Write your name here

Surname		Other names

Centre Number

Candidate Number

Mathematics

Sequences

Higher Tier

GCSE style questions arranged by topic

Paper Reference
1MA1/3H

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out**.

Information

- The total mark for this paper is
- The marks for **each** question are shown in brackets
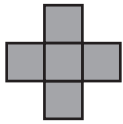 – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
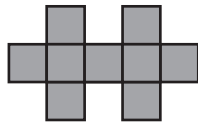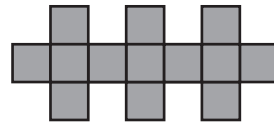- Check your answers if you have time at the end.

Turn over ▶

1 Here are some patterns made from squares.

Pattern number 1   Pattern number 2   Pattern number 3

(a) The diagram below shows part of Pattern number 5
     Complete the diagram for Pattern number 5

Pattern number 4   Pattern number 5

(1)
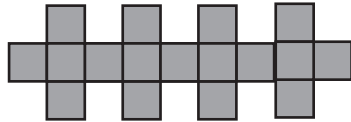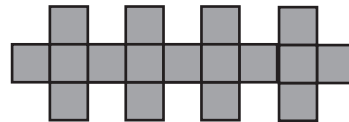
(b) Complete the table.

Pattern number	1	2	3		
Number of squares	5	9	13		

(1)

(c) Find the number of squares used for Pattern number 12

....

(1)

(Total for Question 1 is 3 marks)

2 Here are some patterns made using sticks.
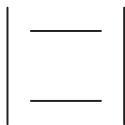
Pattern number 1   Pattern number 2   Pattern number 3

(a) In the space below, complete Pattern number 4.

Pattern number 4

(1)

(b) Complete the table.

Pattern number	1	2			
Number of sticks	4	7	10		

(1)

(c) How many sticks are used in Pattern number 10?

....

(1)

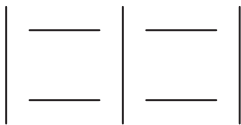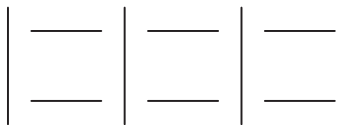**(Total for Question 2 is 3 marks)**

3 Here are some patterns made with dots.
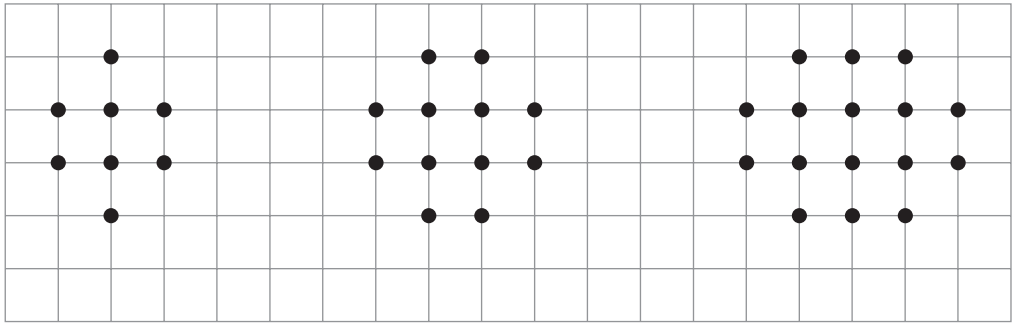
Pattern number 1   Pattern number 2   Pattern number 3

(a) In the space below, draw Pattern number 4

    Pattern number 4

(1)

(b) Complete the table.

Pattern number	1	2			
Number of dots	8	12	16		

(2)

(Total for Question 3 is 3 marks)

4 The first even number is 2

(a) Write down the 4th even number.

....
(1)

Here are some patterns made from sticks.

Pattern number 1   **Pattern number 3**

(b) Draw Pattern number 4

Pattern number 4
(1)

(c) Complete the table.

Pattern number	1	2			
Number of sticks	3	6	9		

(2)

Jenny wants to find the number of sticks in Pattern number 100

(d) Write down a method she could use.

