Name: SOLUTIONS

GCSE (1 - 9)

Linear Sequences

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Solutions by
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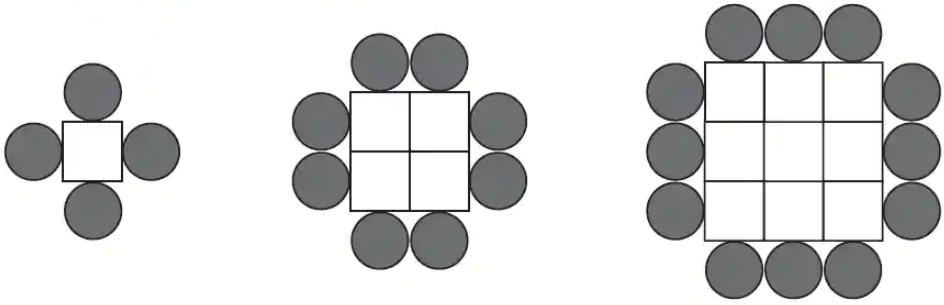
These questions are compiled from *released* Pearson Edexcel GCSE maths exam papers
They contain exam questions from up until the ***Summer 2023*** exam series
More recent exam papers do exist but are withheld for mock exams
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1

A sequence of patterns is made from circular tiles ● and square tiles □

Here are the first three patterns in the sequence.



pattern number 1 pattern number 2 pattern number 3

(a) How many square tiles are needed to make pattern number 6?

$6 \times 6 = 36$

(2)

(b) How many circular tiles are needed to make pattern number 20?

$20 \times 4 = 80$

(2)

Derek says,

"When the pattern number is odd, an odd number of square tiles is needed to make the pattern."

(c) Is Derek right?
You must give reasons for your answer.

Yes. You square the pattern number.

odd x odd = odd

(2)

(Total for Question 11 is 6 marks)

[Edexcel, GCSE, Summer 2017, Paper 1F, Q11]

2

Here are the first six terms of an arithmetic sequence.

-2 3 8 13 18 23 28

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

$5n - 2$

(2)

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

Nathan says that the 4th term of this sequence is 144

(b) Is Nathan right?
Show how you get your answer.

$3(4)^2 = 3 \times 16 = 48$

No. He is wrong.

(1)

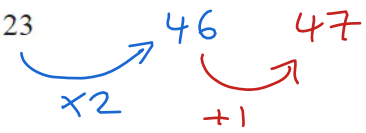
(Total for Question 25 is 3 marks)

[Edexcel, GCSE, Summer 2017, Paper 2F, Q25]

3

Here are the first four terms of a number sequence.

2 5 11 23 46 47



The rule to continue this sequence is

multiply the previous term by 2 and then add 1

Work out the 5th term of this sequence.

47

(Total for Question 5 is 1 mark)

[Edexcel, GCSE, Autumn 2017, Paper 1F, Q5]

4

Here is a sequence of patterns made with counters.



pattern number 1 pattern number 2 pattern number 3

(a) Find an expression, in terms of n, for the number of counters in pattern number n.

1 4 7 10

3 3

$3n + 1$

(2)

Bayo has 90 counters.

(b) Can Bayo make a pattern in this sequence using all 90 of his counters?
You must show how you get your answer.

$3n + 1 = 90$

$3n = 89$

$n = \frac{89}{3} = 29.6$

No. n must be an integer.

(2)

(Total for Question 18 is 4 marks)

[Edexcel, GCSE, Autumn 2017, Paper 3F, Q18]

5

Here are the first 4 terms of a sequence.

2 (+7) 9 (+7) 16 (+7) 23 (+7) 30

(a) (i) Write down the next term in the sequence.

30

(1)

(ii) Explain how you got your answer.

Add seven each time.

(1)

(b) Work out the 10th term of the sequence.

$7n - 5$

$7(10) - 5 = 65$

65

(1)

(Total for Question 4 is 3 marks)

[Edexcel, GCSE, Summer 2018, Paper 3F, Q4]

6

(a) The nth term of a sequence is $3n + 4$

Explain why 21 is not a term of this sequence.

$3n + 4 = 21$

$3n = 17$

$n = \frac{17}{3} = 5.\dot{6}$

n cannot equal $5.\dot{6}$
must be an integer.

(2)

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

1 2 4

Write down two numbers that could be the 4th term and the 5th term of this sequence.
Give the rule you have used to get your numbers.

