CONJECTURES

Answer all of these questions. Remember to show your working out in all questions.

MAIN QUESTIONS

1.

1, 4, 9, 16, 25

2.

2, 3, 5, 7, 11

3.

1, 1, 2, 3, 5, 8

4.

1, 3, 6, 10, 15

5.

1, 8, 27, 64, 125

6.

2, 4, 8, 16, 32

7.

1, 4, 7, 10, 13

8.

3, 6, 12, 24, 48

9.

1, 2, 4, 7, 11, 16

10.

1, 3, 7, 15, 31

11.

1, 5, 14, 30, 55

12.

1, 2, 6, 24, 120

13.

1, 4, 9, 16, 25, 36

14.

2, 6, 18, 54, 162

15.

1, 8, 21, 40, 65

16.

1, 3, 9, 27, 81

17.

1, 5, 13, 25, 41

18.

1, 2, 4, 8, 16, 32

19.

1, 4, 10, 20, 35

20.

1, 3, 6, 10, 15, 21

21.

2, 5, 10, 17, 26

22.

1, 6, 15, 28, 45

23.

1, 4, 13, 40, 121

24.

1, 5, 12, 22, 35

25.

2, 3, 5, 9, 17

26.

1, 3, 8, 21, 55

27.

1, 4, 9, 16, 25, 36, 49

28.

1, 2, 5, 14, 41

29.

1, 7, 19, 37, 61

30.

1, 4, 10, 22, 46

MASTER QUESTIONS

M1.

A sequence begins 1, 3, 6, 10, 15. If this pattern continues, what is the 20th term?

M2.

In a Fibonacci-like sequence, each term is the sum of the previous two terms. If the first two terms are 5 and 8, what is the 10th term?

M3.

A pattern of dots forms triangular numbers. How many dots are in the 15th triangular number?

M4.

A sequence of square numbers starts from 1. What is the sum of the first 10 square numbers?

M5.

In a geometric sequence, the first term is 2 and the common ratio is 3. What is the 8th term?

M6.

A pattern shows that the sum of the first n odd numbers equals n^2. Using this, find the sum of the first 25 odd numbers.

M7.

The number of diagonals in a convex polygon with n sides is given by n(n-3)/2. How many diagonals does a 12-sided polygon have?

M8.

A sequence is defined by $a_n = 2a_{n-1} + 1$ with $a_1 = 1$. What is the 7th term?

M9.

The maximum number of regions created by n lines in a plane is $n(n+1)/2 + 1$. How many regions are created by 10 lines?

M10.

A pattern shows that the sum of the angles in a convex polygon with n sides is $(n-2)\times180°$. What is the sum of angles in a 15-sided polygon?