

## A59 (H) Quadratic Sequences

OCR

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

$$\frac{1}{2} \quad \frac{4}{3} \quad \frac{9}{4} \quad \frac{16}{5}$$

Find the  $n$ th term of this sequence.

(a) ..... [2]

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(b) Here are the first four terms of a quadratic sequence, the  $n$ th term of this quadratic sequence is  $an^2 + bn + c$ .

AS9

2            12            28            50

Find the values of  $a$ ,  $b$  and  $c$ .

(b)  $a = \dots\dots\dots$

$b = \dots\dots\dots$

$c = \dots\dots\dots$

[4]

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

$$\frac{1}{2} \quad \frac{4}{3} \quad \frac{9}{4} \quad \frac{16}{5}$$

Find the  $n$ th term of this sequence.

$$1, 4, 9, 16, \dots, n^2$$

$$+1 \quad 2 \quad 3 \quad 4 \quad 5 \quad \dots \quad n+1$$

$\underbrace{\hspace{1.5em}}_1 \quad \underbrace{\hspace{1.5em}} \quad \underbrace{\hspace{1.5em}}$

$$\frac{n^2}{n+1}$$

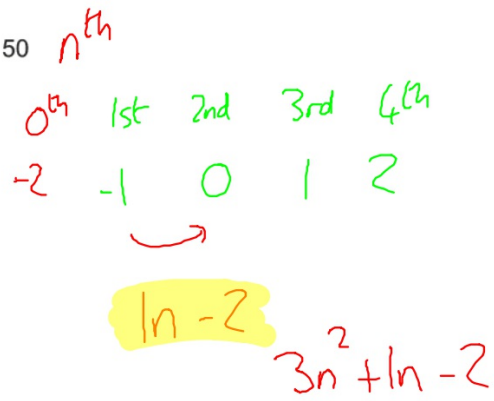
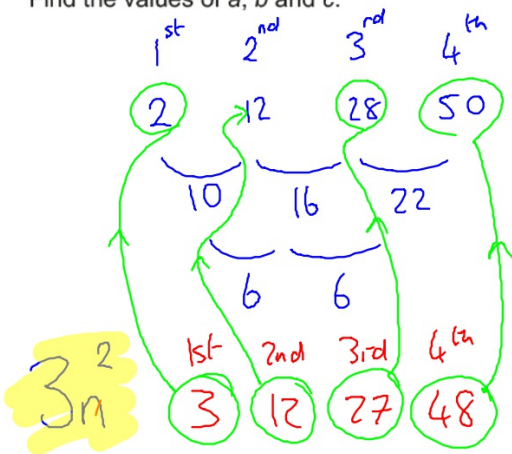
(a) ..... [2]

(b) Here are the first four terms of a quadratic sequence, the  $n$ th term of this quadratic sequence is  $an^2 + bn + c$ .

AS9

2                  12                  28                  50      $n^{\text{th}}$

Find the values of  $a$ ,  $b$  and  $c$ .



(b)  $a = \dots\dots\dots 3$   
 $b = \dots\dots\dots 1$   
 $c = \dots\dots\dots -2$

[4]

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**19** Here are the first four terms of a quadratic sequence.

0      9      22      39

The  $n$ th term can be written as  $an^2 + bn + c$ .

Find the values of  $a$ ,  $b$  and  $c$ .

$a =$  .....

$b =$  .....

$c =$  .....

**[4]**

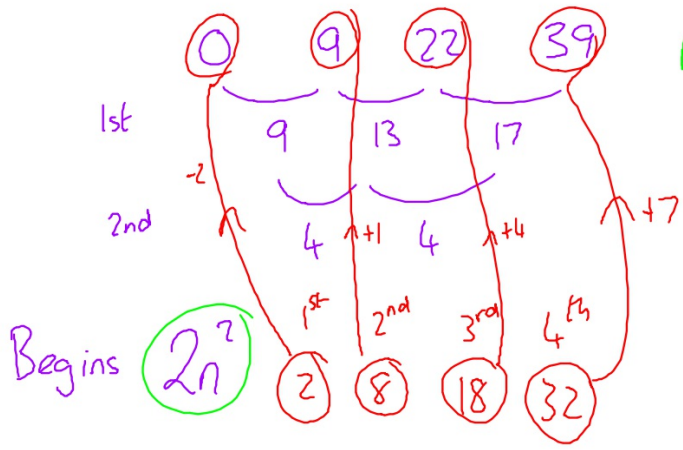
19 Here are the first four terms of a quadratic sequence.

0      9      22      39

The  $n$ th term can be written as  $an^2 + bn + c$ .

