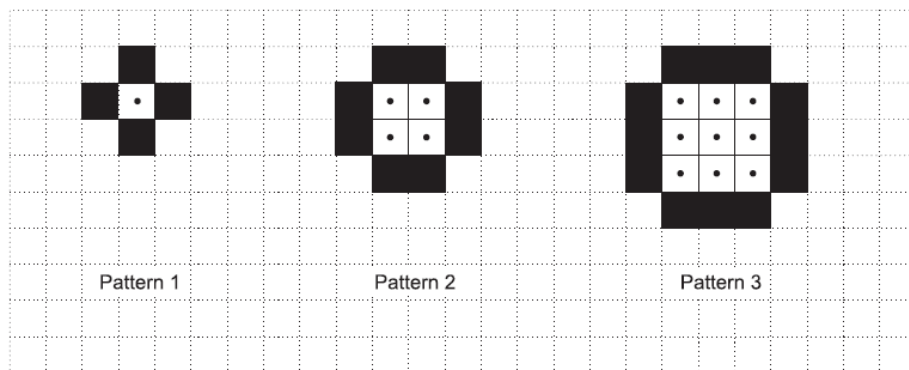# Sequences

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR, Pearson-Edexcel and WJEC Eduqas.

Name:	
Total Marks:	

1. Here are the first three patterns in a sequence.

Pattern 1   Pattern 2   Pattern 3

(a)   Draw Pattern 4 in this sequence on the grid below.

[2]

(b) Pattern 3 has 9 dotted squares and 12 black squares.

How many dotted squares will there be in Pattern 8?

.... [2]

(c) Write an expression for the number of black squares in the nth pattern.

(c) .... [2]

(d) Sally looks at the patterns. She says

If the pattern number is odd, the total number of squares will be odd.

If it is even, the total number of squares will be even.

Explain clearly why Sally is right for all patterns in the sequence.

[6]

2. (a) The nth term of a sequence is given by 3n + 5.

Explain why 21 is not a term in this sequence.

[2]

(b) Here are the first three terms in a sequence.

1   2   4

This sequence can be continued in different ways.

(i) Find one rule for continuing the sequence and give the next two terms.

Rule 1

Next two terms ....

[2]

(ii) Find a second rule for continuing the sequence and give the next two terms.

Rule 2

Next two terms ....

[2]

3. (a) The nth term of a sequence is given by $2n^2 + 1$.

Write down the first three terms of this sequence.

.... , ... , ... [2]

(b) Here are the first four terms of a different sequence.

2   7   12   17

Write an expression for the nth term of this sequence.

.... [2]

4. (a) Look at this table.

Odd numbers	Total
1	1^2
$1 + 3$	2^2
$1 + 3 + 5$	3^2

The pattern in the table continues.

(i) Complete the next row of the table.

[1]

(ii) What will be written in the Total column of the 100th row?

.... [1]

(b) Here is another table.

Even numbers	Total
2	$1^2 + 1$
$2 + 4$	$2^2 + 2$
$2 + 4 + 6$	$3^2 + 3$
$2 + 4 + 6 + 8$	$4^2 + 4$

The pattern in this table continues.

Write an expression for the total of the first n even numbers.

.... [2]

5. A sequence is generated using the rule

- multiply the previous term by 2
- then subtract 30.

The first term of the sequence is 40.

(a)   Find the second term.

.... [2]

(b)   Find the fourth term.

.... [2]

6. The nth term of a sequence is 2n + 1

The nth term of a different sequence is 3n - 1

Work out the three numbers that are
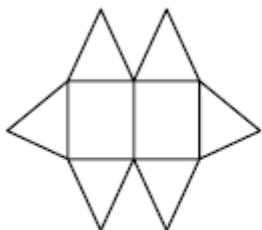
in both sequences

and
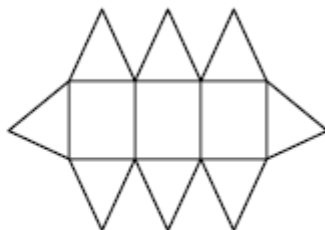
between 20 and 40

[3]

7. Here are the first three patterns in a sequence.
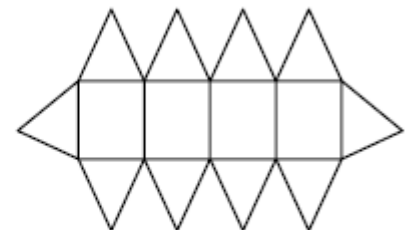
The patterns are made from triangles and rectangles.

pattern number 1   pattern number 2   pattern number 3

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

.... [2]

Charlie says

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

(b) Is Charlie right?