8 16 (double each time)

7 11 (add 3 then add 4)

(2)

(Total for Question 9 is 4 marks)

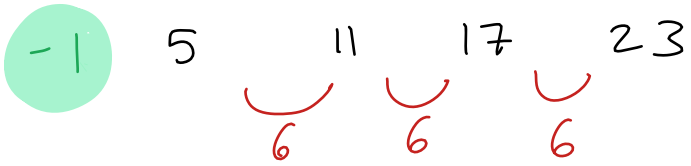
[Edexcel, GCSE, Autumn 2018, Paper 2F, Q9]

7

Here are the first four terms of an arithmetic sequence.

5 11 17 23

Write down an expression, in terms of n, for the nth term of the sequence.



$6n - 1$

(Total for Question 26 is 2 marks)

[Edexcel, GCSE, Autumn 2018, Paper 3F, Q26]

8

Here are the first five terms of a Fibonacci sequence.

3 , 3 , 6 , 9 , 15 , 24 , 39

(+0) (+3) (+3) (+6) (+9) (+15)

(a) Write down the next two terms of the sequence.

24 , 39

(1)

The first three terms of a different Fibonacci sequence are

a , a , $2a$, $3a$, $5a$, $8a$

(+a) (+2a) (+3a)

(b) Find the 6th term of this sequence.

$8a$

(2)

(Total for Question 28 is 3 marks)

[Edexcel, GCSE, Summer 2019, Paper 2F, Q28]

9

The first term of a sequence of numbers is 24
The term-to-term rule of this sequence is 'add 8'

Josie says,

"No number in this sequence is in the 5 times table."

(a) Give an example to show that Josie is wrong.

24 32 40
+8 +8

40

(1)

(b) Is 85 a number in this sequence?
Give a reason for your answer.

No. Only even numbers in this sequence

or

$8n + 16 = 85$

$8n = 69$

$n = \frac{69}{8} = 8\frac{5}{8}$

(1)

(Total for Question 13 is 2 marks)

[Edexcel, GCSE, Summer 2019, Paper 3F, Q13]

10

The nth term of a sequence is $2n^2 - 1$

The nth term of a different sequence is $40 - n^2$

Show that there is only one number that is in both of these sequences.

$2n^2 - 1$

$2(1)^2 - 1 = 1$

$2(2)^2 - 1 = 7$

$2(3)^2 - 1 = 17$

$2(4)^2 - 1 = 31$

$2(5)^2 - 1 = 49$

$40 - n^2$

$40 - (1)^2 = 39$

$40 - (2)^2 = 36$

$40 - (3)^2 = 31$

$40 - (4)^2 = 24$

$40 - (5)^2 = -10$

31 is the only term that appears in both.

(Total for Question 26 is 3 marks)

[Edexcel, GCSE, Autumn 2019, Paper 2F, Q26]

11

Here are the first five terms of a sequence.

1 3 6 10 15 21 28

Write down the next two terms of the sequence.

21 , 28

(Total for Question 8 is 2 marks)

[Edexcel, GCSE, Autumn 2019, Paper 3F, Q8]

12

The first five terms of an arithmetic sequence are

1 4 7 10 13

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

$3n - 2$

(Total for Question 20 is 2 marks)

[Edexcel, GCSE, Autumn 2020, Paper 1F, Q20]

13

Here are the first five terms of a number sequence.

45 40 35 30 25 20 15 10 5 0 −5

11th

(a) (i) Write down the next two terms of this sequence.

20 , 15

(1)

A term of this sequence is −5

(ii) Which term?

11th term

(1)

The nth term of a different sequence is given by the expression $4n + 3$

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

$4(9) + 3 = 39$

(1)

(Total for Question 12 is 3 marks)

[Edexcel, GCSE, Autumn 2020, Paper 3F, Q12]

14

Here are the first five terms of an arithmetic sequence.

−5 , 3 , 11 , 19 , 27

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

$8n - 13$

(Total for Question 19 is 2 marks)

[Edexcel, GCSE, Summer 2023, Paper 1F, Q19]

15

Here are the first five terms of a sequence.

3 , 8 , 13 , 18 , 23 , 28

(a) Write down the next term of this sequence.

28

(1)

(b) Write down the ratio of the second term to the fourth term.
Give your ratio in its simplest form.

8 : 18

4 : 9

4 : 9

(2)

(Total for Question 9 is 3 marks)

[Edexcel, GCSE, Summer 2023, Paper 2F, Q9]

16

Here are the first five terms of an arithmetic sequence.

