

**MATHEMATICS****CLASS 9****Chapter 8: Predicting What Comes Next — Exploring Sequences and Progressions****WORKSHEET**

Name: \_\_\_\_\_

Class/Section: \_\_\_\_\_

Date: \_\_\_\_\_

**Instructions:**

1. This worksheet contains 25 Multiple Choice Questions (MCQs) covering Chapter 8.
2. Read each question carefully and select the single correct option (A, B, C, or D).
3. An Answer Key table along with short explanations is provided at the end of the document.

Q1. What is an ordered list of numbers where each number is called a term?

- A) Set  
B) Sequence  
C) Matrix  
D) Variable

Q2. What is the 5th term of the triangular numbers sequence (1, 3, 6, 10, ...)?

- A) 12  
B) 14  
C) 15  
D) 18

Q3. What formula gives the  $n$ th term of the triangular numbers sequence directly?

- A)  $n^2$   
B)  $2n - 1$   
C)  $n(n + 1)/2$   
D)  $2^n$

Q4. What is the 10th term of the square numbers sequence (1, 4, 9, 16, ...)?

- A) 81  
B) 100  
C) 121  
D) 90

Q5. Using the explicit rule  $t_n = 3n - 4$ , what is the 1st term of the sequence?

- A) -1  
B) 1  
C) -4  
D) 0

Q6. For the explicit rule  $t_n = 5n - 3$ , what is the 10th term?

- A) 53  
B) 47  
C) 50  
D) 45

Q7. Determine which term of the sequence  $t_n = 5n - 3$  equals 97.

- A) 18th term  
B) 19th term  
C) 20th term  
D) 21st term

Q8. For the explicit rule  $u_n = 2n - 1$ , what is the 53rd term?

- A) 105  
B) 106  
C) 107  
D) 104

Q9. A rule that gives a term of a sequence using one or more preceding terms is called a:

- A) Explicit rule  
B) Recursive rule  
C) Constant rule  
D) Linear equation

Q10. Given  $t_1 = -5$  and  $t_{n+1} = t_n + 3$ , what is the 3rd term ( $t_3$ )?

A) -2

B) 1

C) 4

D) 7

Q11. In the Virahānka-Fibonacci sequence (1, 2, 3, 5, 8, 13, 21, 34, ...), what is the next term after 34?

A) 45

B) 50

C) 55

D) 89

Q12. What is the defining characteristic of an Arithmetic Progression (AP)?

A) Constant ratio between consecutive terms

B) Constant difference between consecutive terms

C) Each term is the square of its position

D) Terms alternate in sign

Q13. What is the common difference (d) of the AP: 3, 8, 13, 18, ...?

A) 3

B) 4

C) 5

D) 8

Q14. Find the 10th term of the AP: 3, 8, 13, 18, ... using the formula  $t_n = a + (n - 1)d$ .

A) 43

B) 48

C) 53

D) 50

Q15. What is the general formula for the nth term of an Arithmetic Progression with first term 'a' and common difference 'd'?

A)  $a + nd$ B)  $a + (n - 1)d$ C)  $a r^{(n-1)}$ D)  $n(a + d)$ 

Q16. What is the defining characteristic of a Geometric Progression (GP)?

A) Constant difference between consecutive terms

B) Constant ratio between consecutive terms

C) Each term is prime

D) Terms increase by adding position number

Q17. What is the common ratio (r) of the GP: 5, 25, 125, ...?

A) 5

B) 20

C) 25

D) 2

Q18. What is the general formula for the nth term of a Geometric Progression?

A)  $t_n = a + (n - 1)r$ B)  $t_n = ar^{(n-1)}$ C)  $t_n = an^r$ D)  $t_n = (ar)^n$ 

Q19. For a GP with first term  $a = 2$  and common ratio  $r = 3$ , what is the explicit formula for  $t_n$ ?

A)  $2 \times 3^n$ B)  $2 \times 3^{(n-1)}$ C)  $3 \times 2^{(n-1)}$ D)  $6^{(n-1)}$

Q20. Find the 12th term of a GP with common ratio  $r = 2$  and 8th term equal to 192.

- A) 1536                      B) 3072                      C) 6144                      D) 768

Q21. What is the common ratio of the sequence 1, -1, 1, -1, 1, ...?

- A) 1                      B) -1                      C) 0                      D) -2

Q22. Which term of the sequence  $t_n = 5n - 3$  is 607?

- A) 120th term                      B) 121st term  
C) 122nd term                      D) 125th term

Q23. Given  $T_1 = 1$ ,  $T_2 = 2$ ,  $T_3 = 4$  and  $T_n = T_{\{n-1\}} + T_{\{n-2\}} + T_{\{n-3\}}$  for  $n \geq 4$ , what is  $T_4$ ?

