Geometry & Measurement Made Easy

Area, Perimeter, Volume and Angle Tricks for PSLE

Your Complete Guide to PSLE Mathematics Excellence

Master every formula, technique, and problem-solving strategy

Table of Contents

- Quadrilateral Properties

- Common Mistakes to Avoid
- Examination Tips

Chapter 1: Foundation Concepts

Building Strong Mathematical Foundations

Understanding Basic Shapes

2D Shapes

4 equal sides, 4 right angles

Opposite sides equal, 4 right angles

Triangle: 3 sides, angles sum to 180°

Perfect round shape, constant radius

3D Shapes

Cube
6 square faces, all edges equal

Cuboid
6 rectangular faces, opposite faces equal

Cylinder
2 circular faces, curved surface

Essential Units and Measurements

Length	Area	Volume

- mm (millimetre)
- cm (centimetre)
- m (metre)
- km (kilometre)

- cm^2 (square centimetre)
- m^2 (square metre)
- km^2 (square kilometre)

- cm^3 (cubic centimetre)
- m^3 (cubic metre)
- ℓ (litre) = 1000 cm^3
- ml (millilitre) = 1 cm^3

Essential Formula Quick Reference

Area Formulas

Rectangle: `length × width`

Square: `side × side`

Triangle: `½ × base × height`

Circle: `π × radius²`

Volume Formulas

Cube: `side³`

Cuboid: `length × width × height`

Cylinder: `π × radius² × height`

Chapter 2: Area Mastery

Complete Guide to Area Calculations

Rectangles and Squares

Rectangle and Square Area Formulas

Worked Example: Rectangle Area

Question: Find the area of a rectangle with length 12 cm and width 8 cm.

Step 1: Identify the formula: Area = length × width

Step 2: Substitute the values: Area = 12 cm × 8 cm

Step 3: Calculate: Area = 96 cm²

Answer: 96 cm²

Triangle Area

Triangle Area Formula

$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$$

Key Points:

- Base can be any side of the triangle
- Height is perpendicular to the base
- Height forms a right angle with the base
- Units: if base and height in cm, area in cm²

Common Mistakes:

- Forgetting the ½ in the formula
- Using slant height instead of perpendicular height
- Mixing up base and height measurements
- Wrong units in the final answer

Worked Example: Triangle Area

Question: A triangle has a base of 10 cm and height of 6 cm. Find its area.

Step 1: Write the formula: Area = ½ × base × height

Step 2: Substitute: Area = ½ × 10 cm × 6 cm

Step 3: Calculate: Area = ½ × 60 cm² = 30 cm²

Answer: 30 cm²

Circle Area and Circumference

Circle Formulas

Area of Circle

$$\text{Area} = \pi \times \text{radius}^2$$

$\pi \approx 3.14$ or $22/7$

Circumference

$$C = 2 \times \pi \times \text{radius}$$

or $C = \pi \times \text{diameter}$

Important Relationships:

- Diameter = 2 × radius
- Radius = diameter ÷ 2
- Semicircle area = ½ × π × radius²
- Quarter circle area = ¼ × π × radius²

Worked Example: Circle Area

Question: Find the area of a circle with radius 7 cm. (Take π = 22/7)

Step 1: Write the formula: Area = π × radius²

Step 2: Substitute: Area = 22/7 × 7² = 22/7 × 49

Step 3: Simplify: Area = 22 × 7 = 154 cm²

Answer: 154 cm²

Composite Figures

Composite Figure Strategies

Addition Method

- Break the figure into simple shapes
- Calculate area of each shape
- Add all areas together

Subtraction Method

- Find area of larger shape
- Find area of cut-out portions
- Subtract cut-out from larger area

- Check units are consistent
- Useful for shapes with holes

Worked Example: Composite Figure

Question: Find the area of a shape made by joining a rectangle (8cm × 5cm) and a triangle (base 8cm, height 3cm).

Step 1: Calculate rectangle area: 8 × 5 = 40 cm²

Step 2: Calculate triangle area: ½ × 8 × 3 = 12 cm²

Step 3: Add both areas: 40 + 12 = 52 cm²

Answer: 52 cm²

Chapter 3: Perimeter Excellence

Master All Perimeter Calculations

Basic Perimeter Concepts

Perimeter Formulas for Basic Shapes

Rectangles and Squares

```
Rectangle: 2 × (length + width)
```

```
Square: 4 × side
```

Add all four sides

Triangles

```
Triangle: side₁ + side₂ + side₃
```

Sum of all three sides

Perimeter vs Area - Key Differences

Perimeter

- Distance around the outside
- Measured in length units (cm, m)
- Like putting a fence around a field
- Add all the sides

Area

- Space inside the shape
- Measured in square units (cm^2, m^2)
- Like painting the surface
- Use specific formulas

Circle Circumference

Circle Circumference Formulas

Using Radius

$$C = 2 \times \pi \times radius$$

When radius is given

Using Diameter

$$C = \pi \times diameter$$

When diameter is given

Partial Circles:

