



EP.M118 Properties of Quadrilaterals and Symmetry

GL ASSESSMENT GL-11PLUS-MATHS · Calculators not allowed · about 55 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

1 Which quadrilateral has exactly one pair of parallel sides?

- ☐ A) Parallelogram
- ☐ B) Trapezium
- ☐ C) Kite
- ☐ D) Square
- ☐ E) Rhombus

(Total for Question 1 is 1 mark)

2 Which quadrilateral has all four sides equal but does not have to have all angles equal?

- ☐ A) Rectangle
- ☐ B) Parallelogram
- ☐ C) Rhombus
- ☐ D) Kite
- ☐ E) Trapezium

(Total for Question 2 is 1 mark)

3 Which quadrilateral has diagonals that bisect each other and are equal in length, but are not perpendicular?

- ☐ A) Square
- ☐ B) Rhombus
- ☐ C) Rectangle
- ☐ D) Kite
- ☐ E) Parallelogram

(Total for Question 3 is 1 mark)

4 Which quadrilateral always has four lines of symmetry?

- ☐ A) Rectangle
- ☐ B) Parallelogram
- ☐ C) Square
- ☐ D) Kite
- ☐ E) Rhombus

(Total for Question 4 is 1 mark)

5 What is the order of rotational symmetry of a square?

- ☐ A) 1
- ☐ B) 2
- ☐ C) 3
- ☐ D) 4
- ☐ E) 8

(Total for Question 5 is 1 mark)

6 In parallelogram ABCD, angle A is 65 degrees. Work out the sizes of angles B, C and D.

(Total for Question 6 is 3 marks)

7 State the order of rotational symmetry of a rectangle that is not a square.

- ☐ A) 1
- ☐ B) 2
- ☐ C) 3
- ☐ D) 4
- ☐ E) 8

(Total for Question 7 is 1 mark)

8 A convex quadrilateral has three angles of 95 degrees, 85 degrees and 100 degrees. Work out the size of the fourth angle.

(Total for Question 8 is 2 marks)

- 9** A rhombus has one interior angle of 120 degrees. Find the sizes of all four interior angles.

(Total for Question 9 is 3 marks)

- 10** A rectangle is not a square.

(a) How many lines of symmetry does it have? (1)

(b) What is its order of rotational symmetry? (1)

(Total for Question 10 is 2 marks)

- 11** Does every parallelogram have a line of symmetry? Give a reason for your answer.

(Total for Question 11 is 2 marks)

- 12** Name the quadrilateral that has two pairs of adjacent equal sides (each pair next to each other) but whose opposite sides are not equal.

(Total for Question 12 is 1 mark)

- 13** A pupil writes: "The interior angles of a quadrilateral add up to 180 degrees." Is the pupil correct? Explain briefly.

(Total for Question 13 is 2 marks)

14 An isosceles trapezium (ABCD with AB parallel to CD and $AD = BC$) is drawn.

(a) How many lines of symmetry does this isosceles trapezium have? **(1)**

(b) What is its order of rotational symmetry? **(1)**

(Total for Question 14 is 2 marks)

15 A quadrilateral has four lines of symmetry. What must its order of rotational symmetry be?

(Total for Question 15 is 1 mark)

16 A kite has diagonals of lengths 10 cm and 24 cm which meet at right angles. Calculate the area of the kite.

(Total for Question 16 is 2 marks)

17 Explain what is meant by 'order of rotational symmetry 2' for a shape.

(Total for Question 17 is 1 mark)

18 Which quadrilateral always has all interior angles equal?

- ☐ A) Parallelogram
- ☐ B) Rhombus
- ☐ C) Kite
- ☐ D) Rectangle
- ☐ E) Trapezium

(Total for Question 18 is 1 mark)

19 Which property is true for every parallelogram?

- ☐ A) Diagonals are perpendicular
- ☐ B) Opposite sides are equal and parallel
- ☐ C) Has four lines of symmetry
- ☐ D) All angles are 90 degrees
- ☐ E) All sides are equal

(Total for Question 19 is 1 mark)

20 A quadrilateral has all four sides equal and its diagonals are equal in length. Name this quadrilateral.

(Total for Question 20 is 1 mark)

Mark scheme · EP.M118 Properties of Quadrilaterals and Symmetry

Question 1

- **B1** correct option B (Trapezium) cao
- **Answer: B) Trapezium (one pair of parallel sides).** The other options have either two pairs or none of the single-pair property; a parallelogram, square and rhombus have two pairs, a kite has no parallel pairs in general.)

