DANEMATHICS
FREE CAPS MATHS RESOURCES

GRADE 10 · EUCLIDEAN GEOMETRY

Euclidean Geometry Riders: Proving It, With Reasons (Grade 10)

MARKING GUIDELINE

MARKS	DURATION	QUESTIONS
31	50 minutes	3

Name: ..... Class: .....

Date: .....

MARK ____ / 31

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 x and y are alternate angles between AB and CD, where AB ∥ CD. The reason for $x = y$ is ... (1)

A) corresp ∠s; AB ∥ CD
B) co-int ∠s; AB ∥ CD
C) alt ∠s; AB ∥ CD ✓
D) vert opp ∠s

> **Answer: C** — Alternate angles are equal, and the parallel lines must be named in the reason.
> - **A** — corresponding angles sit on the SAME side, in matching positions
> - **B** — co-interior angles ADD to 180°; they are not equal
> - **D** — vertically opposite angles need two lines crossing, not parallel lines

1.2 Co-interior angles between parallel lines are ... (1)

A) equal
B) supplementary ✓
C) complementary
D) vertically opposite

> **Answer: B** — They add up to 180°.
> - **A** — that is true of alternate and corresponding angles
> - **C** — they add to 180°, not 90°
> - **D** — they lie on the same side of the transversal, between the lines

1.3 In $\triangle ABC$, $\hat{A} = 50°$ and $\hat{B} = 60°$. The exterior angle at C is ... (1)

A) 110° ✓ **B)** 70°

C) 130° **D)** 50°

> **Answer: A** — The exterior angle of a triangle equals the sum of the interior opposite angles: $50° + 60° = 110°$.
>
> - **B** — that is the INTERIOR angle at C
> - **C** — added $50° + 60° + 20°$
> - **D** — that is only one of the two interior opposite angles

1.4 Which condition does NOT prove two triangles congruent? (1)

A) SSS **B)** SAS

C) RHS **D) AAA ✓**

> **Answer: D** — Three equal angles fix the shape only, not the size — AAA gives similar triangles.
>
> - **A** — three pairs of equal sides fix the triangle
> - **B** — two sides and the included angle fix the triangle
> - **C** — the right angle, hypotenuse and a side fix the triangle

1.5 If $\triangle ABC \equiv \triangle DEF$, the side equal to BC is ... (1)

A) DE **B)** DF

C) EF ✓ **D)** AC

> **Answer: C** — The order matches B with E and C with F, so BC = EF.
>
> - **A** — DE matches AB
> - **B** — DF matches AC
> - **D** — AC is a side of the same triangle

1.6 A quadrilateral with one pair of opposite sides both equal AND parallel is ... (1)

A) a trapezium **B) a parallelogram ✓**

C) a kite **D)** always a rhombus

> **Answer: B** — That is one of the five accepted tests for a parallelogram.
>
> - **A** — a trapezium's parallel sides are not equal
> - **C** — a kite has no parallel sides unless it is a rhombus
> - **D** — the other pair of sides need not equal these

1.7 The diagonals of every parallelogram ... (1)

A) bisect each other ✓ **B)** are equal

C) meet at 90° **D)** bisect the angles of the parallelogram

> **Answer: A** — Each diagonal cuts the other into two equal parts.
>
> - **B** — that is true of a rectangle, not of every parallelogram
> - **C** — that is true of a rhombus
> - **D** — that is true of a rhombus

1.8 D and E are the midpoints of AB and AC of $\triangle ABC$. If DE = 7 cm, then BC = ... (1)

A) 7 cm **B)** 3,5 cm

C) 21 cm **D) 14 cm ✓**

> **Answer: D** — Midpoint theorem: $DE = \frac{1}{2}BC$, so BC = 14 cm.
>
> - **A** — DE is HALF of BC, not equal to it
> - **B** — halved instead of doubling
> - **C** — multiplied by 3 instead of 2

1.9 In $\triangle PQR$, PQ = PR and $\hat{P} = 40°$. Then $\hat{Q}$ = ... (1)

A) 40° **B)** 140°

C) 70° ✓ **D)** 50°

> **Answer: C** — $\hat{Q} = \hat{R}$ (∠s opp equal sides), so $\hat{Q} = \frac{180° - 40°}{2} = 70°$.
>
> - **A** — the equal angles are opposite the equal sides, at Q and R
> - **B** — did not halve $180° - 40°$
> - **D** — used 90° instead of 180°

