Unit 16 · Circle

STUDY NOTES

Key terms

Circle: the path of a point that stays the **same distance** from a fixed point.

Center: that fixed point, the same distance from every point of the circle; usually *O*.

Radius: center to a point on the circle; every radius the same length; plural **radii**.

Circumference: the closed curve all the way round; also its length.

Chord: a segment joining any two points of the circumference.

Diameter: a chord through the center.

Arc: a part of the circumference: arc AB.

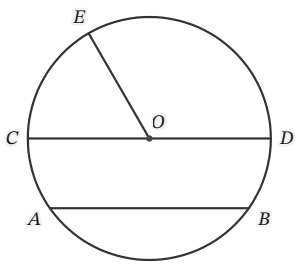
Sector: the part between two radii, like a slice of pizza.

Semicircle: half a circle, cut off by a diameter ("semi" = half).

Drawing with a compass

- parts
  - **needle** (stays still)
  - **pencil**
  - the two legs joined at the top
- needle on the center; legs opened to the radius (needle on the ruler's 0, pencil on the 2 cm mark → radius 2 cm)
- turn by the **handle**, legs neither opening nor closing → every point the same distance from O
- legs slip → the ends of the curve don't meet

The parts on one circle



O center; *OC*, *OD*, *OE* radii; *CD* a diameter; *AB* a chord; arc CE, arc ED, arc AB; *CD* cuts off two semicircles; between *OC* and *OE* a sector.

Diameter and radius

- diameter = 2 × radius; radius = diameter ÷ 2
- radius 5 cm → diameter 10 cm; diameter 14 cm → radius 7 cm
- the diameter is the **longest chord**: radius 3 cm → no chord longer than 6 cm
- every diameter is a chord; most chords are not diameters
- one center; **as many diameters as you like**, each in its own direction
- each diameter cuts the circle into **two semicircles**

Finding the center of a plate

1. draw round the plate; cut out the circle
2. fold it exactly in half: the crease is a diameter
3. fold again another way: a second diameter
4. the creases cross **at the center**; edge to edge along a crease = the diameter

Why wheels are round

- axle at the center; every point of the rim one radius away → the axle stays at one height
- square wheel, side 40 cm: axle 20 cm up on a side, about 28 cm up on a corner → bump, bump
- square of side 4 cm: middle to a side 2 cm, to a corner about 2.8 cm; circle of radius 2 cm: 2 cm every way
- round manhole cover: the same width (its diameter) every way → can't fall through its hole

COMMON MISTAKES

✗ a chord joining two points of the circle called a radius
✓ a radius starts at the **center**.

✗ a circle has only one diameter
✓ one through the center in every direction.

✗ diameter 14 cm → radius 28 cm
✓ radius is half: 7 cm.

✗ a chord 12 cm long in a circle of radius 5 cm
✓ the longest chord is the diameter, 10 cm.