

GEOMETRY

Mental Maths • Puzzles • Problem Solving • Real-Life Applications

What's inside	Core skills
12 printable pages packed with quick-fire mental maths, puzzles, reasoning and practical geometry.	Angles • shapes • symmetry • perimeter • area • circles • volume • coordinates • transformations

Suggested age: 11–14 years • Grades 6–8 • KS3

International alignment: supports common lower-secondary geometry expectations, including Common Core 6.G, 7.G and 8.G strands.

Name: _____ Date: _____

Learning Targets

I can identify and classify shapes, reason about angles, calculate perimeter and area, use circle measures, work with volume and coordinates, and explain geometric reasoning.

Mental Maths Warm-Up

1. What is the angle in a straight line?

2. How many degrees are in a full turn?

3. How many sides does a hexagon have?

4. How many vertices does a cube have?

5. What is 7×8 ?

6. What is half of 36?

7. What is 10% of 80?

8. What is 25% of 60?

9. What is the perimeter of a square with side 5 cm?

10. What is the area of a rectangle 6 cm by 4 cm?

Quick Recall

1. Name a quadrilateral with exactly one pair of parallel sides.

2. How many equal sides does an equilateral triangle have?

3. How many right angles does a rectangle have?

4. Name a quadrilateral with four equal sides and four right angles.

5. How many diagonals does a quadrilateral have?

6. Is every square a rectangle? Explain briefly.

7. Is every rectangle a square? Explain briefly.

Shape Detective

Mystery shape: I have 4 sides, opposite sides are parallel and equal, but I do not have to have right angles. What am I?

Create your own mystery shape clue for a partner.

Remember: angles on a straight line total 180° ; angles around a point total 360° ; angles in a triangle total 180° .

1. One angle on a straight line is 65° . Find the other.

2. Two angles in a triangle are 50° and 60° . Find the third.

3. Angles around a point are 90° , 120° and x° . Find x .

4. A right angle is split into 35° and x° . Find x .

5. An isosceles triangle has two equal angles of 70° . Find the third.

6. A quadrilateral has angles 90° , 80° , 100° and x° . Find x .

7. An angle is 20° more than 50° . Find it.

8. An angle is twice 40° . Find it.

Speed Round: Estimate each answer before calculating. Which answer is closest to 90° : 86° , 102° , 72° or 118° ?

Mental Maths First

1. A square has side 9 cm. Find its perimeter mentally.

2. A rectangle is 8 cm by 5 cm. Find its perimeter.

3. A triangle has sides 7 cm, 9 cm and 11 cm. Find its perimeter.

4. A regular pentagon has side 6 cm. Find its perimeter.

5. A rectangle has perimeter 30 cm and length 9 cm. Find its width.

6. A square has perimeter 48 cm. Find its side.

Perimeter Detective

A garden has perimeter 50 m. One side is 15 m and the opposite side is also 15 m. The other two sides are equal. Find each of them.

Challenge: Can two different rectangles have the same perimeter but different areas? Give an example.

Use mental strategies where possible.

1. Area of a rectangle 7 cm $\times$ 6 cm.

2. Area of a square with side 8 cm.

3. Area of a triangle with base 10 cm and height 6 cm.

4. Area of a parallelogram with base 12 cm and height 5 cm.

5. A rectangle has area 48 cm² and width 6 cm. Find its length.

6. A square has area 121 cm². Find its side.

7. A 10 m $\times$ 8 m room has a 2 m $\times$ 3 m cupboard area that is not covered. Find the remaining floor area.

Area Puzzle

Which has the greater area: a 12 cm $\times$ 5 cm rectangle or a square with side 8 cm? By how much?

Use $\pi \approx 3.14$ unless another value is given.

1. A circle has radius 5 cm. Find its diameter.

2. A circle has diameter 18 cm. Find its radius.

3. Find the circumference of a circle with diameter 10 cm. Give an approximate answer.

4. Find the circumference of a circle with radius 7 cm. Give an approximate answer.

5. Find the area of a circle with radius 4 cm. Give an approximate answer.

6. A wheel has diameter 60 cm. What is its circumference approximately?

7. Which is larger: the area of a circle with radius 3 cm or a square with side 5 cm?

Circle Challenge

Without calculating exactly, estimate the circumference of a 20 cm diameter circle. Which is closest: 40 cm, 60 cm, 80 cm or 100 cm?

1. A cuboid is $5\text{ cm} \times 4\text{ cm} \times 3\text{ cm}$. Find its volume.

2. A cube has side 4 cm . Find its volume.

3. A box has volume 120 cm^3 , length 10 cm and width 4 cm . Find its height.

4. A cube has side 5 cm . How many square centimetres are on one face?

5. How many faces does a triangular prism have?

6. How many edges does a cube have?

7. How many vertices does a rectangular prism have?

Real-Life Challenge

A storage box measures $40\text{ cm} \times 30\text{ cm} \times 20\text{ cm}$. What is its volume in cm^3 ? How many 1 cm^3 cubes could fit if packed perfectly?

Coordinates are written (x, y): move across first, then up or down.