Find the values of  $a$ ,  $b$  and  $c$ .

0<sup>th</sup> 1<sup>st</sup> 2<sup>nd</sup> 3<sup>rd</sup> 4<sup>th</sup>  
 -5 -2, 1, 4, 7  
 $n^{\text{th}}$  term =  $3n - 5$



Ans =  $2n^2 + 3n - 5$

$a = 2$   
 $b = 3$   
 $c = -5$



**17** Here are the first four terms of a quadratic sequence.

**A59**                    2            15            34            59

The  $n$ th term is  $an^2 + bn + c$ .

Find the values of  $a$ ,  $b$  and  $c$ .

$a =$  .....

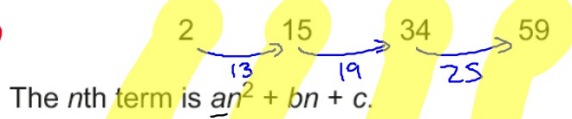
$b =$  .....

$c =$ ..... **[4]**

17 Here are the first four terms of a quadratic sequence.

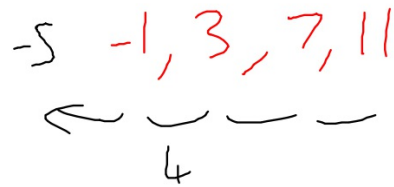
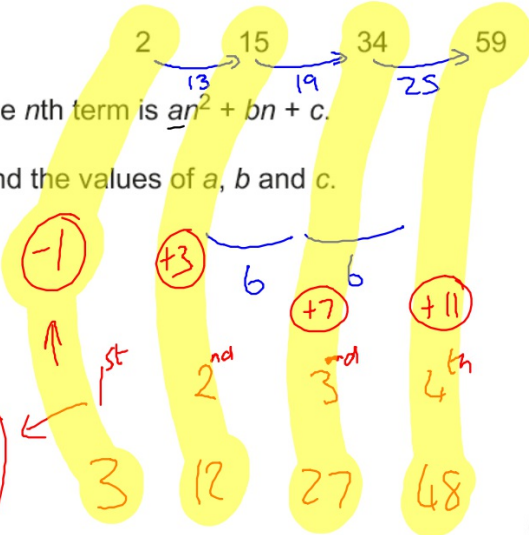
$n^{\text{th}}$  (A21)

A59



The  $n^{\text{th}}$  term is  $an^2 + bn + c$ .

Find the values of  $a$ ,  $b$  and  $c$ .



$$4n - 5$$

$$3n^2 + 4n - 5$$

$$a = \frac{3}{\dots\dots\dots}$$

$$b = \frac{4}{\dots\dots\dots}$$

$$c = \frac{-5}{\dots\dots\dots} [4] \checkmark$$

EDEXCEL

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17 Here are the first 5 terms of a quadratic sequence.

1            3            7            13            21

Find an expression, in terms of  $n$ , for the  $n$ th term of this quadratic sequence.

.....  
(Total for Question 17 is 3 marks)

17 Here are the first 5 terms of a quadratic sequence.

1            3            7            13            21

Find an expression, in terms of  $n$ , for the  $n$ th term of this quadratic sequence.

1st 2nd 3rd 4th 5th

1    3    7    13    21

2    4    6    8

2    2    2

↑

0    -1    -2    -3    -4

2    1st 2nd 3rd 4th 5th

$n$     1    4    9    16    25

sequence has a  $n^2$

$\div 2$

0th 1st 2nd 3rd 4th 5th

+1 0, -1, -2, -3, -4

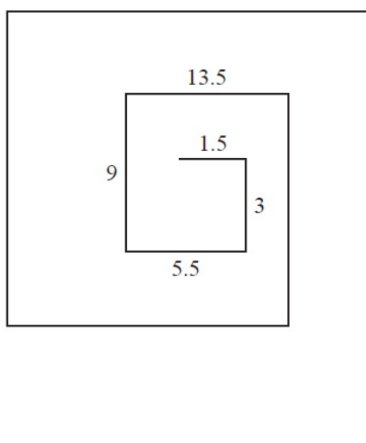
$-n + 1$

$n^2 - n + 1$

**(Total for Question 17 is 3 marks)**

- 18** The diagram shows the first 10 sides of a spiral pattern.  
It also gives the lengths, in cm, of the first 5 sides.

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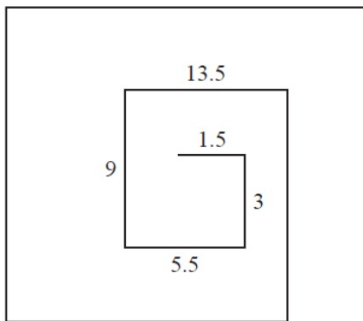


The lengths, in cm, of the sides of the spiral form a sequence.

