

Topic 16 Sequences and functions (Pre-TT) [48]

1.

A sequence of numbers is shown.

5 9 13 17 21

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

(2)

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

(2)

(Total 4 marks)

2.

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

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

(2)

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

(2)

(Total 4 marks)

3.

(a) A sequence is given by 5, 11, 19, 29,...

Find a formula for the n -th term in the form $u_n = an^2 + bn + c$.

(4)

(b) Does the term 341 appear in the sequence? Show how you got your answer.

(3)

(Total 7 marks)

4.

A sequence is defined by the term-to-term rule $u_{n+1} = u_n^2 - 8u_n + 17$.

(a) Given that $u_1 = 4$, find u_2 and u_3 .

(b) Given instead that $u_1 = 2$, find u_2 , u_3 and u_{100} .

(Total 5 marks)

5.

The n th term of a sequence is $2n + 1$

The n th term of a different sequence is $3n - 1$

Work out the **three** numbers that are

in both sequences

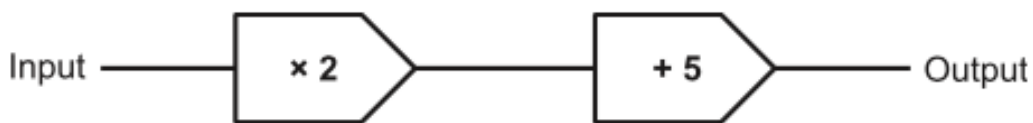
and

between 20 and 40

[3 marks]

6.

(a) A function is represented by the following function machine.



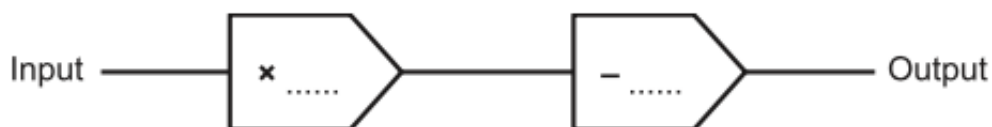
- (i) A number is input into the machine.
The output is used as a new input.
The second output is 11.

Work out the number that was the **first input**.

- (ii) A number is input into the machine.
The output given is the same number.

Work out the number.

(b) Another function machine is shown below.



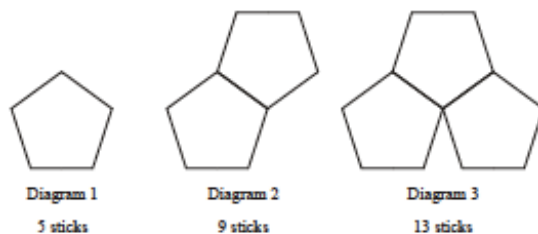
If the Input is 3, the Output is 5.
If the Input is 7, the Output is 25.

Use this information to fill in the two boxes.

(Total 8 marks)

7.

A pattern using pentagons is made of sticks.



- (a) How many sticks are needed for Diagram 5? (2)
- (b) Write down an expression for the number of sticks in Diagram n . (2)
- (c) Which Diagram uses 201 sticks? (3)

(Total 7 marks)

8.

Here are the first six terms of a Fibonacci sequence.

1 1 2 3 5 8

The rule to continue a Fibonacci sequence is,

the next term in the sequence is the sum of the two previous terms.

(a) Find the 9th term of this sequence.

The first three terms of a different Fibonacci sequence are

a b $a + b$

(b) Show that the 6th term of this sequence is $3a + 5b$

Given that the 3rd term is 7 and the 6th term is 29,

(c) find the value of a and the value of b .

(Total 6 marks)

9.

Work out the formula for the n -th term of the sequence: $-8, 2, 16, 34, \dots$

(Total 4 marks)