Give a reason for your answer.

[1]

8. 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]

9. 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.

.... [1]

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

[2]

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

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

a = ...

b = ...

[3]

10. Here are the first five terms of a sequence.

$$2 \qquad 8 \qquad 18 \qquad 32 \qquad 50$$

(a) Find the next term of this sequence.

.... [1]

The nth term of a different sequence is $3n^2 - 10$

(b) Work out the 5th term of this sequence.

.... [1]

11. The first three terms of a number pattern are 1   2   4

Hester says the first five terms of this number pattern are 1 2 4 8 16

(a) Write down the rule Hester could have used to get the 4th and 5th terms.

....

.... [1]

(b) Write down the 6th term of Hester's number pattern.

.... [1]

Jack uses a different rule.

He says the first six terms of the number pattern are

$$1 \qquad 2 \qquad 4 \qquad 7 \qquad 11 \qquad 16$$

(c) Write down the 7th and 8th terms of Jack's number pattern.

.... , ... [1].

12. Here are the first five terms of an arithmetic sequence.

$$-3 \quad 1 \quad 5 \quad 9 \quad 13$$

Find an expression, in terms of n, for the nth term of this sequence.

.... [2].

13. Which sequence is a geometric progression?

Circle your answer.

| 1 | 2 | 3 | 4 | | 1 | 2 | 4 | 7 |

| 1 | 2 | 4 | 8 | | 1 | 2 | 3 | 5 |

[1]

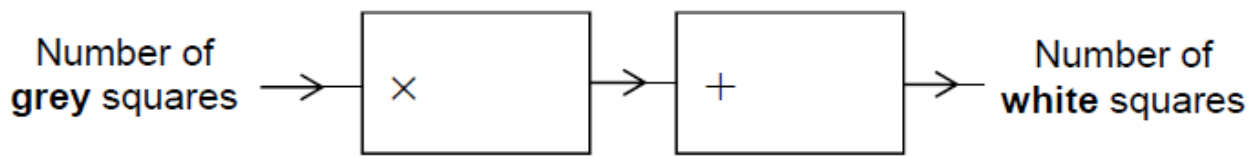14. A sequence of patterns uses grey squares and white squares.

Here are the first four patterns.
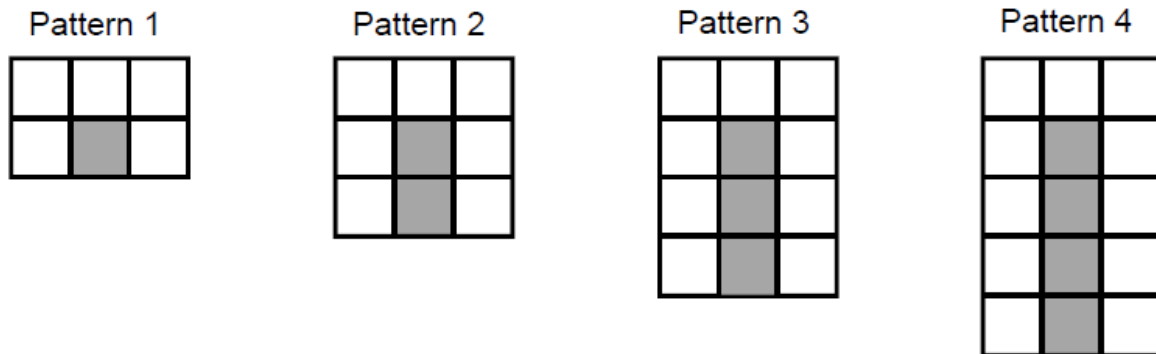
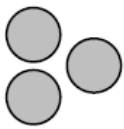(a) Work out the total number of squares in Pattern 100

[3]

(b) Complete this number machine for the sequence of patterns.

Number of
grey squares → [×] → [+] → Number of
white squares
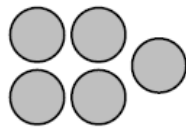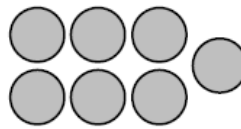
[1]

15. The diagram shows a sequence of patterns.
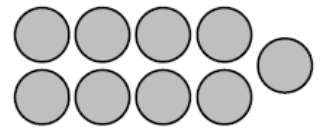
Pattern 1   Pattern 2   Pattern 3   Pattern 4

Pattern 1 Pattern 2 Pattern 3 Pattern 4

(a) Work out the number of circles in Pattern 6

[1]

(b) Complete the rule below.

