MARKING GUIDELINE

MARKS	DURATION	QUESTIONS
30	45 minutes	3

Name: _____ Class: _____

Date: _____

MARK ____ / 30

INSTRUCTIONS AND INFORMATION

1. Answer **ALL** the questions in this question paper.
2. Answer QUESTION 1 by **circling** the letter (A–D) in the answer grid at the end of that section.
3. Show **ALL** calculations clearly.
4. Show all units where applicable.
5. Number the answers correctly according to the numbering system used in this question paper.
6. A non-programmable calculator may be used, unless stated otherwise.
7. Write neatly and legibly.

QUESTION 1 [10 MARKS]

Four options are given as possible answers to the following questions. Choose the correct answer and circle the letter (A–D) in the grid at the end of this section. If you want to change your choice, put a cross through the wrong letter and circle your new choice.

1.1 Which property does a RECTANGLE have that a general parallelogram does NOT? (1)

A) its opposite angles are equal
B) its diagonals bisect each other
C) its diagonals are equal ✓
D) its opposite sides are parallel

> **Answer: C** — Equal diagonals is the extra property a rectangle gains; the other three belong to every parallelogram.
>
> - **A** — every parallelogram has equal opposite angles
> - **B** — every parallelogram's diagonals bisect each other
> - **D** — every parallelogram has both pairs of opposite sides parallel

1.2 Which property does a RHOMBUS have that a rectangle does NOT? (1)

A) its diagonals are equal
B) its opposite angles are equal
C) its opposite sides are parallel
D) its diagonals cross at right angles ✓

> **Answer: D** — Four equal sides force the diagonals of a rhombus to be perpendicular; a rectangle's are not.
>
> - **A** — EQUAL diagonals is the rectangle's property, not the rhombus's
> - **B** — both shapes have equal opposite angles — both are parallelograms
> - **C** — both shapes have opposite sides parallel

1.3 A quadrilateral with exactly ONE pair of parallel sides is a ... (1)

A) kite
B) parallelogram
C) trapezium ✓
D) rhombus

> **Answer: C** — A trapezium has one pair of parallel sides; a parallelogram has two.
> - **A** — a kite that is not a rhombus has no parallel sides — it has two pairs of adjacent equal sides
> - **B** — a parallelogram has TWO pairs of parallel sides
> - **D** — a rhombus has two pairs of parallel sides

1.4 In parallelogram ABCD, $\hat{A} = 70°$. Then $\hat{B}$ = ... (1)

A) $70°$
B) $290°$
C) $20°$
D) $110°$ ✓

> **Answer: D** — $\hat{A}$ and $\hat{B}$ are co-interior between the parallel sides AD and BC, so they are supplementary.
> - **A** — that is $\hat{C}$, the OPPOSITE angle, which is the equal one
> - **B** — subtracted from $360°$ instead of from $180°$
> - **C** — subtracted from $90°$ instead of from $180°$

1.5 Which ONE of these proves that a quadrilateral is a parallelogram? (1)

A) the diagonals are equal
B) both pairs of opposite sides are equal ✓
C) one pair of opposite sides is equal
D) one pair of opposite angles is equal

> **Answer: B** — Both pairs of opposite sides equal is one of the standard tests for a parallelogram.
> - **A** — equal diagonals give a RECTANGLE, and only once it is already a parallelogram
> - **C** — one pair must be equal AND parallel; equal on its own is not enough
> - **D** — BOTH pairs of opposite angles must be equal

1.6 The diagonals of a KITE ... (1)

A) bisect each other
B) cross at $90°$, and the axis of symmetry bisects the other diagonal ✓
C) are equal
D) are both axes of symmetry

> **Answer: B** — A kite has one axis of symmetry — the long diagonal — and it cuts the other diagonal in half at right angles.
> - **A** — only ONE of the two diagonals is bisected
> - **C** — equal diagonals belong to the rectangle
> - **D** — only the diagonal joining the vertices between the equal sides is an axis of symmetry

1.7 The interior angles of any quadrilateral add up to ... (1)

A) $180°$
B) $540°$
C) $360°$ ✓
D) $720°$

> **Answer: C** — A quadrilateral splits into two triangles, and $2 \times 180° = 360°$.
> - **A** — that is the sum for a TRIANGLE
> - **B** — that is the sum for a pentagon
> - **D** — that is the sum for a hexagon

1.8 In rhombus PQRS the diagonals meet at T. Then △PTQ is ... (1)

A) obtuse-angled
B) equilateral
C) scalene with no special angle
D) right-angled ✓

> **Answer: D** — The diagonals of a rhombus cross at $90°$, so $P\hat{T}Q = 90°$.
> - **A** — $P\hat{T}Q$ is exactly $90°$, which is not obtuse
> - **B** — PT, TQ and PQ are not all equal
> - **C** — $P\hat{T}Q$ is exactly $90°$, which IS a special angle

1.9 A square is ... (1)

A) both a rectangle and a rhombus ✓
B) a rhombus but not a rectangle
C) a rectangle but not a rhombus
D) neither a rectangle nor a rhombus

> **Answer: A** — A square has four right angles, which makes it a rectangle, and four equal sides, which makes it a rhombus.
> - **B** — four right angles makes it a rectangle as well
> - **C** — four equal sides makes it a rhombus as well
> - **D** — it satisfies the definition of both

1.10 In parallelogram ABCD, AB $= 3x - 4$ and DC $= x + 8$. Then $x =$ ... (1)

A) 6 ✓
B) 4
C) 12
D) 3

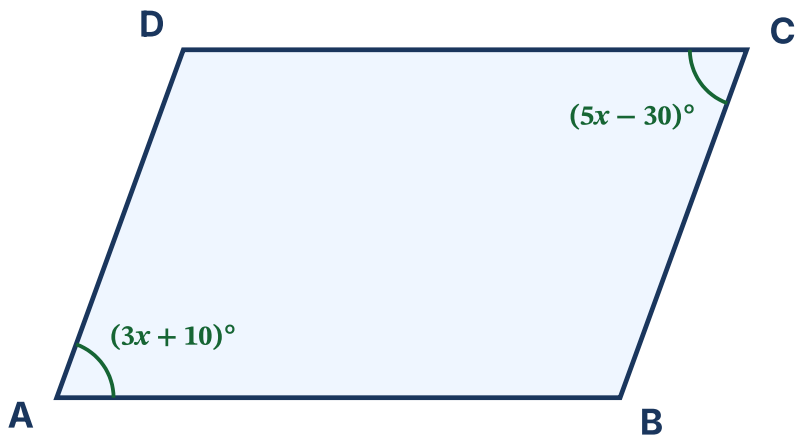
> **Answer: A** — Opposite sides of a parallelogram are equal, so $3x - 4 = x + 8$ and $2x = 12$.
> - **B** — dropped the -4 and solved $3x = x + 8$
> - **C** — reached $2x = 12$ but never divided by the 2
> - **D** — divided the 12 by 4 instead of by 2

ANSWER GRID — MARKING GUIDELINE

1.1	A	B	(C)	D
1.2	A	B	C	(D)
1.3	A	B	(C)	D
1.4	A	B	C	(D)
1.5	A	(B)	C	D
1.6	A	(B)	C	D
1.7	A	B	(C)	D
1.8	A	B	C	(D)
1.9	(A)	B	C	D
1.10	(A)	B	C	D

QUESTION 2 [9 MARKS]

ABCD is a parallelogram. It is given that $\hat{A} = (3x + 10)°$ and $\hat{C} = (5x - 30)°$.



not drawn to scale

2.1 Give a reason why $\hat{A} = \hat{C}$. (2)

> The OPPOSITE angles of a parallelogram are equal *(2)*

2.2 Calculate the value of x. (3)

> $3x + 10 = 5x - 30$ *(1)*
> $40 = 2x$ *(1)*
> $\boldsymbol{x = 20}$ *(1)*

2.3 Hence calculate the size of $\hat{A}$ and of $\hat{B}$, with reasons. (4)

> $\hat{A} = 3(20) + 10 = \mathbf{70°}$ *(1)*
> $\hat{A} + \hat{B} = 180°$ *(1)* — co-interior angles, AD ∥ BC *(1)*
> $\hat{B} = \mathbf{110°}$ *(1)*

QUESTION 3 [11 MARKS]

Answer the questions below on the properties of quadrilaterals.

3.1 State THREE properties that a rhombus has but a general parallelogram does not. (3)

> All four sides are equal *(1)*
> The diagonals cross at right angles *(1)*
> The diagonals bisect the interior angles *(1)*

3.2 A quadrilateral has one pair of opposite sides both parallel AND equal. Prove that it must be a parallelogram. (3)

> The equal, parallel sides make the two triangles formed by a diagonal congruent *(1)*
> So the other pair of sides is equal too *(1)*
> A quadrilateral with both pairs of opposite sides equal is a parallelogram *(1)*

3.3 A quadrilateral has diagonals that bisect each other at right angles but are NOT equal in length. Name the quadrilateral and give a reason. **(3)**

> A **rhombus** *(1)* — bisecting diagonals make it a parallelogram *(1)*, and perpendicular diagonals make it a rhombus; equal diagonals would have made it a square *(1)*

3.4 Explain why every square is a rectangle, but not every rectangle is a square. **(2)**

> A square has four right angles, which is the definition of a rectangle *(1)*; a rectangle need not have four equal sides *(1)*

TOTAL: 30 marks

This question paper consists of 3 questions.

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