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 The next term of the pattern 4 ; 7 ; 10 ; 13 ; ... is ... (1)

A) 26 **B) 16 ✓**

C) 15 **D)** 17

Answer: B — The constant difference is 3.

- **A** — doubled the last term
- **C** — added 2
- **D** — added 4

1.2 The pattern 2 ; 6 ; 18 ; 54 ; ... is ... (1)

A) neither linear nor geometric **B) geometric, multiplying by 3 each time ✓**

C) linear, adding 12 each time **D)** linear, adding 4 each time

Answer: B — $6 \div 2 = 3$, $18 \div 6 = 3$ and $54 \div 18 = 3$ — a constant RATIO.

- **A** — a constant ratio makes it geometric
- **C** — 12 is only the second difference — the differences are 4, 12 and 36
- **D** — the differences are 4, 12 and 36 — not constant

1.3 Which pattern has a constant DIFFERENCE? (1)

A) 2 ; 6 ; 12 ; 20 **B)** 1 ; 2 ; 4 ; 8

C) 1 ; 4 ; 9 ; 16 **D) 3 ; 8 ; 13 ; 18 ✓**

Answer: D — The difference is 5 every time.

- **A** — the differences are 4, 6 and 8
- **B** — a constant RATIO of 2
- **C** — the square numbers — the differences grow

1.4 The 6th term of the pattern 5 ; 9 ; 13 ; ... is ... (1)

A) 29 **B)** 17

C) 25 ✓ **D)** 21

> **Answer: C** — Adding 4 each time: 5, 9, 13, 17, 21, 25.
> - **A** — that is the 7th term
> - **B** — that is the 4th term
> - **D** — that is the 5th term

1.5 A pattern starts at 100 and each term is HALF the one before. The 4th term is ... (1)

A) 25 **B)** 6,25

C) 50 **D) 12,5 ✓**

> **Answer: D** — 100 ; 50 ; 25 ; 12,5.
> - **A** — that is the 3rd term
> - **B** — that is the 5th term
> - **C** — that is the 2nd term

1.6 In the pattern 1 ; 4 ; 9 ; 16 ; ... each term is ... (1)

A) the position number SQUARED ✓ **B)** double the one before

C) the position number times 3 **D)** 3 more than the one before

> **Answer: A** — 1^2; 2^2; 3^2; 4^2.
> - **B** — 4 is not double 1
> - **C** — 3×2 is not 4
> - **D** — only the first difference is 3

1.7 A tile pattern goes 4 ; 7 ; 10 ; ... How many tiles are in the 10th pattern? (1)

A) 34 **B) 31 ✓**

C) 40 **D)** 30

> **Answer: B** — The 10th term is $4 + 9 \times 3 = 31$.
> - **A** — added one extra step
> - **C** — multiplied 10 by 4
> - **D** — multiplied 10 by 3 and forgot the start

1.8 Which one of the following patterns is DECREASING? (1)

A) 3 ; 6 ; 9 ; 12 **B)** 5 ; 5 ; 5 ; 5

C) 20 ; 16 ; 12 ; 8 ✓ **D)** 1 ; 2 ; 4 ; 8

> **Answer: C** — The terms fall by 4 each time.
> - **A** — increasing by 3
> - **B** — constant, neither rising nor falling
> - **D** — increasing by doubling

1.9 The missing number in 2 ; 5 ; 10 ; ___ ; 26 is ... (1)

A) 17 ✓ **B)** 25

C) 15 **D)** 20

> **Answer: A** — The differences are 3, 5, 7, 9, so the term after 10 is 17.
>
> - **B** — took the next square, $5^2 = 25$ — but each term is one MORE than a square, so the gap is $4^2 + 1 = 17$
> - **C** — assumed a constant difference of 5
> - **D** — assumed a difference of 10

1.10 A pattern is geometric when consecutive terms have a constant ... (1)

A) sum **B)** difference

C) product **D) ratio ✓**

> **Answer: D** — Each term is the one before MULTIPLIED by a fixed number.
>
> - **A** — 2; 6; 18 gives sums of 8 and 24 — not constant
> - **B** — a constant difference makes it LINEAR
> - **C** — 2; 6; 18 gives products of 12 and 108 — not constant

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 [9 MARKS]

Write down the NEXT THREE terms of each pattern, and state the rule you used.

2.1 6; 11; 16; 21; ... (3)

> The difference is +5 *(1)*
> **26; 31; 36** *(2)*

2.2 45; 38; 31; 24; ... (3)

> The difference is −7 *(1)*
> **17; 10; 3** *(2)*

2.3 3; 9; 27; 81; ... (3)

> Each term is multiplied by 3 — a constant RATIO, not a constant difference *(1)*
> **243; 729; 2 187** *(2)*

QUESTION 3 [12 MARKS]

Study the pattern of tiles below and answer the questions that follow.



Term 1
4 tiles

Term 2
7 tiles

Term 3
10 tiles

3.1 Write down the number of tiles in the 4th AND the 5th pattern. **(3)**

> Each pattern adds 3 tiles *(1)*
> 4th: $10 + 3 = \mathbf{13\ tiles}$ *(1)*
> 5th: $13 + 3 = \mathbf{16\ tiles}$ *(1)*

3.2 Determine the number of tiles in the 8th pattern, and explain how you found it without drawing every pattern in between. **(3)**

> The 8th pattern is 3 steps after the 5th *(1)*
> $16 + 3 \times 3 = \mathbf{25\ tiles}$ *(1)*
> The pattern goes up by a CONSTANT 3, so the number of steps can simply be multiplied by 3 *(1)*

3.3 Describe the pattern in your own words, and state how many tiles must be ADDED to the 8th pattern to build the 12th. **(3)**

> Start with 4 tiles *(1)*
> and add 3 more tiles for each new pattern *(1)*
> From the 8th to the 12th is 4 steps, so $4 \times 3 = \mathbf{12\ tiles}$ must be added *(1)*

3.4 Is this pattern linear or geometric? Give a reason for your answer, and write down the first THREE terms of a geometric pattern that also starts at 4. **(3)**

> **Linear** *(1)*
> The terms go up by the SAME amount each time (a constant difference), instead of being multiplied by a constant ratio *(1)*
> A geometric example: **4; 8; 16** — each term is multiplied by 2 *(1)*

TOTAL: 31 marks

This question paper consists of 3 questions.

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