1.10 Which is a property of EVERY rectangle but not of every parallelogram? (1)

A) opposite sides are equal **B) the diagonals are equal ✓**

C) opposite sides are parallel **D)** the diagonals bisect each other

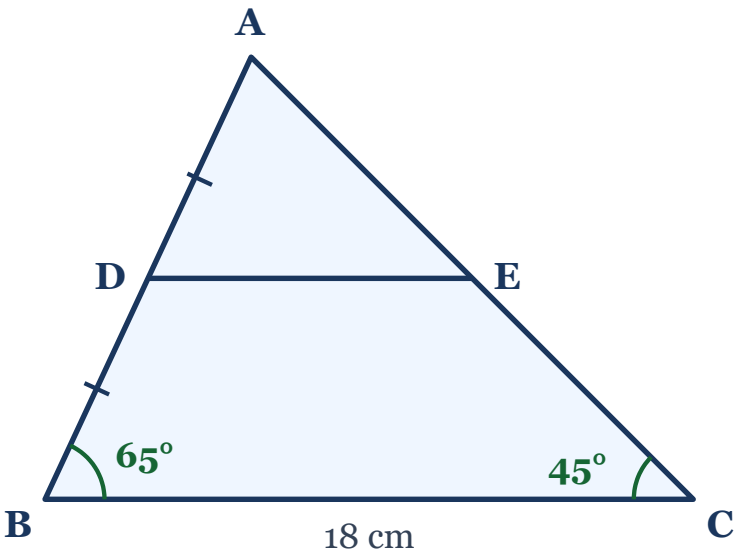
> **Answer: B** — Equal diagonals come from the right angles of a rectangle.
>
> - **A** — every parallelogram has that
> - **C** — every parallelogram has that
> - **D** — every parallelogram has that

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 **[11 MARKS]**

In the diagram below, D lies on AB and E lies on AC of $\triangle ABC$, with DE $\parallel$ BC. D is the midpoint of AB, $A\hat{B}C = 65°$, $A\hat{C}B = 45°$ and BC $= 18$ cm.



2.1 Determine, with reasons, the sizes of $A\hat{D}E$ and $D\hat{E}C$. **(4)**

$A\hat{D}E = \mathbf{65°}$ *(1)* (corresp ∠s; DE ∥ BC) *(1)*
$D\hat{E}C = 180° - 45° = \mathbf{135°}$ *(1)* (co-int ∠s; DE ∥ BC) *(1)*

2.2 Explain why E is the midpoint of AC. **(2)**

D is the midpoint of AB and DE ∥ BC *(1)*
so DE bisects AC (converse of the midpoint theorem) *(1)*

2.3 Calculate the length of DE, giving a reason. **(3)**

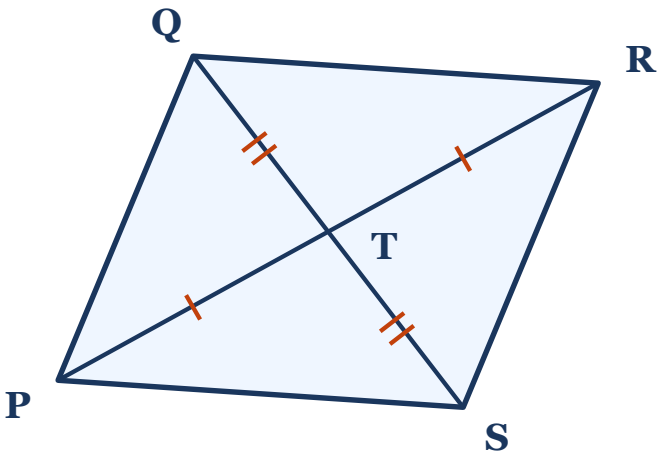
$DE = \frac{1}{2}BC$ *(1)* (midpoint theorem) *(1)*
$DE = \mathbf{9\ cm}$ *(1)*

2.4 Determine $B\hat{A}C$, with a reason. **(2)**

$B\hat{A}C = 180° - 65° - 45° = \mathbf{70°}$ *(1)* (∠s of △) *(1)*

QUESTION 3 [10 MARKS]

In the diagram below, the diagonals PR and QS of quadrilateral PQRS bisect each other at T.



3.1 Prove that △PTQ ≡ △RTS. **(4)**

PT = TR (given) *(1)*
QT = TS (given) *(1)*
$P\hat{T}Q = R\hat{T}S$ (vert opp ∠s) *(1)*
∴ △PTQ ≡ △RTS (SAS) *(1)*

3.2 Hence prove that PQ ∥ SR. **(3)**

$T\hat{P}Q = T\hat{R}S$ (≡△s) *(1)*
these are alternate angles on the transversal PR *(1)*
∴ PQ ∥ SR (alt ∠s equal) *(1)*

3.3 Explain why PQRS is a parallelogram. **(3)**

The diagonals of PQRS bisect each other *(1)*
a quadrilateral whose diagonals bisect each other is a parallelogram *(1)*
∴ PQRS is a parallelogram *(1)*

TOTAL: 31 marks

This question paper consists of 3 questions.

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