Name:	Teacher Assessment

Section A Using the n^{th} Term Formula Grade D / C

1. (a) The first term of a sequence is –2.
The rule for continuing the sequence is

Add 7
then
Multiply by 4

What is the second term of the sequence?

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Answer .....

(1)

(b) This rule is used to continue a different sequence.

Multiply by 2
then
Add 5

The second term of this sequence is 3.
What is the first term?

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Answer .....

(3)
(Total 4 marks)

2. A sequence of numbers is shown.

5 9 13 17 21

(a) Find an expression for the *nth* term of the sequence.

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.....

Answer .....

(2)

(b) Explain why 83 will not be a term in this sequence.

.....

.....

(2)
(Total 4 marks)

3. A sequence of numbers is shown.

2 5 8 11 14

(a) Find an expression for the *n*th term of the sequence.

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Answer .....

(2)

(b) Explain why 99 will not be a term in this sequence.

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(2)

(Total 4 marks)

4. A pattern using pentagons is made of sticks.

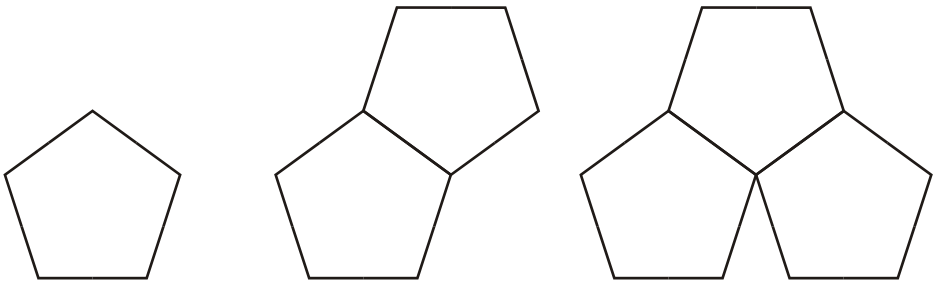

Diagram 1 Diagram 2 Diagram 3

5 sticks 9 sticks 13 sticks

(a) How many sticks are needed for Diagram 5?

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Answer .....

(2)

(b) Write down an expression for the number of sticks in Diagram *n*.

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Answer .....

(2)

(c) Which Diagram uses 201 sticks?

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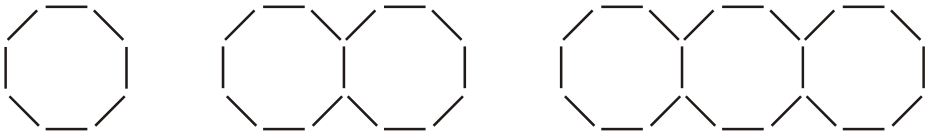
Answer .....

(3)

(Total 7 marks)

5. A sequence of patterns is made using octagons. Each octagon is made of sticks.



Pattern 1
8 sticks

Pattern 2
15 sticks

Pattern 3
22 sticks

(a) (i) How many sticks are needed for Pattern 5?

Answer ……

(1)

(ii) Explain how you worked out your answer.

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(1)

(b) Write down an expression for the number of sticks in Pattern *n*.

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Answer ……

(2)

(c) Which pattern uses 358 sticks?

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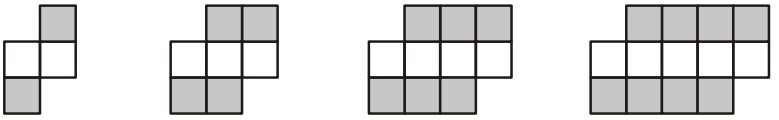
Answer ……

(2)(Total 6 marks)

6. Patterns are made from shaded and unshaded squares.



1st pattern 2nd pattern 3rd pattern 4th pattern

(a) How many shaded squares are there in the *n*th pattern?

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Answer ……..

(1)

(b) How many unshaded squares are there in the *n*th pattern?

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Answer ……..

