MARKING GUIDELINE

MARKS	DURATION	QUESTIONS
36	55 minutes	3

Name: _____ Class: _____

Date: _____

MARK _____ / 36

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 one of the following shows the ASSOCIATIVE property of addition? (1)

A) $2 + 5 = 5 + 2$

B) $(2 + 5) + 3 = 2 + (5 + 3)$ ✓

C) $2 \times (5 + 3) = 2 \times 5 + 2 \times 3$

D) $2 + 0 = 2$

> **Answer: B** — Associative means the GROUPING may change; the order stays the same.
> - **A** — that is commutative — the order changed
> - **C** — that is distributive
> - **D** — that is the identity

1.2 The additive inverse of -9 is ... (1)

A) 0

B) $\frac{1}{9}$

C) -9

D) 9 ✓

> **Answer: D** — $-9 + 9 = 0$.
> - **A** — 0 is the identity, not the inverse
> - **B** — that is a multiplicative inverse
> - **C** — only 0 is its own additive inverse

1.3 The multiplicative inverse of $\frac{2}{3}$ is ... (1)

A) 0 **B)** $\frac{2}{3}$

C) $\frac{3}{2}$ ✓ **D)** $-\frac{2}{3}$

> **Answer: C** — $\frac{2}{3} \times \frac{3}{2} = 1$.
> - **A** — 0 has no multiplicative inverse
> - **B** — a number is its own inverse only for 1 and -1
> - **D** — that is the ADDITIVE inverse

1.4 Which one of the following operations is NOT commutative? (1)

A) multiplication **B) subtraction ✓**

C) none of them **D)** addition

> **Answer: B** — $7 - 5 = 2$ but $5 - 7 = -2$.
> - **A** — $5 \times 7 = 7 \times 5$
> - **C** — subtraction is a counter-example
> - **D** — $5 + 7 = 7 + 5$

1.5 Which number is its own MULTIPLICATIVE inverse as well as its own additive inverse? (1)

A) none of them ✓ **B)** 0

C) 1 **D)** -1

> **Answer: A** — 0 is its own additive inverse but has no multiplicative inverse; 1 and -1 are their own multiplicative inverses but not their own additive ones.
> - **B** — 0 has no multiplicative inverse
> - **C** — $1 + 1$ is not 0
> - **D** — $-1 + (-1)$ is not 0

1.6 $2 \times (7 + 3) = 2 \times 7 + 2 \times 3$ shows the ... property. (1)

A) commutative **B)** associative

C) identity **D) distributive ✓**

> **Answer: D** — The 2 is shared out over the bracket.
> - **A** — no order was swapped
> - **B** — no grouping was changed
> - **C** — nothing was left unchanged

1.7 Which one of the following is the IDENTITY element for multiplication? (1)

A) 1 ✓ **B)** the number itself

C) 0 **D)** -1

> **Answer: A** — Multiplying by 1 leaves any number unchanged.
> - **B** — a number times itself is its SQUARE, not the number
> - **C** — that is the identity for ADDITION
> - **D** — -1 changes the sign

1.8 If $a - b = b - a$, then ... (1)

A) it is true for all a and b **B)** a must be 0

C) a must equal b ✓ **D)** it is never true

> **Answer: C** — It holds only when both sides are 0, which needs $a = b$.
>
> - **A** — $7 - 5$ does not equal $5 - 7$
> - **B** — $0 - 5$ does not equal $5 - 0$
> - **D** — it is true when $a = b$

1.9 The sum of an integer and its additive inverse is always ... (1)

A) 0 ✓ **B)** double the number

C) 1 **D)** negative

> **Answer: A** — That is the definition of an additive inverse.
>
> - **B** — that is adding the number to itself
> - **C** — that is the product of a number and its multiplicative inverse
> - **D** — the sum is 0, which is neither positive nor negative

1.10 Dividing by a number is the same as multiplying by its ... (1)

A) square **B)** opposite sign

C) multiplicative inverse ✓ **D)** additive inverse

> **Answer: C** — $6 \div 2 = 6 \times \frac{1}{2} = 3$.
>
> - **A** — squaring does not undo multiplying
> - **B** — the sign is unrelated
> - **D** — that would change the sign, not divide

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 [13 MARKS]

Answer the questions below on the properties of integers.

2.1 Name the property shown by $(-6) \times 3 = 3 \times (-6)$, and show by ONE example that division is NOT commutative. (3)

> The **commutative** property of multiplication *(1)*
> $6 \div 3 = 2$ but $3 \div 6 = \frac{1}{2}$ *(1)*
> The two answers differ, so division is NOT commutative *(1)*

2.2 Name the property shown by $(2 + (-5)) + 4 = 2 + ((-5) + 4)$, and calculate the value of EACH side to show that it holds. (3)

> The **associative** property of addition *(1)*
> Left: $(2 + (-5)) + 4 = (-3) + 4 = 1$ *(1)*
> Right: $2 + ((-5) + 4) = 2 + (-1) = 1$ — the two sides are equal *(1)*

2.3 Use the distributive property to calculate $(-5) \times (20 + 3)$, and check your answer by working out the bracket first. (4)

> $= (-5)(20) + (-5)(3) = -100 - 15 = -115$ *(2)*
> Check: $(-5) \times 23 = -115$ ✓ *(2)*

2.4 Write down the additive inverse of -11 and the multiplicative inverse of -6. (3)

> Additive inverse: **11** *(1)*, because $-11 + 11 = 0$ *(1)*
> Multiplicative inverse: $\frac{\mathbf{-1}}{\mathbf{6}}$ *(1)*

QUESTION 3 [13 MARKS]

Answer the questions below. Give a reason or an example wherever one is asked for.

3.1 Is subtraction commutative? Give a reason and support it with an example using integers. (3)

> **No** *(1)*
> $3 - 8 = -5$ but $8 - 3 = 5$ *(1)*
> The answers differ, so changing the order changes the answer *(1)*

3.2 Is division associative? Test it with $(24 \div 6) \div 2$ and $24 \div (6 \div 2)$. (4)

> $(24 \div 6) \div 2 = 4 \div 2 = 2$ *(1)*
> $24 \div (6 \div 2) = 24 \div 3 = 8$ *(2)*
> $2 \neq 8$, so division is **not associative** *(1)*

3.3 Zanele says the multiplicative inverse of a number is always smaller than the number. Give ONE example that shows she is wrong, and state for which numbers her statement IS true. (3)

> The multiplicative inverse of $\frac{1}{2}$ is 2 *(1)*
> and 2 is BIGGER than $\frac{1}{2}$, so she is wrong *(1)*
> Her statement is true only for numbers **greater than 1**, and for numbers between -1 and 0 (the inverse of $-\frac{1}{2}$ is -2) *(1)*

3.4 Write down the number that is its own additive inverse, and the TWO numbers that are their own multiplicative inverses. **(3)**

> Additive: **0**, because $0 + 0 = 0$ *(1)*
> Multiplicative: **1**, because $1 \times 1 = 1$ *(1)*
> and **−1**, because $(-1) \times (-1) = 1$ *(1)*

TOTAL: 36 marks

This question paper consists of 3 questions.

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