7 6 13 6 19 6 25 6 31

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

$6n + 1$

$6n + 1$

(2)

The nth term of a different sequence is $8 - 6n$

(b) Is -58 a term of this sequence?
You must show how you get your answer.

$8 - 6n = -58$

$-6n = -66$

$n = \frac{-66}{-6}$

$n = 11$

Yes. It's the 11th term of the sequence.

(2)

(Total for Question 20 is 4 marks)

[Edexcel, GCSE, November 2022, Paper 2F, Q20]

17

Here are the first three terms of a sequence.

20 (−4) 16 (−3) 13 (−2) 11 (−1) 10

(i) Write down two numbers that could be the 4th and 5th terms of this sequence.

11 , 10

(1)

(ii) Write down the rule you used to get your numbers.

The differences between the terms are getting 1 smaller each time.

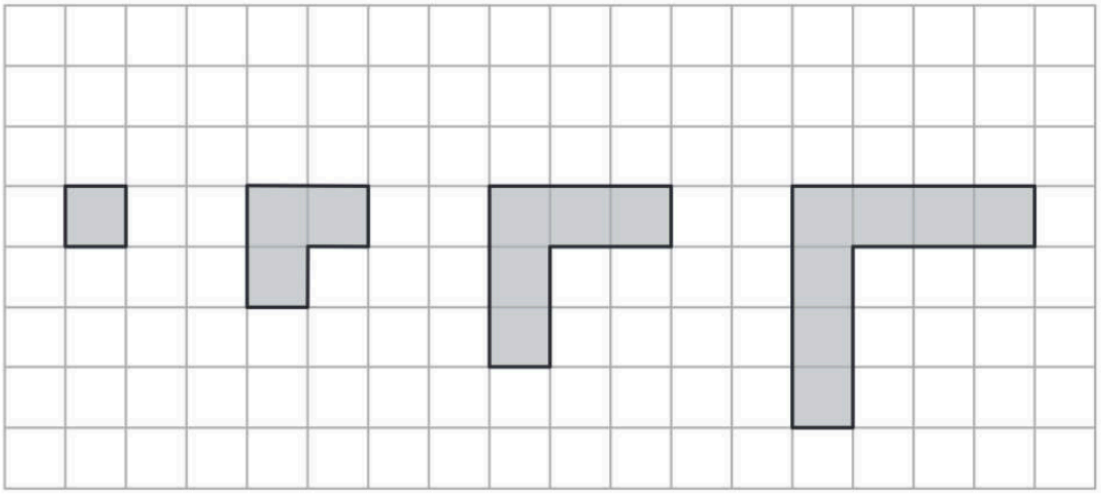
(1)

(Total for Question 10 is 2 marks)

[Edexcel, GCSE, November 2022, Paper 2F, Q10]

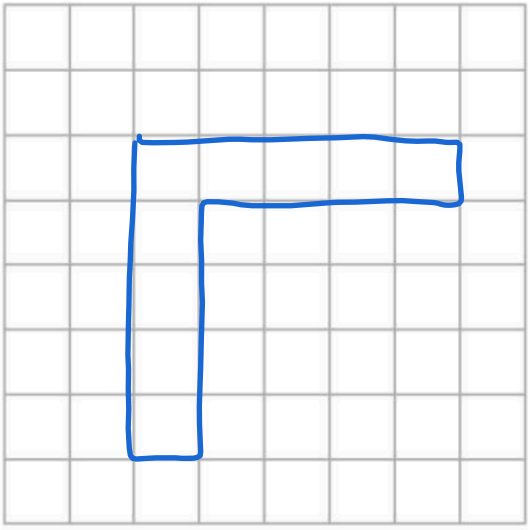
18

Here is a sequence of patterns made from grey square tiles.



Pattern number 1 | Pattern number 2 | Pattern number 3 | Pattern number 4

(a) On the grid below, draw Pattern number 5



(1)

(b) Complete the table.

Pattern number	1	2	3	4	5	6
Number of squares	1	3	5	7	9	11

(1)

(Total for Question 9 is 2 marks)

[Edexcel, GCSE, Summer 2022, Paper 1F, Q9]

19

Here are the first five terms of a number sequence.

3 8 13 18 23

(a) Write down the next two terms of this sequence.

28 33

(1)

Jim says that 50 is a term in this sequence.
Jim is wrong.

(b) Explain why.

This sequence only has terms that end in 3 or 8

$5n - 2 = 50$

$5n = 52$

$n = 10.4$

n must be an integer

(1)

(Total for Question 8 is 2 marks)

[Edexcel, GCSE, Summer 2022, Paper 3F, Q8]