Find an expression in terms of  $n$  for the length, in cm, of the  $n$ th side.

.....  
**(Total for Question 18 is 3 marks)**

18 The diagram shows the first 10 sides of a spiral pattern.  
It also gives the lengths, in cm, of the first 5 sides.



The lengths, in cm, of the sides of the spiral form a sequence.  $n^{\text{th}}$  term  
Find an expression in terms of  $n$  for the length, in cm, of the  $n^{\text{th}}$  side.

$\frac{1}{2}n + 1$  ← ans

	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	
	1.5	3	5.5	9	13.5	
		1.5	2.5	3.5	4.5	... 1 <sup>st</sup> diff
			1	1	1	... 2 <sup>nd</sup> diff.
						this is constant.
						$n^2 \dots$
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	
	0.5	2	4.5	8	12.5	

$\frac{1}{2}n + 1$

(Total for Question 18 is 3 marks)

**12** Here are the first four terms of a quadratic sequence.

3      8      15      24

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

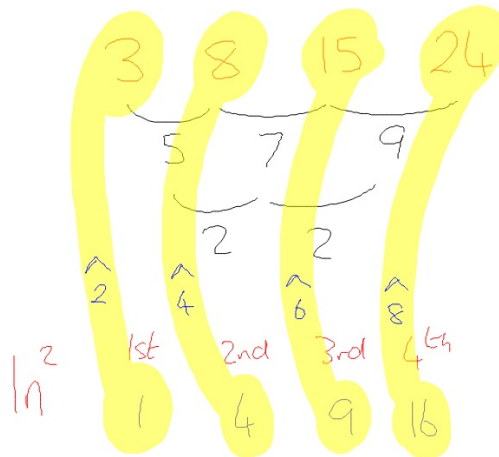


12 Here are the first four terms of a quadratic sequence.

3      8      15      24

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

$$\begin{array}{l} + 2, 4, 6, 8 \\ \hline n^{\text{th}} \text{ term} \\ \hline \underline{\underline{2n}} \end{array}$$



$$\underline{\underline{n^2 + 2n}} \checkmark$$

(3)

7 Here are the first 7 terms of a quadratic sequence.

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3   6   11   18   27   38   51

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

.....  
(2)

(b) Find the 50th term of this sequence.

.....  
(1)

7 Here are the first 7 terms of a quadratic sequence.

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$1^2$      $2^2$      $3^2$      $4^2$      $5^2$      $6^2$      $7^2$   
 1    4    9    16    25    36    49

3    6    11    18    27    38    51  
 3    5    7    9    11    13

2    2    2    2    2 ...

$\frac{1}{2}n^2$   
 $\frac{1}{2} \text{ of } 2 = 1$

$n^2 + 2$   
 (2)

(b) Find the 50th term of this sequence.

$n^2 + 2$      $50^2 \dots 50 \times 50 = 2500$

$2502$   
 (1)

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**22** Here are the first five terms of a sequence.

4      11      22      37      56

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

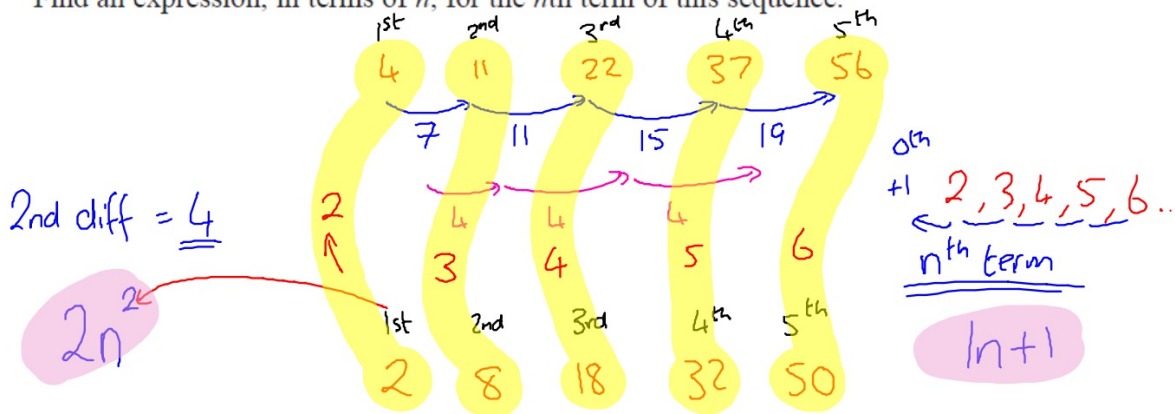
.....  
(Total for Question 22 is 3 marks)

22 Here are the first five terms of a sequence.

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4      11      22      37      56

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



$$2n^2 + n + 1$$

(Total for Question 22 is 3 marks)

Here are the first five terms of a different quadratic sequence.

