

WA8MMGTW4

Two-dimensional space and structures

Core + Challenge

Properties of Quadrilaterals

I can classify quadrilaterals by their sides, angles, diagonals and symmetry, and use properties to find unknowns.

Name: _____ Date: _____ Score: _____ / 59

Key idea

Parallelogram: opposite sides parallel and equal; opposite angles equal; diagonals **bisect** each other.

Rectangle: 4 right angles, **equal** diagonals. **Rhombus:** 4 equal sides; diagonals bisect **at 90°**.

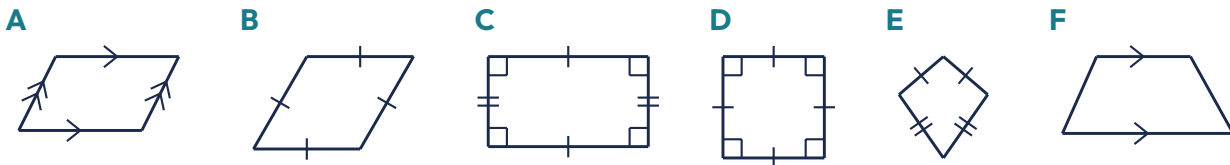
Square: a rectangle and a rhombus. **Kite:** 2 pairs of equal **adjacent** sides. **Trapezium:** 1 pair of parallel sides.

Family tree: square → rectangle and rhombus → parallelogram. Ticks = equal sides; arrows = parallel sides.

A Fluency *practise the skill*

/ 16 marks

Q1–6 and Q10 use shapes A–F. 1 mark each.



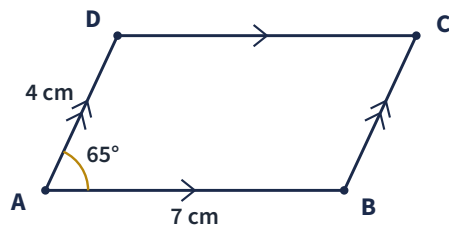
1. Name shape A _____
2. Name shape B _____
3. Name shape C _____
4. Name shape D _____
5. Name shape E _____
6. Name shape F _____
7. Lines of symmetry: kite _____
8. Lines of symmetry: rhombus _____
9. Lines of symmetry: square _____
10. Lines of symmetry: shape A _____
11. Rotational order: rectangle _____
12. 4 equal sides, no right angles _____
13. Parallelogram + a right angle _____
14. Is every square a rhombus? _____
15. Is every rectangle a square? _____
16. Diagonals equal and bisect at 90° _____

B

Core *apply the skill to problems*

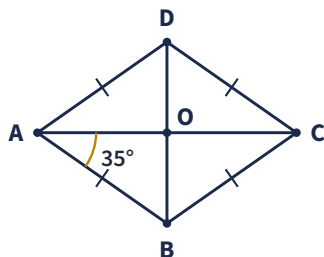
/ 23 marks

- 1 ABCD is a parallelogram. Find the sizes of angle ABC, angle BCD and angle CDA, and the perimeter. [3 marks]



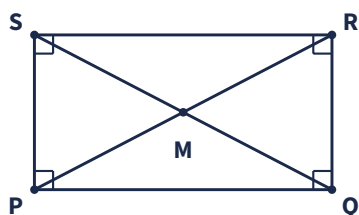
Answer: _____

- 2 ABCD is a rhombus with diagonals meeting at O, and angle OAB = 35° . Find angle AOB, angle ABO and angle DAB. [3 marks]



Answer: _____

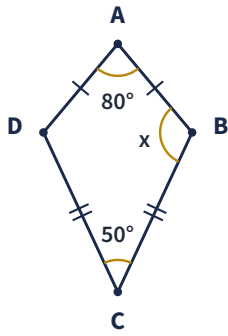
- 3 PQRS is a rectangle with diagonals meeting at M. The diagonal PR is 18 cm. Find QS and PM. [2 marks]



Answer: _____

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- 4 This kite has angles of 80° and 50° between its pairs of equal sides. Find x . [2 marks]



Answer: _____

- 5 A quadrilateral's diagonals bisect each other at right angles, but they are not equal in length. What type of quadrilateral is it? Explain. [2 marks]

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Answer: _____

- 6 In a parallelogram, one side is $(3x + 2)$ cm and the opposite side is 17 cm. Find x . [2 marks]

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Answer: _____

- 7 A rhombus has a perimeter of 52 cm and one diagonal of 24 cm. Find the length of the other diagonal. [3 marks]

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Answer: _____

- 8 From parallelogram, rectangle, rhombus, square and kite, list those whose diagonals are (a) always equal in length, (b) always perpendicular. [2 marks]

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Answer: _____

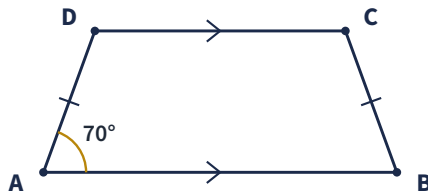
- 9 Using the coordinates $A(1, 1)$, $B(5, 1)$, $C(6, 4)$ and $D(2, 4)$, what is the most specific name for quadrilateral ABCD? Explain. [2 marks]

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Answer: _____

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- 10 ABCD is an isosceles trapezium with AB parallel to DC and $AD = BC$. Find angle ABC, angle BCD and angle CDA. [2 marks]



Answer: _____

C Reasoning *explain, justify and check*

/ 9 marks

- 1 Explain why every square is a rectangle, but not every rectangle is a square. [2 marks]

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- 2 True or false: 'A rhombus is a special kite.' Justify your answer. [2 marks]

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- 3 Zoe says, 'The diagonals of any parallelogram are equal.' Give a counterexample and state which parallelograms do have equal diagonals. [2 marks]

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- 4 In parallelogram ABCD, use co-interior angles to explain why angle A = angle C. [3 marks]

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D

Challenge *multi-step and problem-solving*

/ 11 marks

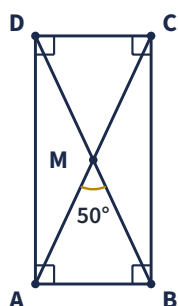
- 1 In rhombus ABCD the diagonals meet at O. Angle OAB = x and angle OBA = $2x$. Find x and all four angles of the rhombus. [3 marks]

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Answer:

- 2 ABCD is a rectangle with diagonals meeting at M, and angle AMB = 50° . Find angle MAB and angle MBC. [3 marks]



Answer:

- 3 P(0, 0), Q(5, 0) and R(8, 4) are three vertices of a parallelogram. Find all three possible positions of the fourth vertex. Which one makes a rhombus? Explain. [3 marks]

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Answer:

- 4 Kite ABCD has AB = AD and CB = CD. Diagonal BD = 24 cm, and diagonal AC crosses it at O with AO = 5 cm and OC = 16 cm. Find the perimeter of the kite. [2 marks]

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Answer:

How did I go?

Fluency ___ / 16 Core ___ / 23 Reasoning ___ / 9 Challenge ___ / 11 **Total** ___ / 59

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