

## Higher Check In - 6.06 Sequences

1. Write  $x_3$ ,  $x_4$  and  $x_5$  for the sequence generated by  $x_{n+2} = x_{n+1} + x_n$  if  $x_1 = 1$  and  $x_2 = 1$ .
2. Complete the term-to-term rule in subscript notation for the sequence 3, 8, 18, 38, 78.

$$u_{n+1} =$$

3. Write down the first five terms of the sequence whose formula for the  $n$ th term is  $u_n = n^2 - 7n + 10$ .
4. Find the  $n$ th term of this sequence.

$$\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \dots$$

5. Write down the formula for the  $n$ th term of this quadratic sequence.

$$12, 24, 40, 60, \dots$$

6. The position-to-term rule for a sequence is  $u_n = 3n^2 + 5$ . Huda says that 82 is a number in the sequence. Explain whether Huda is correct.
7. Louis states that the position-to-term rule for the sequence 4, 15, 26, 37, 48, 59, ... is  $u_n = 2n^2 + 5n - 3$ . Is he correct? Explain your answer.
8. Show that the sequences whose position-to-term rules are  $u_n = 300 - 10n$  and  $u_n = 8n^2 + 5n + 25$  have a term that is both equal in value and in the same position of the sequence.
9. A culture of bacteria doubles every 2 hours. If there are 300 bacteria at the beginning, how many bacteria will there be after 18 hours?
10. Laura is not well and is given some medication from her doctor. The doctor recommends that she takes 200 mg of her medication on the first day, and then decrease the dosage by one half each day for one week. Find the position-to-term rule for this sequence and use it to calculate the amount of medication Laura will take on the 7th day. Write your answer to the nearest milligram.

### Extension

The sum of 8 consecutive even numbers is 280. What are the 1st and 3rd terms in the sequence?



## Answers

1. 2, 3, 5

2.  $u_{n+1} = 2(u_n + 1)$

3. 4, 0, -2, -2, 0

4.  $\frac{n}{n+1}$

5.  $u_n = 2n^2 + 6n + 4$

6. Huda is incorrect. Solving  $3n^2 + 5 = 82$  does not give a whole number answer so 82 cannot be in the sequence.

7. No, he is not correct. The formula is for a quadratic sequence, but the sequence increases by 11 each time so it is a linear sequence.

8. Equating  $8n^2 + 5n + 25 = 300 - 10n$  and solving  $8n^2 + 15n - 275 = 0$  gives  $n = 5$  or  $n = -6.8755$ . Disregarding the negative solution, the equivalent term is in 5th place and has a value of 250.

9.  $u_n = 300 \times 2^{\frac{n}{2}}$ ,  $300 \times 2^9 = 153600$

10.  $u_n = 200 \times \left(\frac{1}{2}\right)^{n-1}$ ,  $200 \times \left(\frac{1}{2}\right)^6 = 200 \times \frac{1}{64} = 3.125$

The answer is 3 mg (to the nearest mg).

## Extension

28 and 32

We'd like to know your view on the resources we produce. By clicking on 'Like' or 'Dislike' you can help us to ensure that our resources work for you. When the email template pops up please add additional comments if you wish and then just click 'Send'. Thank you.

If you do not currently offer this OCR qualification but would like to do so, please complete the Expression of Interest Form which can be found here: [www.ocr.org.uk/expression-of-interest](http://www.ocr.org.uk/expression-of-interest)

### OCR Resources: *the small print*

OCR's resources are provided to support the teaching of OCR specifications, but in no way constitute an endorsed teaching method that is required by the Board, and the decision to use them lies with the individual teacher. Whilst every effort is made to ensure the accuracy of the content, OCR cannot be held responsible for any errors or omissions within these resources. We update our resources on a regular basis, so please check the OCR website to ensure you have the most up to date version. This formative assessment resource has been produced as part of our free GCSE teaching and learning support package. All the GCSE teaching and learning resources, including delivery guides, topic exploration packs, lesson elements and more are available on the qualification webpages. If you are looking for examination practice materials, you can find Sample Assessment Materials (SAMs) on the qualification webpage [here](#).

© OCR 2016 - This resource may be freely copied and distributed, as long as the OCR logo and this message remain intact and OCR is acknowledged as the originator of this work.

OCR acknowledges the use of the following content: n/a

Please get in touch if you want to discuss the accessibility of resources we offer to support delivery of our qualifications: [resources.feedback@ocr.org.uk](mailto:resources.feedback@ocr.org.uk)



Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Generate a sequence from a term-to-term rule given in subscript notation			
AO1	2	Write a term-to-term rule in subscript notation			
AO1	3	Generate a sequence from a position-to-term rule given in subscript notation			
AO1	4	Generate and find $n$ th terms of sequences that are <u>not</u> linear, quadratic or geometric			
AO1	5	Find a formula for the $n$ th term of a quadratic sequence			
AO2	6	Use a formula for the $n$ th term to locate the position of a term in a sequence			
AO2	7	Recognise the difference between a linear and a quadratic sequence			
AO2	8	Use a formula for the $n$ th term to locate the position of a term in a sequence			
AO3	9	Solve a word problem using a formula for the $n$ th term			
AO3	10	Solve a word problem using a formula for the $n$ th term			

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Generate a sequence from a term-to-term rule given in subscript notation			
AO1	2	Write a term-to-term rule in subscript notation			
AO1	3	Generate a sequence from a position-to-term rule given in subscript notation			
AO1	4	Generate and find $n$ th terms of sequences that are <u>not</u> linear, quadratic or geometric			
AO1	5	Find a formula for the $n$ th term of a quadratic sequence			
AO2	6	Use a formula for the $n$ th term to locate the position of a term in a sequence			
AO2	7	Recognise the difference between a linear and a quadratic sequence			
AO2	8	Use a formula for the $n$ th term to locate the position of a term in a sequence			
AO3	9	Solve a word problem using a formula for the $n$ th term			
AO3	10	Solve a word problem using a formula for the $n$ th term			

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Generate a sequence from a term-to-term rule given in subscript notation			
AO1	2	Write a term-to-term rule in subscript notation			
AO1	3	Generate a sequence from a position-to-term rule given in subscript notation			
AO1	4	Generate and find $n$ th terms of sequences that are <u>not</u> linear, quadratic or geometric			
AO1	5	Find a formula for the $n$ th term of a quadratic sequence			
AO2	6	Use a formula for the $n$ th term to locate the position of a term in a sequence			
AO2	7	Recognise the difference between a linear and a quadratic sequence			
AO2	8	Use a formula for the $n$ th term to locate the position of a term in a sequence			
AO3	9	Solve a word problem using a formula for the $n$ th term			
AO3	10	Solve a word problem using a formula for the $n$ th term			

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Generate a sequence from a term-to-term rule given in subscript notation			
AO1	2	Write a term-to-term rule in subscript notation			
AO1	3	Generate a sequence from a position-to-term rule given in subscript notation			
AO1	4	Generate and find $n$ th terms of sequences that are <u>not</u> linear, quadratic or geometric			
AO1	5	Find a formula for the $n$ th term of a quadratic sequence			
AO2	6	Use a formula for the $n$ th term to locate the position of a term in a sequence			
AO2	7	Recognise the difference between a linear and a quadratic sequence			
AO2	8	Use a formula for the $n$ th term to locate the position of a term in a sequence			
AO3	9	Solve a word problem using a formula for the $n$ th term			
AO3	10	Solve a word problem using a formula for the $n$ th term			

