular to AB, and OM = OM is common

so by the **RHS test** the two triangles are congruent, and therefore **AM = MB** by corresponding parts