[1]

Number of circles = Pattern number × [   ] + [   ]

(c) Which Pattern number has 51 circles?
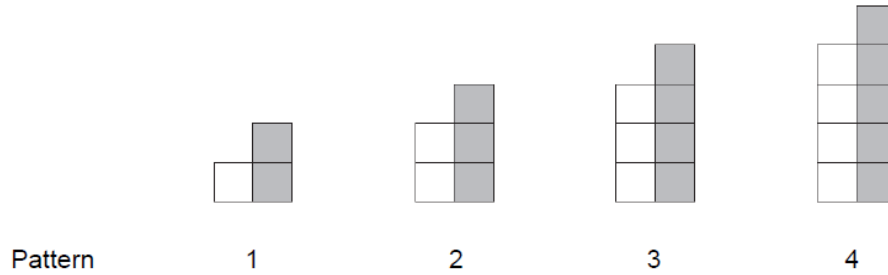
[1]

16. Work out the next term of this quadratic sequence.

4   12   24   40   _____

[2]

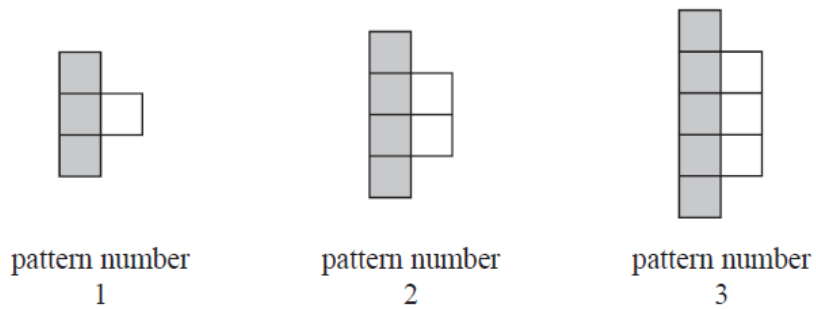17. The following patterns have been made using shaded and unshaded squares.

Pattern   1   2   3   4

Find the total number of squares in pattern 60.

[2]

18. Find the *n*th term of the sequence 6, 13, 20, 27, …

[2]

19. Here is a sequence of patterns made with grey square tiles and white square tiles.

pattern number   pattern number   pattern number
1   2   3

a) In the space below, draw pattern number 4

[2]

b) Find the total number of tiles in pattern number 20

.... [2]

c) Write an expression, in terms of n, for the number of grey tiles in pattern number *n*.

.... [2]

20. Here are the first three terms of a sequence.

                    32   26   20

   Find the first two terms in the sequence that are less than zero.

                                        .... [3]

CREDITS AND NOTES

Question	Awarding Body	Question	Awarding Body
1	OCR	11	Pearson Edexcel
2	OCR	12	Pearson Edexcel
3	OCR	13	AQA
4	OCR	14	AQA
5	OCR	15	AQA
6	AQA	16	AQA
7	Pearson Edexcel	17	WJEC Eduqas
8	Pearson Edexcel	18	WJEC Eduqas
9	Pearson Edexcel	19	Pearson Edexcel
10	Pearson Edexcel	20	Pearson Edexcel

Notes:

These questions have been retyped from the original sample/specimen assessment materials and whilst every effort has been made to ensure there are no errors, any that do appear are mine and not the exam board s (similarly any errors I have corrected from the originals are also my corrections and not theirs!).

Please also note that the layout in terms of fonts, answer lines and space given to each question does not reflect the actual papers to save space.

These questions have been collated by me as the basis for a GCSE working party set up by the GLOW maths hub - if you want to get involved please get in touch. The objective is to provide support to fellow teachers and to give you a flavour of how different topics "could" be examined. They should not be used to form a decision as to which board to use. There is no guarantee that a topic will or won't appear in the "live" papers from a specific exam board or that examination of a topic will be as shown in these questions.

Links:

AQA http://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300

OCR http://ocr.org.uk/gcsemaths

Pearson Edexcel http://qualifications.pearson.com/en/qualifications/edexcel-gcses/mathematics-2015.html

WJEC Eduqas http://www.eduqas.co.uk/qualifications/mathematics/gcse/

Contents:

This version contains questions from:

AQA – Sample Assessment Material and Practice set 1

OCR – Sample Assessment Material and Practice set 1

Pearson Edexcel – Sample Assessment Material, Specimen set 1 and Specimen set 2.

WJEC Eduqas – Sample Assessment Material