0      2      6      12      20

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

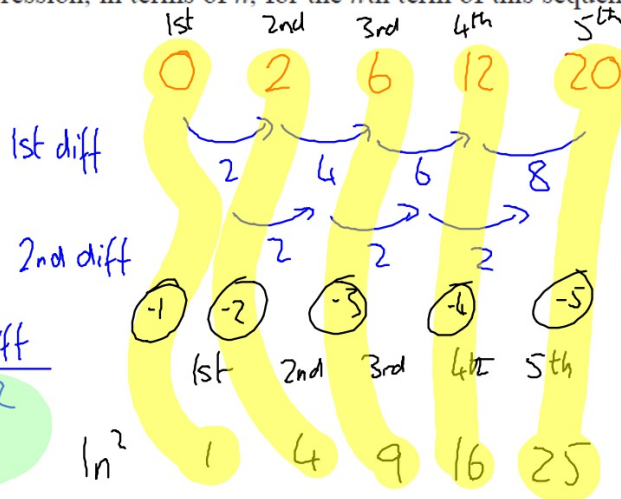
AS9

Here are the first five terms of a different quadratic sequence.

0      2      6      12      20

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

AS9



0th 1st 2nd 3rd 4th 5th

0 -1 -2 -3 -4 -5

$n$ th  $-n + 0$

$n^2 - n$  ✓

$n^2 - n$   
(2)

$\frac{1}{2}$  2nd diff  
 $n^2$

$n^2$

AQA



22 Work out an expression for the  $n$ th term of the quadratic sequence

AS9

2      17      40      71      ....

Give your answer in the form  $an^2 + bn + c$  where  $a$ ,  $b$  and  $c$  are constants.

**[3 marks]**

Answer \_\_\_\_\_

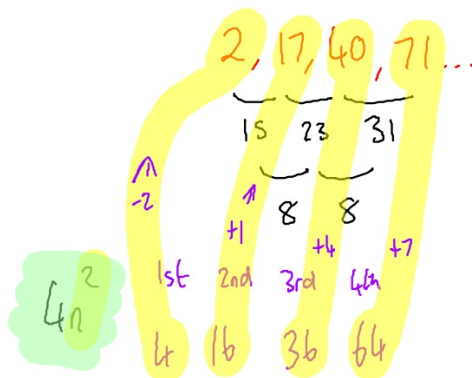
22 Work out an expression for the  $n$ th term of the quadratic sequence

AS9

2      17      40      71      ....

Give your answer in the form  $an^2 + bn + c$  where  $a$ ,  $b$  and  $c$  are constants.

[3 marks]



Handwritten work showing the sequence of differences:  $-5, -2, 1, 4, 7$  with a green box labeled "Ans".

The  $n$ th term is shown as  $-5 + 3$  (with a purple arrow pointing from the second difference to the first difference).

The expression  $3n - 5$  is written in a green box.

Answer  $4n^2 + 3n - 5$  ✓

21

Here are the first four terms of a quadratic sequence.

A59

11      26      45      68

Work out an expression for the  $n$ th term.

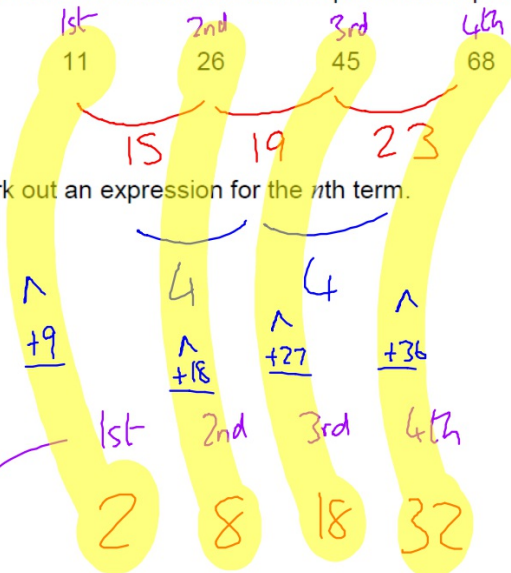
[3 marks]

Answer \_\_\_\_\_

21

A59

Here are the first four terms of a quadratic sequence.



$n$ th term  
↓

[3 marks]

0 9, 18, 27, 36

← -9 → → →

$9n + 0$

Answer

$2n^2 + 9n$  ✓