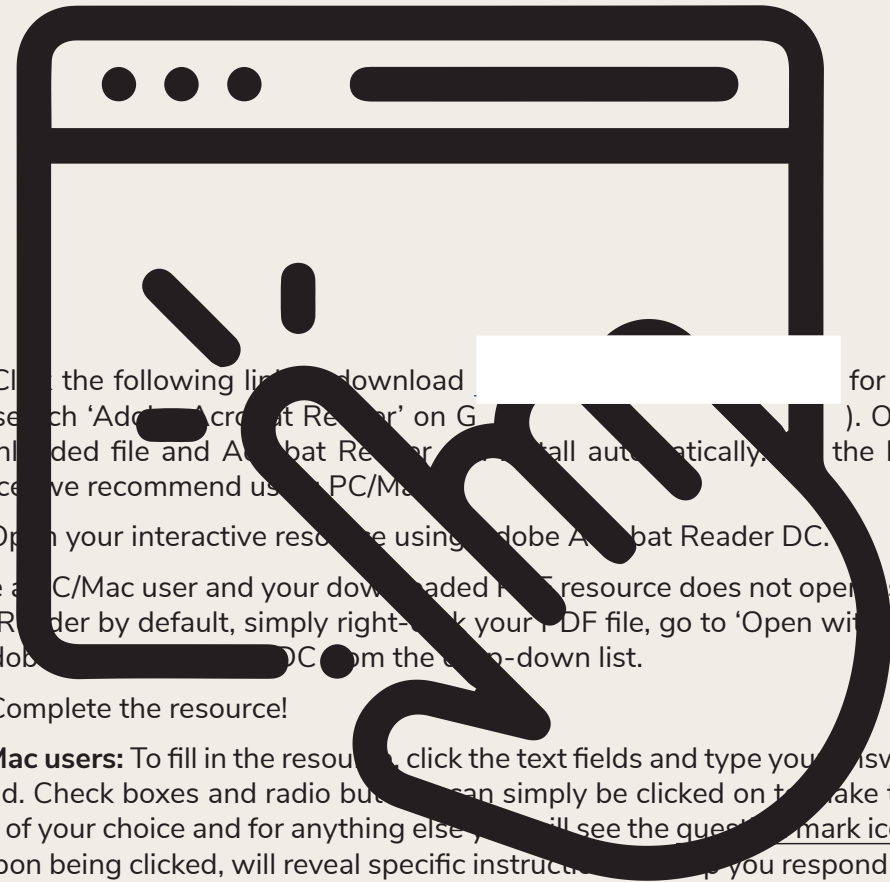


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Generating Linear Sequences

Answers

1. For each sequence, write down the first 5 terms.

a. $2n + 2$

4, 6, 8, 10, 12

b. $3n + 5$

8, 11, 14, 17, 20

c. $5n + 3$

8, 13, 18, 23, 28

d. $2n - 3$

-1, 1, 3, 5, 7

e. $n + 4$

5, 6, 7, 8, 9

f. $4n - 5$

-1, 3, 7, 11, 15

g. $5 + 2n$

7, 9, 11, 13, 15

h. $10 + n$

11, 12, 13, 14, 15

i. $0.1n + 0.1$

0.2, 0.3, 0.4, 0.5, 0.6

j. $3n + 6$

9, 12, 15, 18, 21

k. $0.25n + 2$

2.25, 2.5, 2.75, 3, 3.25

1. $0.5n + 0.75$

1.25, 1.75, 2.25, 2.75, 3.25

2. The n^{th} term of a sequence is given by $2n - 5$. Write down the 100th term.

$2 \times 100 - 5 = 195$

3. The n^{th} term of a sequence is given by $4n + 2$. Write down the 20th term.

$4 \times 20 + 2 = 82$

4. The n^{th} term of a sequence is given by $5n - 4$. Write down the 200th term.

$5 \times 200 - 4 = 996$

5. The n^{th} term of a sequence is given by $4n + 4$. Is 82 a term in this sequence?

$4n + 4 = 82$

$4n = 78$

$n = 19.5$

No, 82 is not a term in this sequence.

6. The n^{th} term of a sequence is given by $2n - 5$. Is 105 a term in this sequence?

$2n - 5 = 105$

$2n = 110$

$n = 55$

Yes, 105 is a term in this sequence.

7. The n^{th} term of a sequence is given by $3n + 2$. Is 96 a term in this sequence?

$3n + 2 = 96$

$3n = 94$

$n = \frac{94}{3} = 31\frac{1}{3}$

No, 96 is not a term in this sequence.

8. The n^{th} term of a sequence is given by $10n + 6$. Is 166 a term in this sequence?

$$10n + 6 = 166$$

$$10n = 160$$

$$n = 16$$

Yes, 166 is a term in this sequence.

9. The n^{th} term of a sequence is given by $3.5n + 2$. Is 37 a term in this sequence?

$$3.5n + 2 = 37$$

$$3.5n = 35$$

$$n = 10$$

Yes, 37 is a term in this sequence.

10. The n^{th} term of a sequence is given by $7n + 6$. Is 221 a term in this sequence?

$$7n + 6 = 221$$

$$7n = 215$$

$$n = \frac{215}{7} = 30\frac{5}{7}$$

No, 221 is not a term in this sequence.

Challenge

A sequence of numbers starts at 15 and follows the rule 'quadruple the last number and add 6.'

15, 66, 270, ...

The number 17 406 is in the sequence. Calculate the number which comes immediately before 17 406 in this sequence.

$$17\ 406 - 6 = 17\ 400$$

$$17\ 400 \div 4 = 4350$$

Generating Linear Sequences

Prior Knowledge:

Before attempting this sheet, students need to be able to:

- substitute into formulae;
- solve a linear equation.

A linear sequence is a sequence with a common difference: the terms increase or decrease by the same amount each time. Linear sequences are also known as arithmetic sequences. For example, 2, 4, 6, 8, 10, ...

Occasionally, you will be given the n^{th} term of a sequence and be asked to write down the first few terms, for example, the first five terms. The n^{th} term rule is a formula that enables you to find any number in a sequence. If you wanted to find the first term of a sequence, you would substitute n with 1; if you wanted to find the 100th term of a sequence, you would substitute n with 100 and so on.

Example 1

The n^{th} term of a sequence is given by $6n - 2$. Write down the first 5 terms of the sequence. To work out the first 5 terms, start by drawing a table. (In this example, we have broken down the n^{th} term into its components to make calculations easier.)

n	1	2	3	4	5
$6n$					
$6n - 2$					

The top row gives details about the position of the terms. The question asks for the first **5** terms, hence the numbers 1 to 5.

Substitute n with the numbers from the top row. To work out the first term of the sequence, substitute n with 1. To work out the second term of the sequence, substitute n with 2 and so on.

n	1	2	3	4	5
$6n$	$6 \times 1 = 6$	$6 \times 2 = 12$	$6 \times 3 = 18$	$6 \times 4 = 24$	$6 \times 5 = 30$
$6n - 2$	$6 - 2 = 4$	$12 - 2 = 10$	$18 - 2 = 16$	$24 - 2 = 22$	$30 - 2 = 28$

The first five terms of the sequence are 4, 10, 16, 22, 28.

Example 2

The n^{th} term of a sequence is given by $3n + 7$. Is 74 a term in this sequence?

This question involves forming and solving a linear equation. If 74 is in the sequence then its associated value of n will be a whole number.

$$3n + 7 = 74$$

$$3n = 67$$

$$n = \frac{67}{3} = 22\frac{1}{3}$$

The value of n is not a whole number so the term 74 is not in the sequence.

When solving the equation, if the answer **is** a whole number, it means that term is in the sequence.

Your Turn

1. For each sequence, write down the first **5** terms.

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b. $3n + 5$

c. $5n + 3$

d. $2n - 3$

e. $n + 4$

f. $4n - 5$

g. $5 + 2n$

h. $10 + n$

Generating Linear Sequences

i. $0.1n + 0.1$

j. $3n + 6$

k. $0.25n + 2$

l. $0.5n + 0.75$

2. The n^{th} term of a sequence is given by $2n - 5$. Write down the 100th term.

3. The n^{th} term of a sequence is given by $4n + 2$. Write down the 20th term.

4. The n^{th} term of a sequence is given by $5n - 4$. Write down the 200th term.

5. The n^{th} term of a sequence is given by $4n + 4$. Is 82 a term in this sequence?

6. The n^{th} term of a sequence is given by $2n - 5$. Is 105 a term in this sequence?

Generating Linear Sequences

7. The n^{th} term of a sequence is given by $3n + 2$. Is 96 a term in this sequence?

8. The n^{th} term of a sequence is given by $10n + 6$. Is 166 a term in this sequence?

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