MARKING GUIDELINE

MARKS	DURATION	QUESTIONS
33	50 minutes	3

Name: _____ Class: _____

Date: _____

MARK ____ / 33

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 Solve for x: $3x - 5 > 7$ (1)

A) $x < 4$ **B)** $x > 2$

C) $x \geq 4$ **D)** $x > 4$ ✓

Answer: D — $3x > 12$, so $x > 4$.

- **A** — the sign reverses only when you divide by a NEGATIVE, and 3 is positive
- **B** — worked out $7 - 5 = 2$ and ignored the 3 — the 5 must be ADDED, and $3x$ still divided by 3
- **C** — the sign is $>$, so 4 itself is NOT included

1.2 Solve for x: $-2x > 6$ (1)

A) $x > -3$ **B)** $x > 3$

C) $x < 3$ **D)** $x < -3$ ✓

Answer: D — Dividing both sides by -2 REVERSES the inequality sign.

- **A** — did not reverse the sign when dividing by a negative
- **B** — lost the negative AND kept the sign the same way round
- **C** — divided 6 by 2 and lost the negative

1.3 Write $x \geq -2$ in interval notation. (1)

A) $[-2\,;\infty)$ ✓ **B)** $(-\infty\,;-2]$

C) $[-2\,;\infty]$ **D)** $(-2\,;\infty)$

Answer: A — A square bracket includes -2, and infinity always takes a round bracket.

- **B** — that is $x \leq -2$, the other direction
- **C** — infinity is never reached, so it never takes a square bracket
- **D** — a round bracket EXCLUDES -2, but $\geq$ includes it

1.4 Solve for x: $-1 \leq 2x - 1 < 5$ (1)

A) $0 < x \leq 3$ **B)** $0 \leq x < 3$ ✓

C) $-1 \leq x < 5$ **D)** $-2 \leq x < 4$

Answer: B — Add 1 throughout to get $0 \leq 2x < 6$, then divide throughout by 2.

- **A** — swapped the two inequality signs on the way through
- **C** — never divided by the 2 at all
- **D** — SUBTRACTED 1 throughout instead of adding it, and never divided by 2

1.5 List the integers satisfying $-2 < x \leq 3$. (1)

A) $-1\,;\,0\,;\,1\,;\,2\,;\,3$ ✓ **B)** $-2\,;\,-1\,;\,0\,;\,1\,;\,2\,;\,3$

C) $-2\,;\,-1\,;\,0\,;\,1\,;\,2$ **D)** $-1\,;\,0\,;\,1\,;\,2$

Answer: A — The $<$ sign excludes -2, and the $\leq$ sign includes 3.

- **B** — included -2, but $<$ excludes it
- **C** — read BOTH signs the wrong way round
- **D** — left out 3, but $\leq$ includes it

1.6 Solve for x: $\frac{x}{3} + 1 < 4$ (1)

A) $x < 11$ **B)** $x < 3$

C) $x < 12$ **D)** $x < 9$ ✓

Answer: D — Subtract 1 to get $\frac{x}{3} < 3$, then multiply both sides by 3.

- **A** — multiplied through by 3 but tripled only the x, not the 1
- **B** — subtracted the 1 but never multiplied by 3
- **C** — forgot to subtract the 1 before multiplying by 3

1.7 A taxi charges R12 plus R7 per kilometre. For the fare to stay UNDER R75, the trip must be ... (1)

A) more than 9 km **B)** less than 9 km ✓

C) less than $10{,}71$ km **D)** less than 63 km

Answer: B — $12 + 7d < 75$ gives $7d < 63$, so $d < 9$.

- **A** — reversed the inequality — a SHORTER trip is the cheaper one
- **C** — divided 75 by 7 without first subtracting the R12 flag fall
- **D** — forgot to divide the 63 by the R7 per kilometre

1.8 Solve for x: $5 - x \geq 2$ (1)

A) $x \leq 3$ ✓ **B)** $x \geq -3$

C) $x \geq 3$ **D)** $x \leq 7$

Answer: A — $-x \geq -3$, and multiplying by -1 reverses the sign to give $x \leq 3$.

- **B** — kept the -3 and did not reverse the sign either
- **C** — did not reverse the sign when multiplying by -1
- **D** — added the 2 to the 5 instead of subtracting it

1.9 The interval $(2\ ;\ 7]$ means ... (1)

A) $x > 2$ and $x < 7$

B) $x \geq 2$ and $x < 7$

C) $x > 2$ **and** $x \leq 7$ ✓

D) $x \geq 2$ and $x \leq 7$

> **Answer: C** — A round bracket excludes the 2; a square bracket includes the 7.
>
> - **A** — the square bracket at 7 INCLUDES it
> - **B** — the two brackets have been read the wrong way round
> - **D** — the round bracket at 2 EXCLUDES it

1.10 Solve for x: $4(x - 1) \leq 2x + 6$ (1)

A) $x \geq 5$

B) $x \leq 3{,}5$

C) $x \leq 5$ ✓

D) $x \leq 10$

> **Answer: C** — $4x - 4 \leq 2x + 6$ gives $2x \leq 10$, so $x \leq 5$.
>
> - **A** — the sign reverses only when dividing by a NEGATIVE, and 2 is positive
> - **B** — multiplied only the x by 4, leaving the -1 inside untouched
> - **D** — forgot to divide the 10 by the 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 [12 MARKS]

Solve for x, where $x \in \mathbb{R}$. Show your answers on a number line and in interval notation where asked.

2.1 $-3 \leq \frac{2x - 1}{3} < -1$ (5)

> Multiply throughout by 3: $-9 \leq 2x - 1 < -3$ *(2)*
> Add 1: $-8 \leq 2x < -2$ *(1)*
> Divide by 2: $-4 \leq x < -1$ *(1)*
> Interval notation: **$[-4\ ;\ -1)$** *(1)*

2.2 $-2x > 10$ (3)

> Divide by -2 and REVERSE the sign *(2)*
> **$x < -5$** *(1)*

2.3 $3 - 2x \geq 11$ **(4)**

> $-2x \geq 8$ *(2)*
> Dividing by -2 reverses the sign *(1)*
> $\boldsymbol{x \leq -4}$ *(1)*

QUESTION 3 [11 MARKS]

Answer the questions below.

3.1 Write $-2 \leq x < 7$ in interval notation, and describe what the two different bracket types mean. **(3)**

> $\boldsymbol{[-2\,;\,7)}$ *(1)*
> The square bracket includes -2 *(1)*; the round bracket excludes 7 *(1)*

3.2 Write $(-\infty\,;\,3]$ as an inequality, and explain why ∞ never takes a square bracket. **(3)**

> $\boldsymbol{x \leq 3}$ *(1)*
> ∞ is not a number and can never be reached *(2)*

3.3 The perimeter of a rectangle with length $(x + 4)$ cm and breadth 3 cm is at most 26 cm. Determine the largest possible value of x. **(5)**

> $2(x + 4) + 2(3) \leq 26$ *(2)*
> $2x + 14 \leq 26$ *(1)*
> $x \leq 6$ *(1)*
> The largest value is $\boldsymbol{x = 6}$ *(1)*

TOTAL: 33 marks

This question paper consists of 3 questions.

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