....

....
(1)

(Total for Question 4 is 5 marks)

5 Here is a sequence of patterns made from grey squares and white squares.
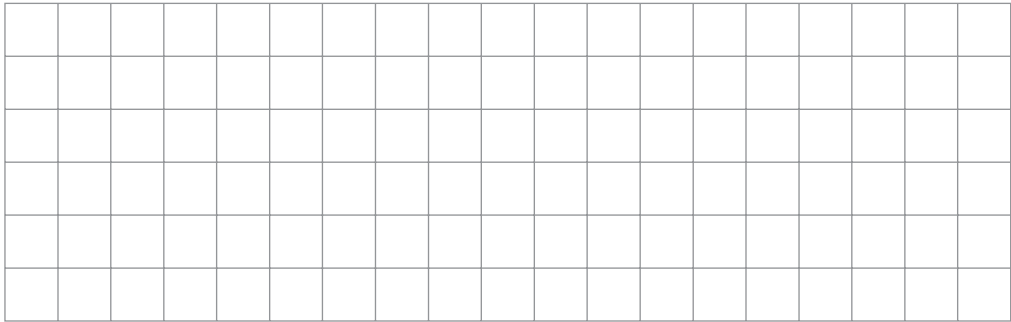
Pattern
Number 1

Pattern
Number 2

Pattern
Number 3

(a) Complete Pattern Number 5

Pattern
Number 4

Pattern
Number 5

(1)

(b) Complete the table.

Pattern Number	1	2			
Total number of squares	3	6			

(1)

One of the patterns in the sequence has 10 grey squares.

(c) How many white squares does this pattern have?

....

(1)

Another pattern in the sequence has a total of 18 squares.

(d) How many grey squares does the pattern have?

....

(1)

(Total for Question 5 is 4 marks)

6 Here are the first four terms of a number sequence.

$$5 \quad 9 \quad 13 \quad 17$$

(a) (i) Write down the next term of the number sequence.

....

(ii) Explain how you found your answer.

....

(2)

The 24 th term of the number sequence is 97

(b) Work out the 25 th term of the number sequence.

....

(3)

(Total for Question 6 is 3 marks)

7   The nth term of a number sequence is given by $3n+1$

(a) Work out the first **three** terms of the number sequence.

....
(1)

Here are the first four terms of another number sequence.

1   5   9   13

(b) Find, in terms of n, an expression for the nth term of this number sequence.

....
(2)

(Total for Question 7 is 3 marks)

8 Write down the next term in each sequence.

(a)(i)   5   8   11   14   ....

....

(1)

(a)(ii)   6   4   2   0   ....

....

(1)

(a)(iii)   2   4   8   16   ....

....

(1)

(b) The numbers in this sequence increase by the same amount each time.

11   35

What are the missing numbers?

....

(1)

(Total for Question 8 is 4 marks)

9   The nth term of a sequence is $100 - 3n$.

(a)   Work out the first three terms.

.........,...................,..................

(2)

(b)   Work out the first term of the sequence that is negative.

....

(2)

(Total for Question 9 is 4 marks)

10 **(a)**   Here are the first three terms of a sequence.

$$12 \qquad 8 \qquad 6 \qquad ....$$

The rule for working out the next term in the sequence is

> Add 4 to the previous term and then divide by 2

Work out the first term that is **not** a whole number.

………..…………......………

(2)

(b)   This sequence uses the same rule.

> Add 4 to the previous term and then divide by 2

The third term of this sequence is 9.

$$.... \qquad .... \qquad 9 \qquad ....$$

Work out the first term.

……..…………......………

(3)

(Total for Question 10 is 5 marks)

11 (a) Write down the next term of each sequence.

(a) (i)   3   8   13   18   ....

....

(1)

(a) (ii)   5.1   5.3   5.5   5.7   ....

....

(1)

(a) (iii)   2   –1   –4   –7   ....

....