1. Which quadrant contains $(-3, 4)$?

2. What is the x-coordinate of $(7, -2)$?

3. What is the y-coordinate of $(5, 9)$?

4. Reflect $(4, 3)$ across the y-axis. Give the new coordinates.

5. Reflect $(-2, 5)$ across the x-axis. Give the new coordinates.

6. Translate $(3, 2)$ 4 units right. Give the new coordinates.

7. Translate $(-1, 6)$ 3 units down. Give the new coordinates.

Coordinate Code

Start at $(2, 3)$. Move 3 right, 2 down, 4 left, then 5 up. What coordinate do you finish at?

Solve the clues. Show enough working to explain your thinking.

1. The sum of the angles in my shape is 540° . How many sides does the shape have if it is a polygon?

2. I have 4 equal sides but no right angles. What shape could I be?

3. My perimeter is 36 cm. I am a square. What is my area?

4. My area is 64 cm^2 and I am a square. What is my perimeter?

5. I have 6 faces, 12 edges and 8 vertices. What 3D shape am I?

6. Two angles in a triangle are 45° and 85° . What is the third?

7. A rectangle has area 72 cm^2 . Give two possible whole-number side lengths.

Part A • Find the Mistake

1. A student says a triangle can have angles 90° , 60° and 40° . Explain the error.

Explanation:

Correct result:

2. A student calculates the area of a $9\text{ cm} \times 4\text{ cm}$ rectangle as 26 cm^2 . Correct it.

Explanation:

Correct result:

3. A student says the circumference of a circle with diameter 10 cm is 20 cm because $C = 2d$. Explain.

Explanation:

Correct result:

4. A student says a square with perimeter 20 cm has side 10 cm . Correct the reasoning.

Explanation:

Correct result:

Part B • Mental Maths Exit Ticket

1. $180^\circ - 75^\circ = ?$

2. $360^\circ - 125^\circ = ?$

3. $12 \times 5 = ?$

4. Half of $98 = ?$

5. Area of a 5×5 square = ?

6. Perimeter of a 6×4 rectangle = ?

7. $\sqrt{81} = ?$

8. A cube has how many edges?

Page 2

1. 180° • 2. 360° • 3. 6 • 4. 8 • 5. 56 • 6. 18 • 7. 8 • 8. 15 • 9. 20 cm • 10. 24 cm^2 .

Page 3

1. Trapezium/trapezoid • 2. 3 • 3. 4 • 4. Square • 5. 2 • 6. Yes • 7. No. Mystery: parallelogram. Student-created clue: answers vary.

Page 4

1. 115° • 2. 70° • 3. 150° • 4. 55° • 5. 40° • 6. 90° • 7. 70° • 8. 80° . Closest to 90° : 86° .

Page 5

1. 36 cm • 2. 26 cm • 3. 27 cm • 4. 30 cm • 5. 6 cm • 6. 12 cm. Garden: 10 m each. Challenge: yes; e.g. 2×8 and 4×6 both have perimeter 20, but areas 16 and 24.

Page 6

1. 42 cm^2 • 2. 64 cm^2 • 3. 30 cm^2 • 4. 60 cm^2 • 5. 8 cm • 6. 11 cm • 7. 74 m^2 . Puzzle: $12 \times 5 = 60$, $8 \times 8 = 64$, so square is greater by 4 cm^2 .

Page 7

1. 10 cm • 2. 9 cm • 3. $\approx 31.4 \text{ cm}$ • 4. $\approx 43.96 \text{ cm}$ • 5. $\approx 50.24 \text{ cm}^2$ • 6. $\approx 188.4 \text{ cm}$ • 7. Square: 25 cm^2 ; circle $\approx 28.26 \text{ cm}^2$, so circle. Challenge: 60 cm is closest.

Page 8

1. 60 cm^3 • 2. 64 cm^3 • 3. 3 cm • 4. 25 cm^2 • 5. 5 faces • 6. 12 edges • 7. 8 vertices. Challenge: $24,000 \text{ cm}^3$ and 24,000 unit cubes.

Page 9

1. Quadrant II • 2. 7 • 3. 9 • 4. $(-4, 3)$ • 5. $(-2, -5)$ • 6. $(7, 2)$ • 7. $(-1, 3)$. Coordinate code: (1,6).

Page 10

1. 7 sides • 2. Rhombus • 3. 81 cm^2 • 4. 32 cm • 5. Cube/rectangular prism (specifically cube if all edges equal; clues alone identify a cuboid family) • 6. 50° • 7. e.g. 8×9 or 6×12 .

Page 11

1. Triangle angles total 180° ; $90 + 60 + 40 = 190^\circ$, so impossible. 2. 36 cm^2 . 3. Circumference is πd , so $\approx 31.4 \text{ cm}$. 4. Side = $20 \div 4 = 5 \text{ cm}$. Exit: 105° , 235° , 60, 49, 25 cm^2 , 20 cm, 9, 12.

Teacher note

Use the mental-maths questions as warm-ups, retrieval practice, exit tickets or quick partner games. Encourage estimation before calculation and require students to explain their reasoning in puzzle activities.