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2D Perimeter and Area

IGCSE Mathematics

The Panda Math Tutor

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Quality Mathematics Education for Students

Contents

1 Introduction 2

2 Key Definitions 2

3 Units of Measurement and Conversions 3

4 Rectangle 4

5 Triangle 6

6 Parallelogram 7

7 Trapezium (Trapezoid) 8

8 Circle 10

9 Sectors and Arcs of Circles 12

10 Composite Shapes 15

11 Shaded Region Problems 17

12 Formula Reference Summary 19

13 Harder and Multi-Step Problems 19

14 Summary and Exam Tips 21

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1 Introduction

Note

Perimeter and area are two of the most fundamental and frequently tested topics at IGCSE level. They appear not only in pure geometry questions, but also in real-world contexts such as fencing a garden, tiling a floor, or painting a wall.
In this chapter, we will explore:

- The difference between perimeter and area
- Units of measurement and unit conversions
- Perimeter and area of rectangles, triangles, parallelograms, and trapezoids
- Circumference and area of circles
- Sectors and arcs of circles
- Composite shapes (combining multiple shapes)
- Shaded region problems
- Real-world applications

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2 Key Definitions

Definition

The **perimeter** of a 2D shape is the **total length of its boundary** — the distance you would travel if you walked all the way around the outside edge of the shape.
Perimeter is measured in **units of length**: mm, cm, m, km, etc.

Definition

The **area** of a 2D shape is the **amount of space it covers** (or encloses) in a flat plane.
Area is measured in **square units**: mm^2, cm^2, m^2, km^2, etc.

Note

A helpful way to remember the difference:

- **Perimeter** = the fence around a garden (it goes around the edge)
- **Area** = the grass inside the garden (it covers the surface)

These are entirely different quantities and must **never be confused**. Always check which one the question is asking for.

3 Units of Measurement and Conversions

Unit Conversions for Length

$$1 \text{ cm} = 10 \text{ mm}$$
$$1 \text{ m} = 100 \text{ cm} = 1000 \text{ mm}$$
$$1 \text{ km} = 1000 \text{ m}$$

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Unit Conversions for Area

Since area involves **two** dimensions, conversions are squared:

$$1 \text{ cm}^2 = 100 \text{ mm}^2 \quad \text{(because } 10 \times 10 = 100\text{)}$$
$$1 \text{ m}^2 = 10{,}000 \text{ cm}^2 \quad \text{(because } 100 \times 100 = 10{,}000\text{)}$$
$$1 \text{ km}^2 = 1{,}000{,}000 \text{ m}^2 \quad \text{(because } 1000 \times 1000 = 1{,}000{,}000\text{)}$$

Warning

Common Mistake: Forgetting that area conversions are squared!
Many students write $1 \text{ m}^2 = 100 \text{ cm}^2$ because $1 \text{ m} = 100 \text{ cm}$. This is **wrong**.
Correct: $1 \text{ m}^2 = 10{,}000 \text{ cm}^2$
A square that is $1\,\text{m} \times 1\,\text{m}$ is the same as $100\,\text{cm} \times 100\,\text{cm} = 10{,}000\,\text{cm}^2$.

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