(1)(Total 2 marks)

7. The *n*th term of a sequence is given by the expression $n^2 - 3$
Write down the first three terms of the sequence.

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Answer ..... , ... , ...

(Total 2 marks)

8. (a) Write down the first three terms of the sequence whose *n*th term is given by

$$\frac{5n}{4n+7}$$

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Answer .....

(2)

(b) Which term of the sequence has a value of 1?

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Answer .....

(2)

(Total 4 marks)

9. Here are the *n*th terms of 3 sequences.

Sequence 1	*n*th term	$4n + 1$
Sequence 2	*n*th term	$3n + 3$
Sequence 3	*n*th term	$3n - 1$

For each sequence state whether the numbers in the sequence are

A	Always multiples of 3
S	Sometimes multiples of 3
N	Never multiples of 3

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Success:

Target:

Answer Sequence 1 ..... Sequence 2 ..... Sequence 3 .....

(Total 3 marks)

Teacher Assessment

Section C Problem Solving Using Sequences Grade B → A*

1. Find the n^{th} term of the following sequences.

(a) 1, 4, 9, 16, 25, ...

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Answer.....

(1)

(b) –2, 1, 6, 13, 22, ...

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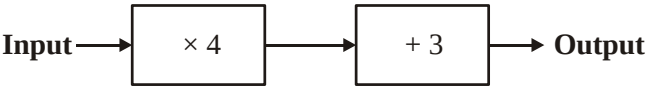
Answer.....

(1)
(Total 2 marks)

2. Here is a number machine.



Use the number machine to complete the table.

Input	2		*n*	
Output	11	35		*x*

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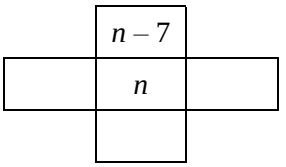
(Total 6 marks)

3. (a) Part of a number grid is shown below.

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	32	33	34	35

The shaded cross is called C_{11} because it has the number 11 at the centre.

This is C_n



Fill in the empty boxes.

(2)

(b) Kevin notices the following number sequence in the grid.

1, 9, 17, 25, 33,...

Write down the *nth* term of this sequence.

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Answer .....

(2)
(Total 4 marks)

4. Annie, Bert and Charu are investigating the number sequence

21, 40, 65, 96, 133, ...

(a) Annie has found the following pattern.

1st term	1	×	2	+	3^2	+	2	×	5	= 21
2nd term	2	×	3	+	4^2	+	3	×	6	= 40
3rd term	3	×	4	+	5^2	+	4	×	7	= 65
4th term	4	×	5	+	6^2	+	5	×	8	= 96
5th term	5	×	6	+	7^2	+	6	×	9	= 133

Complete the *n*th term for Annie's pattern.

*n*th term $n \times (n + 1) +$ ..... $+$ ..... $\times$ .....

(2)

(b) Bert has found this formula for the *n*th term

$$(3n + 1)(n + 3) + 5$$

Charu has found this formula for the *n*th term

$$(2n + 3)^2 - (n + 1)^2$$

Prove that these two formulae are equivalent.

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(3)
(Total 5 marks)

5. Each term of a Fibonacci sequence is formed by adding the previous two terms.

1, 1, 2, 3, 5, 8, 13, 21, ……

A Fibonacci sequence starts a, b, $a + b$, …

(a) Use algebra to show that the 6th term of this Fibonacci sequence is $3a + 5b$

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(2)

(b) Use algebra to prove that the difference between the 9th term and 3rd term of this sequence is four times the 6th term.

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(3)
(Total 5 marks)

6. The triangle number sequence is

1, 3, 6, 10, 15, 21, ...

The *n*th term of this sequence is given by

$$\frac{1}{2}n(n+1)$$

(a) Write down an algebraic expression for the $(n-1)$th term of the sequence.

Answer .....

(1)

(b) Prove, algebraically, that the sum of any two consecutive triangle numbers is a square number.

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(3)
(Total 4 marks)

Success:	Target: