Mathematics

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(Chapter – 8) (Predicting What Comes Next: Exploring Sequences and Progressions)
(Assignment 5)
(Class – 9)

Name _____ Date _____

Answer all 15 questions. Choose one option for each MCQ. Show your working and give reasons where required.

Section A: Multiple Choice Questions

1. Find the 10^{th} and 15^{th} terms of the sequence $t_n = 5n - 3$ for $n \geq 1$.

(a) 47 and 72
(b) 50 and 75
(c) 48 and 73
(d) 43 and 68

2. Determine whether 97 and 172 are terms of the sequence $t_n = 5n - 3$ for $n \geq 1$.

(a) Only 97 is a term.
(b) Only 172 is a term.
(c) Both are terms.
(d) Neither is a term.

3. Find the smallest value of n such that the sum of the first n natural numbers is greater than 1,000.

(a) 43
(b) 44
(c) 45
(d) 46

4. Harish started work at an annual salary of ₹5,00,000 and received an increment of ₹20,000 each year. After how many years did his income reach ₹7,00,000?

(a) 9 years
(b) 10 years
(c) 11 years
(d) 12 years

5. What is the common ratio of the GP 3, −6, 12, −24, ...?

(a) −3
(b) −2
(c) 2
(d) 3

Section B: Very Short Answer Questions

6. Can the same approach be used to find the sum of 1 + 2 + 3 + ... + 100?

Answer:

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7. If the 4^{th}, 10^{th} and 16^{th} terms of a GP are x, y and z respectively, prove that x, y, z are in GP.

Answer:

8. A ball is dropped from a height of 80 metres. After hitting the ground, it bounces back to 60% of the height from which it fell. It continues bouncing in this way — each time rising to 60% of the previous height.

(i) What height does the ball reach after the 5^{th} bounce?

Answer:

9. Can you explain why we need n to be a natural number?

Here n denotes a term's position in a sequence indexed from 1.

Answer:

10. The number of bacteria in a certain culture doubles every hour. If there were 30 bacteria present in the culture originally, how many bacteria will be present at the end of the 2^{nd} hour, 4^{th} hour and n^{th} hour?

Answer:

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Section C: Short and Long Answer Questions

11. A ball is dropped from a height of 80 metres. After hitting the ground, it bounces back to 60% of the height from which it fell. It continues bouncing in this way — each time rising to 60% of the previous height.

(ii) What is the total vertical distance the ball has travelled by the time it hits the ground for the 6^{th} time?

Answer:

12. Which term of the GP: 2, 8, 32, ... is 131072? Write the explicit formula as well as the recursive formula for the n^{th} term.

Answer:

13. A sequence begins with 120 and each next term is half the previous term. Write its explicit and recursive rules. Find the first term that is less than 5, and explain why it is the first.

Answer:

14. Find all possible ways of expressing 100 as the sum of consecutive natural numbers.

Answer:

15. Suppose $W_1 = 1$, $W_2 = 2$ and for $n > 2$, $W_n = W_1 + W_2 + \cdots + W_{n-2} + 2$. Find the values of W_1, W_2, ..., W_8. Do you recognise this sequence?

Answer: