MARKING GUIDELINE

MARKS	DURATION	QUESTIONS
25	40 minutes	2

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

Date: .....

MARK ____ / 25

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 The gradient of a line with an angle of inclination of $45°$ is ... (1)

A) $\sqrt{3}$ **B)** 0

C) 1 ✓ **D)** 45

> **Answer: C** — $m = \tan\theta$, and $\tan 45° = 1$.
>
> - **A** — that is $\tan 60°$
> - **B** — that is the gradient of a HORIZONTAL line
> - **D** — quoted the ANGLE instead of its tangent

1.2 A line has gradient $\sqrt{3}$. Its angle of inclination is ... (1)

A) $120°$ **B)** $30°$

C) $45°$ **D)** $60°$ ✓

> **Answer: D** — $\tan\theta = \sqrt{3}$, so $\theta = 60°$.
>
> - **A** — $\tan 120° = -\sqrt{3}$, which is negative
> - **B** — $\tan 30° = \frac{1}{\sqrt{3}}$, the reciprocal
> - **C** — $\tan 45° = 1$

1.3 A line has gradient -1. Its angle of inclination is ... (1)

A) $225°$ **B)** $45°$

C) $-45°$ **D)** **$135°$ ✓**

> **Answer: D** — An angle of inclination is taken between $0°$ and $180°$, and $\tan 135° = -1$.
>
> - **A** — $225°$ lies outside the $0°$ to $180°$ range
> - **B** — $\tan 45° = +1$, not -1
> - **C** — an angle of inclination is never quoted as negative

1.4 The line through $(2\ ;\ 3)$ with gradient 4 has equation ... (1)

A) $y = 4x + 5$ **B)** **$y = 4x - 5$ ✓**

C) $y = 4x + 3$ **D)** $y = 2x + 3$

> **Answer: B** — $y - 3 = 4(x - 2)$ gives $y = 4x - 8 + 3 = 4x - 5$.
>
> - **A** — made a sign slip on the -8
> - **C** — used the point's y-value as the y-intercept
> - **D** — used the point's x-value as the gradient

1.5 The line through A$(1\ ;\ 2)$ and B$(5\ ;\ 10)$ has gradient ... (1)

A) **2 ✓** **B)** 8

C) $\frac{1}{2}$ **D)** 4

> **Answer: A** — $m = (10 - 2) \div (5 - 1) = 8 \div 4 = 2$.
>
> - **B** — that is the change in y
> - **C** — inverted the formula
> - **D** — that is the change in x

1.6 A line perpendicular to $y = 3x - 1$ has gradient ... (1)

A) -3 **B)** $\frac{1}{3}$

C) **$\frac{-1}{3}$ ✓** **D)** 3

> **Answer: C** — The perpendicular gradient is the negative reciprocal of 3.
>
> - **A** — changed the sign but never took the reciprocal
> - **B** — took the reciprocal but left off the minus
> - **D** — that is the PARALLEL gradient

1.7 The midpoint of A$(-1\ ;\ 4)$ and B$(5\ ;\ -2)$ is ... (1)

A) **$(2\ ;\ 1)$ ✓** **B)** $(4\ ;\ 2)$

C) $(6\ ;\ -6)$ **D)** $(3\ ;\ 3)$

> **Answer: A** — $((-1 + 5) \div 2\ ;\ (4 + (-2)) \div 2) = (2\ ;\ 1)$.
>
> - **B** — added the coordinates without halving them
> - **C** — SUBTRACTED the coordinates instead of averaging them
> - **D** — dropped the minus signs on -1 and -2

1.8 Two lines are PARALLEL when their angles of inclination are ... (1)

A) differing by $90°$ **B)** complementary

C) supplementary **D) equal ✓**

> **Answer: D** — Equal inclinations give equal gradients.
>
> - **A** — that describes PERPENDICULAR lines
> - **B** — complementary inclinations give reciprocal gradients
> - **C** — supplementary inclinations give gradients that are negatives of each other

1.9 The angle of inclination of the line $2y = 6x + 4$ is ... (1)

A) $18{,}43°$ **B) $71{,}57°$ ✓**

C) $60°$ **D)** $80{,}54°$

> **Answer: B** — Divide by 2 to get $y = 3x + 2$, so $m = 3$ and $\theta = \tan^{-1}(3) = 71{,}57°$.
>
> - **A** — that is $\tan^{-1}(\frac{1}{3})$, the PERPENDICULAR line's inclination
> - **C** — $\tan 60° = \sqrt{3}$, not 3
> - **D** — used the gradient 6 without first dividing the equation by 2

1.10 The line joining $(0\ ;\ 0)$ and $(3\ ;\ 3)$ makes an angle with the x-axis of ... (1)

A) $60°$ **B) $45°$ ✓**

C) $30°$ **D)** $90°$

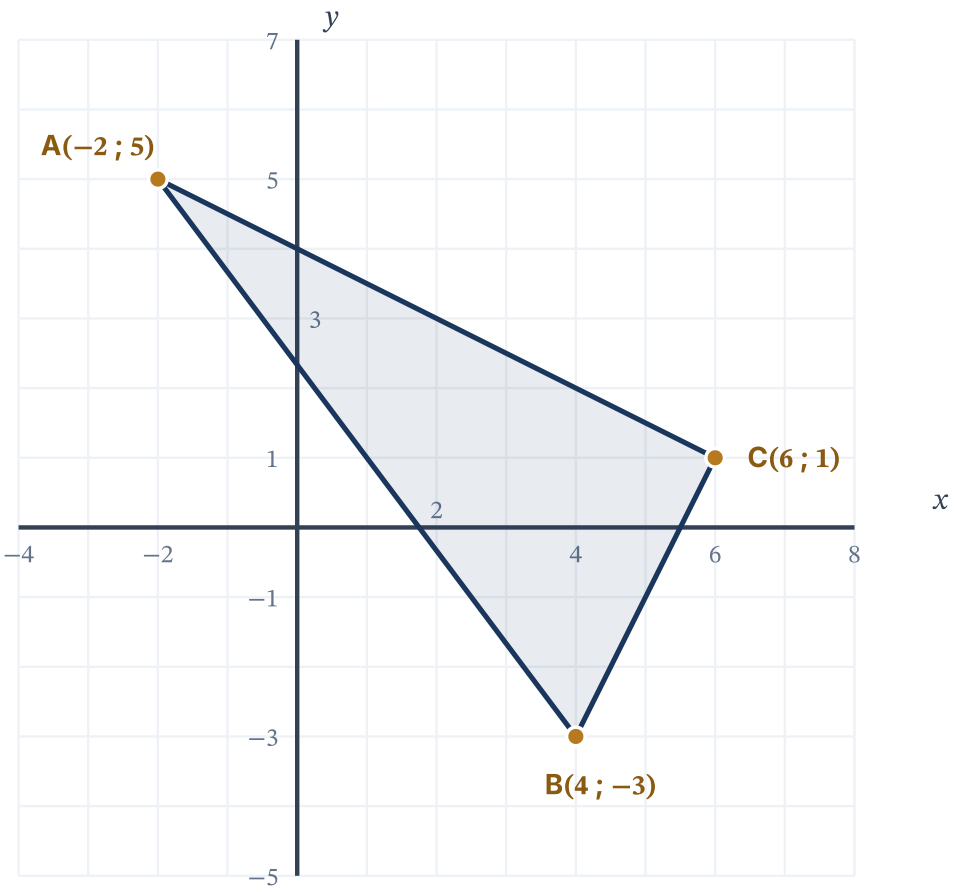
> **Answer: B** — The gradient is $3 \div 3 = 1$, and $\tan^{-1}(1) = 45°$.
>
> - **A** — $\tan 60° = \sqrt{3}$, not 1
> - **C** — $\tan 30° = \frac{1}{\sqrt{3}}$, not 1
> - **D** — a gradient of 1 is not vertical

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 [15 MARKS]

In the diagram below, A$(-2\ ;\ 5)$, B$(4\ ;\ -3)$ and C$(6\ ;\ 1)$ are the vertices of $\triangle$ABC drawn in the Cartesian plane.



2.1 Calculate the length of AB. **(3)**

AB $= \sqrt{(4-(-2))^2+(-3-5)^2}$ *(1)*
$= \sqrt{36+64}$ *(1)* $=$ **10 units** *(1)*

2.2 Calculate the gradient of AB, and hence the angle of inclination of AB, correct to TWO decimal places. **(5)**

$m_{AB} = \frac{-3-5}{4+2} = -\frac{4}{3}$ *(2)*

$\tan\theta = -\frac{4}{3}$ *(1)*

The gradient is negative, so θ is obtuse *(1)*

$\theta =$ **126,87°** *(1)*

2.3 Determine the equation of the line through C parallel to AB. **(4)**

Parallel lines have equal gradients: $m = -\frac{4}{3}$ *(1)*

$1 = -\frac{4}{3}(6) + c$ *(2)*

$c = 9$, so $\boldsymbol{y = -\frac{4}{3}x + 9}$ *(1)*

2.4 Determine whether AB ⊥ BC. Show ALL your working. **(3)**

$m_{BC} = \frac{1-(-3)}{6-4} = 2$ *(1)*

$m_{AB} \times m_{BC} = -\frac{4}{3} \times 2 = -\frac{8}{3}$ *(1)*

The product is not -1, so **AB is NOT perpendicular to BC** *(1)*

TOTAL: 25 marks

This question paper consists of 2 questions.

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