Question 2

- **B1** correct option C (Rhombus) cao
- **Answer: C) Rhombus**

Question 3

- **B1** correct option C (Rectangle) cao
- **Answer: C) Rectangle (its diagonals bisect each other, are equal in length and, unless it is a square, are not perpendicular).**

Question 4

- **B1** correct option C (Square) cao
- **Answer: C) Square**

Question 5

- **B1** correct option D (4) cao
- **Answer: D) 4**

Question 6

- **M1** Use that opposite angles in a parallelogram are equal; deduce angle C = 65
- **M1** Use that adjacent angles are supplementary; deduce angle B = $180 - 65 = 115$
- **A1** All three angles correct: B = 115, C = 65, D = 115 cao
- **Answer: Angle B = 115 degrees, angle C = 65 degrees, angle D = 115 degrees**

Question 7

- **B1** correct option B (2) cao
- **Answer: B) 2**

Question 8

- **M1** Add the three given angles to find their total: $95 + 85 + 100 = 280$
- **A1** $360 - 280 = 80$, fourth angle 80 degrees cao
- **Answer: 80 degrees**

Question 9

- **M1** Use that opposite angles in a rhombus are equal; deduce the opposite angle = 120
- **M1** Use that adjacent angles are supplementary; calculate adjacent angle = $180 - 120 = 60$
- **A1** All angles correct: 120, 60, 120, 60 cao
- **Answer: 120, 60, 120, 60 degrees**

Question 10

- (a) **B1** 2 lines of symmetry cao
- (a) **Answer: 2**
- (b) **B1** Order 2 cao
- (b) **Answer: 2**

Question 11

- **B1** No (simple correct statement) cao
- **A1** Reason: opposite sides are parallel but angles need not be equal; only special parallelograms (rectangles, rhombuses) have symmetry ao
- **Answer: No. A general parallelogram need not have equal adjacent angles or equal adjacent sides, so it does not necessarily have a line of symmetry; only special cases like rectangles or rhombuses do.**

Question 12

- **B1** Kite cao
- **Answer: Kite**

Question 13

- **B1** State that the pupil is incorrect cao
- **A1** Give correct reason: sum is 360 degrees since $(4 - 2) \times 180 = 360$ or split into two triangles ao
- **Answer: No. A quadrilateral's interior angles sum to 360 degrees because $(4 - 2) \times 180 = 360$, or by dividing the quadrilateral into two triangles each with sum 180.**

Question 14

- (a) **B1** 1 line of symmetry cao
- (a) **Answer: 1**
- (b) **B1** Order 1 cao
- (b) **Answer: 1**

Question 15

- **B1** Order 4 cao
- **Answer: 4**

Question 16

- **M1** Use area formula for kite/orthogonal diagonals: $(1/2) \times d_1 \times d_2$
- **A1** Area = $(1/2) \times 10 \times 24 = 120 \text{ cm}^2$ cao
- **Answer: 120 cm²**

Question 17

- **B1** Correct explanation: the shape matches itself after rotation by 180 degrees (and 360 degrees) cao
- **Answer: It means the shape maps onto itself after a rotation of 180 degrees (and again at 360 degrees).**

Question 18

- **B1** correct option D (Rectangle) cao
- **Answer: D) Rectangle**

Question 19

- **B1** correct option B (Opposite sides are equal and parallel) cao
- **Answer: B) Opposite sides are equal and parallel**

Question 20

- **B1** Square cao
- **Answer: Square**