- Semicircle perimeter = π × radius + diameter
- Quarter circle perimeter = ½ × π × radius + 2 × radius

Worked Example: Semicircle Perimeter

Question: Find the perimeter of a semicircle with radius 14 cm. (Take π = 22/7)

Step 1: Semicircle perimeter = curved part + straight part

Step 2: Curved part = ½ × 2 × π × radius = π × radius = 22/7 × 14 = 44 cm

Step 3: Straight part = diameter = 2 × 14 = 28 cm

Step 4: Total perimeter = 44 + 28 = 72 cm

Answer: 72 cm

Complex Shape Perimeters

Strategies for Complex Shapes

Step 1: Trace

Trace around the outside edge of the shape with your finger

Step 2: Identify

Identify each side or curve that forms the perimeter

Step 3: Calculate

Calculate the length of each part and add them up

Chapter 4: Volume Techniques

Master 3D Measurements and Calculations

Understanding Volume

Volume: What It Measures

Definition

Volume measures the amount of space inside a 3D object. Think of it as "How much can it hold?"

Examples:

- Water in a swimming pool
- Air inside a balloon
- Books that fit in a box

Units

cm^3 (cubic centimetre)

m^3 (cubic metre)

ℓ (litre) = 1000 cm^3

ml (millilitre) = 1 cm^3

Cube and Cuboid Volume

Volume Formulas

Cube

$$\text{Volume} = \text{side}^3$$

$$\text{Volume} = \text{side} \times \text{side} \times \text{side}$$

All edges are equal

Cuboid

$$\text{Volume} = l \times w \times h$$

length × width × height

Different edge lengths

Worked Example: Cube Volume

Question: Find the volume of a cube with edge length 5 cm.

Step 1: Identify: It's a cube, so all edges are equal

Step 2: Formula: Volume = side^3

Step 3: Substitute: Volume = 5^3 = 5 × 5 × 5

Step 4: Calculate: Volume = 125 cm^3

Answer: 125 cm^3

Worked Example: Cuboid Volume

Question: A rectangular tank has length 8 m, width 5 m, and height 3 m. Find its volume.

Step 1: Identify measurements: l = 8 m, w = 5 m, h = 3 m

Step 2: Formula: Volume = length × width × height

Step 3: Substitute: Volume = 8 × 5 × 3

Step 4: Calculate: Volume = 120 m^3

Answer: 120 m^3

Liquid Volume Problems

Liquid Volume Relationships

Key Conversions

- 1 litre (ℓ) = 1000 cm^3
- 1 millilitre (ml) = 1 cm^3
- 1000 ml = 1 ℓ
- 1 m^3 = 1,000,000 cm^3 = 1000 ℓ

Problem Types

- Water in rectangular tanks
- Finding water level height
- Overflow problems
- Capacity calculations

Worked Example: Water Tank Problem

Question: A rectangular tank 60 cm long and 40 cm wide contains 72 litres of water. Find the height of water.

Step 1: Convert volume: 72 ℓ = 72,000 cm^3

Step 2: Use volume formula: Volume = length × width × height

Step 3: Substitute: 72,000 = 60 × 40 × height

Step 4: Solve: height = 72,000 ÷ (60 × 40) = 72,000 ÷ 2,400 = 30 cm

Answer: 30 cm

Finding Unknown Dimensions

Strategies for Finding Unknown Dimensions

Given Volume + 2 Dimensions

Use: Unknown = Volume ÷ ($known_1$ × $known_2$)

Cube Problems

If Volume = 64 cm^3, then side = $\sqrt[3]{64}$ = 4 cm

Check Your Answer

Always multiply back to verify the volume

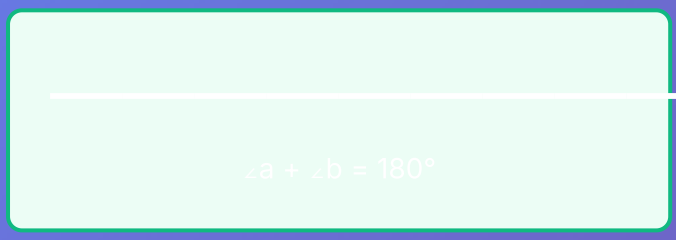
Chapter 5: Angle Properties

Master All Angle Rules and Calculations

Basic Angle Properties

Fundamental Angle Rules

Angles on a Straight Line



Angles on a straight line add up to 180°

Angles at a Point

Angles around a point add up to 360°

Vertically Opposite Angles

When two lines cross, opposite angles are equal

Right Angles

A right angle is exactly 90°

Worked Example: Angles on a Straight Line

Question: Two angles on a straight line are 65° and x°. Find x.

