MARKING GUIDELINE

MARKS	DURATION	QUESTIONS
34	55 minutes	3

Name: _____ Class: _____

Date: _____

MARK ____ / 34

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 For $y = 4x - 3$, the value of y when $x = 5$ is ... (1)

A) 20 **B)** 23

C) -17 **D) 17 ✓**

Answer: D — $4(5) - 3 = 17$.

- **A** — forgot to subtract the 3
- **B** — added the 3
- **C** — subtracted the wrong way round

1.2 For $y = 4x - 3$, the value of x when $y = 29$ is ... (1)

A) 26 **B)** 113

C) 6,5 **D) 8 ✓**

Answer: D — $4x = 32$, so $x = 8$.

- **A** — subtracted 3 instead of adding it, and did not divide
- **B** — multiplied instead of dividing
- **C** — subtracted 3 instead of adding it: $26 \div 4$

1.3 A flow diagram gives the outputs 1 ; 4 ; 7 ; 10 for the inputs 1 ; 2 ; 3 ; 4. The rule is ... (1)

A) $y = 3x - 2$ ✓ **B)** $y = 2x - 1$

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

Answer: A — The outputs go up by 3, and $3(1) - 2 = 1$.

- **B** — gives 1 for $x = 1$ but 3 for $x = 2$
- **C** — gives 3 for $x = 1$
- **D** — gives 4 for $x = 1$

1.4 In the relationship $y = -2x + 5$, as x INCREASES the value of y ... (1)

A) increases
B) first rises, then falls
C) decreases ✓
D) stays the same

> **Answer: C** — The input is multiplied by a NEGATIVE number.
> - **A** — that would need a positive coefficient
> - **B** — a LINEAR rule changes in one direction only; it never turns
> - **D** — the coefficient of x is not 0

1.5 For $y = x^2 - 2$, the value of y when $x = 6$ is ... (1)

A) 34 ✓
B) 36
C) -38
D) 10

> **Answer: A** — $6^2 - 2 = 34$.
> - **B** — forgot to subtract the 2
> - **C** — subtracted 36 from -2
> - **D** — multiplied 6 by 2 and subtracted 2

1.6 For $y = x^2 - 2$, which TWO inputs give $y = 14$? (1)

A) 8 and -8
B) 4 only
C) 4 and −4 ✓
D) 16 and -16

> **Answer: C** — $x^2 = 16$, and both 4 and -4 square to 16.
> - **A** — halved 16
> - **B** — missed the negative root
> - **D** — that is x^2, not x

1.7 Which one of the following tables shows a LINEAR relationship? (1)

A) $1;2;3 \rightarrow 1;4;9$
B) $1;2;3 \rightarrow 1;8;27$
C) $1;2;3 \rightarrow 2;4;8$
D) 1;2;3 → 5;8;11 ✓

> **Answer: D** — The outputs go up by a CONSTANT 3.
> - **A** — the differences are 3 and 5 — the squares
> - **B** — the cubes
> - **C** — the outputs DOUBLE — that is exponential

1.8 The rule "subtract 4, then multiply by 3" written as a formula is ... (1)

A) $y = 3(x - 4)$ ✓
B) $y = x - 12$
C) $y = 3x + 4$
D) $y = 3x - 4$

> **Answer: A** — The subtraction happens FIRST, so it is inside the bracket.
> - **B** — that leaves out the multiplication of x
> - **C** — that adds instead of subtracting
> - **D** — that multiplies first

1.9 For $y = 3(x - 4)$, the value of y when $x = 4$ is ... (1)

A) -12 **B)** 0 ✓

C) 12 **D)** -8

> **Answer: B** — $3(4 - 4) = 3(0) = 0$.
> - **A** — used $x = 0$
> - **C** — multiplied before subtracting
> - **D** — subtracted 12 from 4

1.10 In $y = mx + c$, the value of y when $x = 0$ is ... (1)

A) $m + c$ **B)** c ✓

C) m **D)** 0

> **Answer: B** — The mx term becomes 0, leaving c.
> - **A** — the mx term vanishes
> - **C** — m is multiplied by x, which is 0
> - **D** — only if c is also 0

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]

Answer the questions below on the relationship $y = 4x - 3$.

2.1 Determine y when $x = 5$, and the value of x for which $y = 29$. (3)

> $y = 4(5) - 3 = \mathbf{17}$ *(2)*
> $4x - 3 = 29$ gives $4x = 32$, so $x = \mathbf{8}$ *(1)*

2.2 Determine x when $y = 17$. (3)

> $4x - 3 = 17$ *(1)*
> $4x = 20$ *(1)*
> $\boldsymbol{x = 5}$ *(1)*

2.3 Determine the rule, in the form $y = \ldots$, for the table $1 \to 4$; $2 \to 7$; $3 \to 10$. (3)

> The outputs go up by 3 each time, so $y = 3x + c$ *(1)*
> $3(1) + c = 4$, so $c = 1$ *(1)*
> $\boldsymbol{y = 3x + 1}$ *(1)*

2.4 If $y = x^2 - 2$, determine y when $x = 6$, and the TWO values of x for which $y = 14$. **(3)**

> $y = 6^2 - 2 = \mathbf{34}$ *(2)*
> $x^2 - 2 = 14$ gives $x^2 = 16$, so $x = \mathbf{4}$ or $x = \mathbf{-4}$ *(1)*

QUESTION 3 [12 MARKS]

The rule for finding the output values in the table below is $y = -2x + 5$.

x	-2	0	4	8
y				

3.1 Complete the table by determining the four output values. **(4)**

> $x = -2$: $y = -2(-2) + 5 = \mathbf{9}$ *(1)*
> $x = 0$: $y = \mathbf{5}$ *(1)*
> $x = 4$: $y = \mathbf{-3}$ *(1)*
> $x = 8$: $y = \mathbf{-11}$ *(1)*

3.2 Write the rule in words, and hence write down the output value when the input is 0. **(3)**

> Multiply the input by -2 *(1)*
> and then add 5 *(1)*
> When $x = 0$ the first step gives 0, so $y = \mathbf{5}$ *(1)*

3.3 Determine the value of x for which $y = 0$. **(3)**

> $-2x + 5 = 0$ *(1)*
> $-2x = -5$ *(1)*
> $\boldsymbol{x = 2{,}5}$ *(1)*

3.4 State whether the output values increase or decrease as x increases, and give a reason. **(2)**

> They **decrease** *(1)* — the input is multiplied by a NEGATIVE number *(1)*

TOTAL: 34 marks

This question paper consists of 3 questions.

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