(1)

(b)   Here is a different sequence.
       The third term is 20 and the fourth term is 36.

       ……   ……   20   36   ……

The term to term rule for this sequence is

Double and subtract four

Work out the first term of the sequence.

....

(2)

(Total for Question 11 is 5 marks)

12 (a)   The numbers in this sequence decrease by the same amount each time.

74   ……   58   50   42   ……

What are the **two** missing numbers?

.... and ....

(b)   The numbers in this different sequence decrease by the same amount each time.   **(2)**

26   ……   ……   ……   6

What are the **three** missing numbers?

.... , ... , ...

(2)

(Total for Question 12 is 4 marks)

13 (a)   Here are the first two terms of a sequence.

  5   4   ……   ……   ……

The rule for finding the next term in the sequence is

| Multiply the previous term by 2 and subtract 6 |

Work out the first negative term of the sequence.

(2)

(b)   Here are the first three terms of another sequence.

  1   4   7   …   …   …   ---   …

Which of the following is the nth term for this sequence? Circle the correct answer.

  $n + 3$ $3n + 1$ $3n - 2$ $3n + 2$

(1)

(Total for Question 13 is 3 marks)

14 (a) A sequence starts

          49   46   43   40

(a) (i) Write down the next two terms.

          .... and ....

(2)

(a) (ii) What is the rule for continuing the sequence?

          ....

(1)

(b) Another sequence starts

          57   50   43   36

This sequence is continued.

What is the first negative number in this sequence?

          ....

(1)

(c) The first sequence is also continued.

The two sequences have the number 43 in common.

What is the next number that the two sequences have in common?

          ....

(2)

(Total for Question 14 is 6 marks)

15 Here are the first four terms of an arithmetic sequence.

6   10   14   18

(a) Write an expression, in terms of n, for the nth term of this sequence.

....
(2)

The nth term of a different arithmetic sequence is $3n + 5$

(b) Is 108 a term of this sequence?
Show how you get your answer.

(2)

(Total for Question 15 is 4 marks)

16 (a) The nth term of a sequence is $2^n + 2^{n-1}$

Work out the 10th term of the sequence.

....

(1)

(b) The nth term of a different sequence is $4(2^n + 2^{n-1})$

Circle the expression that is equivalent to $4(2^n + 2^{n-1})$

$$2^{n+2} + 2^{n+1} \qquad\qquad 2^{2n} + 2^{2(n-1)}$$

$$8^n + 8^{n-1} \qquad\qquad 2^{n+2} + 2^{n-1}$$

(1)

(Total for Question 16 is 2 marks)

17 **(a)** Find the nth term of this linear sequence.

$$8 \qquad 11 \qquad 14 \qquad 17$$

(a) ....

(2)

(b) Here is a quadratic sequence.

$$2 \qquad 14 \qquad 36 \qquad 68$$

The expression for the nth term of this sequence is $pn^2 + qn$.
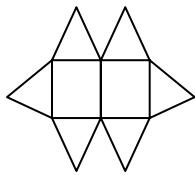
Find the value of p and the value of q.

(b) $p =$ ....

$q =$ ....
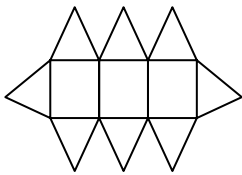
(4)

(Total for Question 17 is 6 marks)
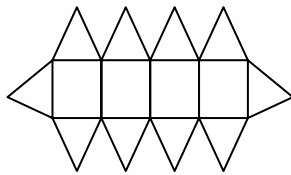
18 Here are the first three patterns in a sequence.
The patterns are made from triangles and rectangles.

pattern number 1   pattern number 2   pattern number 3

(a) How many triangles are there in pattern number 7?

....

(2)

Hassan says

"There are 4 rectangles in pattern number 3 so there will be 8 rectangles in pattern number 6"

(b) Is Hassan right?

Give a reason for your answer.

(1)

(Total for Question 18 is 3 marks)

BLANK PAGE