

# Introduction to Euclid's Geometry: Axioms and Postulates

CBSE Class 9 Maths · Knowledge organiser

## KEY DEFINITIONS

### Axiom

A basic fact accepted without proof and used throughout mathematics.

### Postulate

A basic assumption accepted without proof that is about geometry.

### Theorem

A statement proved from axioms, postulates and earlier results.

## KEY FORMULAS

Axioms: things equal to the same thing are equal; equals added to (or taken from) equals give equals; the whole is greater than the part

Postulates: a line through any two points; extend a segment; a circle with any centre and radius; all right angles equal

Postulate 5: interior angles on one side  $< 180^\circ \Rightarrow$  lines meet on that side. Playfair: one parallel through a point not on a line

Measurement:  $C$  between  $A, B \Rightarrow AC + CB = AB$ ; a segment has exactly one mid-point

## YOU SHOULD BE ABLE TO...

- Tell definitions, axioms, postulates and theorems apart and state Euclid's axioms and postulates in your own words.
- Use the axioms to find lengths on a line and justify short steps, and apply the diagonal rule.
- Justify a construction from the postulates and use Postulate 5 to decide where two lines meet.
- Write a full argument from the axioms and prove that a mid-point is unique.

## WORKED EXAMPLE

$A, B, C, D$  lie on a line in that order, with  $AB = CD$ . Show that  $AC = BD$ .

$AC = AB + BC$  and  $BD = BC + CD$  (measurement).  
Since  $AB = CD$ , adding  $BC$  to both gives  
 $AB + BC = CD + BC$  (Axiom 2), so  $AC = BD$ .

## COMMON MISTAKES

- ✗ Mixing up axioms (for all of mathematics) and postulates (for geometry).
- ✗ Quoting the axiom number without saying what it states: write the axiom in words.
- ✗ Assuming a fact from the figure ("it looks equal") instead of giving a reason.
- ✗ Reading Postulate 5 the wrong way round: the lines meet on the side where the two interior angles add to less than  $180^\circ$ .