Step 1: Use the rule: Angles on a straight line = 180°

Step 2: Set up equation: 65° + x° = 180°

Step 3: Solve: x° = 180° - 65° = 115°

Answer: x = 115°

Triangle Angle Properties

Triangle Angle Rules

$$\angle A + \angle B + \angle C = 180^\circ$$

The sum of angles in any triangle is always 180°

Equilateral Triangle

All angles = 60°
All sides equal

Isosceles Triangle

Two angles equal
Two sides equal

Right-angled Triangle

One angle = 90°
Other two add to 90°

Worked Example: Triangle Angles

Question: In a triangle, two angles are 45° and 70°. Find the third angle.

Step 1: Use the rule: Sum of triangle angles = 180°

Step 2: Set up equation: 45° + 70° + third angle = 180°

Step 3: Solve: third angle = 180° - 45° - 70° = 65°

Answer: 65°

Quadrilateral Angle Properties

Special Quadrilaterals

General Rule

$$\text{Sum of angles} = 360^\circ$$

This applies to ALL quadrilaterals

Rectangle/Square

$$\text{All angles} = 90^\circ$$

Four right angles

Parallelogram

Rhombus

- Opposite angles are equal
- Adjacent angles add to 180°
- Opposite sides are parallel

- Opposite angles are equal
- All sides are equal
- Adjacent angles add to 180°

Trapezium

- One pair of parallel sides
- Co-interior angles on same side add to 180°
- Sum of all angles = 360°

Worked Example: Parallelogram Angles

Question: In a parallelogram, one angle is 110°. Find all other angles.

Step 1: In a parallelogram, opposite angles are equal

Step 2: So another angle is also 110°

Step 3: Adjacent angles add to 180°: 180° - 110° = 70°

Step 4: The other two angles are both 70°

Answer: 110°, 70°, 110°, 70°

Chapter 6: PSLE Success Strategies

Examination Techniques and Problem-Solving Methods

Problem-Solving Framework

The PSLE Problem-Solving Process

Step 1: Understand

- Read the question carefully

Step 2: Plan

- Choose the right formula

- Identify what is given
- Identify what to find
- Draw a diagram if helpful

Step 3: Solve

- Show all working clearly
- Use correct formulas
- Calculate carefully
- Include units in answer

- Decide on the method
- Break into smaller steps
- Check units match

Step 4: Check

- Does the answer make sense?
- Are the units correct?
- Check your arithmetic
- Re-read the question

Common Mistakes to Avoid

⚠ Top 10 Mistakes in Geometry & Measurement

Formula Mistakes

- Forgetting ½ in triangle area formula
- Using diameter instead of radius (or vice versa)
- Confusing perimeter and area formulas
- Wrong formula for composite shapes
- Mixing up volume and area formulas

Calculation Mistakes

- Wrong units in final answer
- Arithmetic errors in multiplication
- Not converting units properly
- Forgetting to add/subtract in composite figures
- Rounding too early in calculations

Quick Reference Formulas

Formula Cheat Sheet

Area Formulas

Rectangle: `l × w`
Square: `s²`
Triangle: `½ × b × h`
Circle: `πr²`
Parallelogram: `b × h`

Perimeter Formulas

Rectangle: `2(l + w)`
Square: `4s`
Triangle: `a + b + c`
Circle: `2πr`

Volume & Angles

Cube: `s³`
Cuboid: `l × w × h`
Triangle angles: `180°`
Quadrilateral: `360°`
Straight line: `180°`

Examination Tips

Time Management Strategies

For 2-mark questions:

- Spend 2-3 minutes maximum
- Usually single-step calculations
- Show key working steps
- Double-check units

For 4-5 mark questions:

- Allow 6-8 minutes
- Multi-step problems
- Draw diagrams when helpful
- Show all working clearly

PSLE-Style Challenge Problem

Question (5 marks): A rectangular swimming pool is 25 m long and 12 m wide. A circular fountain with radius 3 m is built in the centre. Find the area available for swimming. (Take $\pi = 3.14$)

Step 1: Find pool area: $25 \times 12 = 300$ m²

Step 2: Find fountain area: $\pi \times 3^2 = 3.14 \times 9 = 28.26$ m²

Step 3: Swimming area = Pool area - Fountain area

Step 4: Swimming area = 300 - 28.26 = 271.74 m²

Answer: 271.74 m²

Final Success Tips

During Practice

- Practice with actual PSLE papers
- Time yourself regularly
- Learn from your mistakes
- Master the basic formulas first
- Draw diagrams for complex problems

During the Exam

- Read questions twice before solving
- Show all working clearly
- Check units in every answer
- Don't panic if stuck - move on
- Use remaining time to check answers

Congratulations!

You've now mastered all the essential geometry and measurement concepts for PSLE success!

Formulas Mastered
Area, Perimeter, Volume

Angles Conquered
All angle properties

Complex Shapes
Composite figures solved

PSLE Ready
Exam strategies learned

Remember the Keys to Success:

- ✓ Practice regularly with timed conditions
- ✓ Always show your working clearly
- ✓ Double-check your units and calculations
- ✓ Draw diagrams for complex problems
- ✓ Stay calm and work systematically

Best of luck with your PSLE!

You're well-prepared for excellence!