- A) 6                      B) 7                      C) 8                      D) 9

Q24. A ball dropped from 80 m bounces back to 60% of its previous height each time. What height does it reach after the 1st bounce?

- A) 40 m                      B) 48 m                      C) 52 m                      D) 60 m

Q25. Why is an explicit formula for the  $n$ th term preferred over a recursive rule when finding a far-away term (like the 100th term)?

- A) It is only applicable to negative numbers  
B) It allows direct calculation without calculating all previous terms  
C) It gives multiple answers  
D) It works only for finite sequences

## ANSWER KEY &amp; EXPLANATIONS TABLE

| Q. No. | Correct Option | Explanation / Justification                                                                                  |
|--------|----------------|--------------------------------------------------------------------------------------------------------------|
| 1      | Option B       | A sequence is defined as an ordered list of numbers where each individual number is called a term.           |
| 2      | Option C       | Triangular numbers are formed by summing natural numbers: $t_5 = 1 + 2 + 3 + 4 + 5 = 15$ .                   |
| 3      | Option C       | The $n$ th triangular number is the sum of first $n$ natural numbers, given by $t_n = n(n + 1)/2$ .          |
| 4      | Option B       | The $n$ th square number is given by $t_n = n^2$ . For $n = 10$ , $t_{10} = 10^2 = 100$ .                    |
| 5      | Option A       | Substitute $n = 1$ in $t_n = 3n - 4$ : $t_1 = 3(1) - 4 = 3 - 4 = -1$ .                                       |
| 6      | Option B       | Substitute $n = 10$ in $t_n = 5n - 3$ : $t_{10} = 5(10) - 3 = 50 - 3 = 47$ .                                 |
| 7      | Option C       | Set $5n - 3 = 97 \Rightarrow 5n = 100 \Rightarrow n = 20$ . Thus, 97 is the 20th term.                       |
| 8      | Option A       | Substitute $n = 53$ in $u_n = 2n - 1$ : $u_{53} = 2(53) - 1 = 106 - 1 = 105$ .                               |
| 9      | Option B       | A recursive rule expresses each term in terms of one or more preceding terms.                                |
| 10     | Option B       | $t_1 = -5$ ; $t_2 = -5 + 3 = -2$ ; $t_3 = -2 + 3 = 1$ .                                                      |
| 11     | Option C       | Each term is the sum of preceding two terms. The next term is $34 + 21 = 55$ .                               |
| 12     | Option B       | An Arithmetic Progression (AP) has a constant difference between consecutive terms (common difference $d$ ). |
| 13     | Option C       | Common difference $d = t_2 - t_1 = 8 - 3 = 5$ .                                                              |
| 14     | Option B       | Using $t_n = a + (n-1)d$ with $a = 3$ , $d = 5$ : $t_{10} = 3 + (10 - 1) \times 5 = 3 + 45 = 48$ .           |
| 15     | Option B       | The explicit formula for the $n$ th term of an AP is $t_n = a + (n - 1)d$ .                                  |
| 16     | Option B       | A Geometric Progression (GP) has a constant ratio between consecutive terms (common ratio $r$ ).             |
| 17     | Option A       | Common ratio $r = t_2 / t_1 = 25 / 5 = 5$ .                                                                  |
| 18     | Option B       | The explicit formula for the $n$ th term of a GP is $t_n = a \times r^{(n-1)}$ .                             |
| 19     | Option B       | Using $t_n = a \times r^{(n-1)}$ with $a = 2$ and $r = 3$ , we get $t_n = 2 \times 3^{(n-1)}$ .              |

20     **Option B**      $t_8 = a \times r^7 = 192 \Rightarrow a \times 27 = 192 \Rightarrow a \times 128 = 192 \Rightarrow a = 3/2$ . Then  $t_{12} = (3/2) \times 2^{11} = 3 \times 2^{10} = 3072$ .

21     **Option B**      $r = t_2 / t_1 = -1 / 1 = -1$ .

22     **Option C**     Set  $5n - 3 = 607 \Rightarrow 5n = 610 \Rightarrow n = 122$ . Thus, 607 is the 122nd term.

23     **Option B**      $T_4 = T_3 + T_2 + T_1 = 4 + 2 + 1 = 7$ .

24     **Option B**     Height after 1st bounce  $= 80 \times 60\% = 80 \times 0.6 = 48$  metres.

25     **Option B**     An explicit formula calculates any specific term directly without requiring previous terms.