MATHEMATICS · GRADES 10-12

Arithmetic sequences

Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how you predict what comes next when something grows by the same step each time. Saving five dollars more each week, or a plant growing the same amount each month, both follow a steady step. Once you spot the step, you can work out any future value without listing every value in between.



Rule

Arithmetic sequences: each term is the one before it plus the same number, called the common difference.

You find the common difference by subtracting any term from the one after it, and you find the next term by adding the common difference on.

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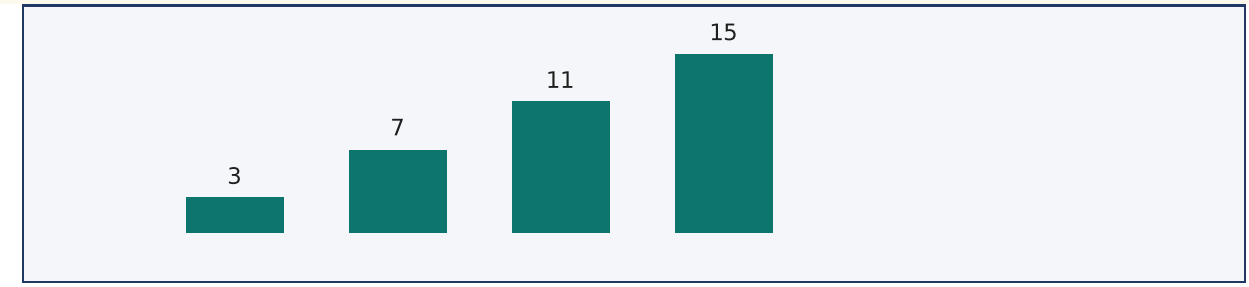
Worked examples

EXAMPLE 1

Q Is 3, 7, 11, 15 an arithmetic sequence?



SOLUTION

Subtract neighbours: 7 - 3 = 4, 11 - 7 = 4, 15 - 11 = 4

The difference is the same every time.

Yes, it is arithmetic with common difference 4.

EXAMPLE 2

Q Find the next two terms of 20, 17, 14.

SOLUTION

The step is 17 - 20 = -3

14 – 3 = 11

11 – 3 = 8

The next two terms are 11 and 8.

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Practice questions

1 Is 2, 5, 8, 11 arithmetic?

A Yes

B No

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2 What is the common difference of 2, 5, 8, 11?

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3 Find the next term of 10, 7, 4

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4 What is the 5th term of 6, 10, 14, 18?

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5 Find the next two terms of 5, 9, 13

A 17 and 21

B 15 and 17

C 17 and 19

D 21 and 25

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6 What is the common difference of 30, 25, 20?

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7 Find the missing term: 20, __, 12, 8.

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8 Is 6, 6, 6, 6 arithmetic?

A. Yes, with common difference 0

B. No, because all the terms are the same

C. Yes, with common difference 6

D. No, because the difference changes

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9 A sequence starts at 2 with common difference -3. What are its first four terms?

- **A** 2, -1, -4, -7
- **B** 2, 5, 8, 11
- **C** -3, -1, 2, 5
- **D** 2, -1, -4, -10

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10 What stays the same in an arithmetic sequence?

- **A** The difference between consecutive terms
- **B** The sum of all the terms
- **C** The first term
- **D** The number of terms

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ANSWER KEY

1. Yes

2. 3

3. 1

4. 22

5. 17 and 21

6. -5

7. 16

8. Yes, with common difference 0

9. 2, -1, -4, -7

10. The difference between consecutive terms

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