Number Patterns: Linear Sequences (Grade 10)

MEMORANDUM

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

Date: .....

MARK ____ / 24

Answer all questions. Show all your working — marks are awarded for method as well as the final answer. **Teacher copy: accept any correct equivalent method.**

1 Write down the constant difference of 5 ; 8 ; 11 ; 14 ; ... (1)

$d = 3$ ✓ (1)

2 Determine the general term T_n of 5 ; 8 ; 11 ; 14 ; ... (3)

$d = 3$, $T_1 = 5 \rightarrow c = 2 \rightarrow \mathbf{T_n = 3n + 2}$ ✓✓✓ (3)

3 Calculate T_{50} for the sequence 5 ; 8 ; 11 ; ... (2)

$3(50) + 2 = \mathbf{152}$ ✓✓ (2)

4 Which term of 5 ; 8 ; 11 ; ... is equal to 47? (2)

$3n + 2 = 47 \rightarrow \mathbf{n = 15}$ ✓✓ (2)

5 Is 100 a term of the sequence 5 ; 8 ; 11 ; ...? Justify. (3)

$3n = 98$ gives $n = 32{,}67$ which is **not a whole number**, so no. ✓✓✓ (3)

6 Determine the general term of 7 ; 11 ; 15 ; 19 ; ... (2)

$d = 4$, $c = 3 \rightarrow \mathbf{T_n = 4n + 3}$ ✓✓ (2)

7 Determine the general term of 20 ; 17 ; 14 ; 11 ; ... (2)

$d = -3$, $c = 23 \rightarrow \mathbf{T_n = -3n + 23}$ ✓✓ (2)

8 Explain why a linear sequence plots as a straight line. (2)

Because $T_n = dn + c$ is the equation of a straight line, with the **constant difference as the gradient**. ✓✓ (2)

9 Which is the first term of 5 ; 8 ; 11 ; ... that is greater than 200? **(3)**

> $3n + 2 > 200 \rightarrow n > 66$ *(2)*
> $n = 67$: $T_{67} = \mathbf{203}$ *(1)* ✓✓✓ **(3)**

10 Square tables are placed in a row, with chairs around them: 1 table seats 4, 2 tables seat 6 and 3 tables seat 8. How many tables are needed to seat 60 people? **(4)**

> $T_n = 2n + 2$ *(2)*
> $2n + 2 = 60 \rightarrow \boldsymbol{n = 29}$ **tables** *(2)* ✓✓✓✓ **(4)**

TOTAL: 24 marks

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