

Class 9 Mathematics Practice Worksheet
New NCERT Syllabus (2026-27) - Ganita Manjari
Chapter 2: Introduction to Linear Polynomials

Section A: Conceptual Section (5 Questions)

Q1. Identify the basic terminology of algebraic expressions:

- (a) In the expression $5x - 8$, the numerical coefficient of the variable term x is _____.
- (b) The constant term present in the expression $y^3 + 2y - 11$ is _____.
- (c) The highest power of the variable in any polynomial expression is known as its _____.

Q2. Find the exact degree of each of the following polynomial expressions:

- (a) $2x^2 - 5x + 3 \rightarrow$ Degree = _____
- (b) $4z - 3 \rightarrow$ Degree = _____
- (c) $-9 \rightarrow$ Degree = _____

Q3. State whether the following statements are True or False:

- (a) A linear polynomial can have a maximum degree of 2. ()
- (b) The expression $2x + 3$ is a linear polynomial in one variable. ()**
- (c) If there is no term containing the variable x in an expression, the coefficient of x is considered to be 0. (_____)

Q4. Evaluate the linear polynomial expression $P(x) = 3x + 7$ for the following given input values:

- (a) If $x = 4$, then $P(4) =$ _____
- (b) If $x = -2$, then $P(-2) =$ _____

Q5. Write down a custom mathematical example for each of the following descriptions:

- (a) A linear polynomial in variable y : _____
- (b) A constant polynomial: _____

Section B: Logical Section (5 Questions)

Q6. Look carefully at the sequence of structural perimeters generated by growing shapes:
7, 10, 13, 16, 19...

- (a) Calculate the constant difference between each successive value in this pattern:

- (b) Is this number pattern classified as a linear pattern? Why or why not?

Q7. Polynomials can be mathematically modeled as input-output processing systems.
Consider the linear expression $4x - 5$.

(a) If the required system output value is 11, what specific numerical value must be supplied as the variable input x ? _____

(b) Write this relationship out as a formal linear equation. _____

Q8. A gamer plays a tournament where the total joining fee is 100 rupees, and every single match played costs an additional 50 rupees.

(a) Write a linear polynomial expression representing the total cost for playing x matches:

(b) If a player spent a total of 450 rupees, use a linear equation to find the total number of matches played.

Q9. Two numbers have a sum of 64. One of the numbers is logically given to be 10 more than the other number.

(a) If the smaller number is represented as x , write an expression for the larger number:

(b) Form a linear equation and solve it to find the values of both numbers. [1, 2]

Q10. Predict structural properties logically: If a linear polynomial $ax + b$ yields an output value of 5 when $x = 0$, and an output value of 7 when $x = 1$, logically deduce the exact numerical values of the constants a and b .

Section C: High Thinking Section / HOTS (5 Questions)

Q11. A rectangular layout plot has its perimeter fixed at exactly 24 cm. The geometric length of the plot is algebraically described by the linear expression $(2x + 3)$ cm, while its geometric width is given as x cm. Formulate a perimeter equation to find the value of x , and calculate the actual dimensions of the plot.

Q12. Analyze linear change / slope behaviors: A water storage tank initially holds 500 litres of liquid. Due to usage, water drains out at a uniform linear rate of 25 litres every hour.

(a) Write a linear polynomial representing the volume of water remaining after t hours:

(b) After how many hours will the tank become exactly half empty? Show your systematic work.

Q13. Let $P(x) = ax + b$ be a general linear polynomial. If evaluating the expression at different inputs gives $P(2) = 7$ and $P(4) = 11$, calculate the exact values of the unknown coefficients a and b .

Q14. Think about geometric growth constraints: A string of length L cm is formed into an equilateral triangle with sides measuring $(x + 2)$ cm.

(a) Write the linear polynomial representing the total length of the string L in terms of x :

(b) If the length of the string cannot exceed 30 cm, find the maximum possible whole-number value that the variable x can safely take.

Q15. Think deeply about definitions: Can the algebraic expression $[3x + (5/x)]$ be classified as a linear polynomial? Critically explain your mathematical reasoning by focusing on the rules governing polynomial exponents.

Answer Key (For Teachers and Parents)

Section A:

Q1: (a) 5, (b) -11, (c) degree.

Q2: (a) 2 (since the highest power of x is 2), (b) 1 (highest power of z is 1), (c) 0 (a constant polynomial has a degree of 0).

Q3: (a) False (a linear polynomial must have a degree of exactly 1), (b) True, (c) True.

Q4: (a) $P(4) = 3(4) + 7 = 12 + 7 = 19$. (b) $P(-2) = 3(-2) + 7 = -6 + 7 = 1$.

Q5: (a) Example: $3y - 4$, (b) Example: 7 or -12. [1]

Section B:

Q6: (a) Constant difference is 3 ($10 - 7 = 3$, $13 - 10 = 3$, etc.). (b) Yes, it is a linear pattern because the difference between successive terms remains constant.

Q7: (a) Input x must be 4. (b) $4x - 5 = 11$. Solving it gives $4x = 16$, so $x = 4$.

Q8: (a) $50x + 100$. (b) $50x + 100 = 450$. This means $50x = 350$, which simplifies to $x = 7$ matches.

Q9: (a) $x + 10$. (b) $x + (x + 10) = 64$, which gives $2x + 10 = 64$. $2x = 54$, so $x = 27$. The numbers are 27 and 37.

Q10: When $x = 0$, $a(0) + b = 5$, which means $b = 5$. When $x = 1$, $a(1) + 5 = 7$, which gives $a = 2$. [1, 2]

Section C:

Q11: Perimeter = $2(\text{length} + \text{width}) = 24$.

$$2[(2x + 3) + x] = 24$$

$$2(3x + 3) = 24$$

$$3x + 3 = 12$$

$$3x = 9 \rightarrow x = 3.$$

Width = 3 cm, and Length = $2(3) + 3 = 9$ cm.

Q12: (a) $500 - 25t$. (b) Half empty means 250 litres remain. $500 - 25t = 250$. This gives $25t = 250$, so $t = 10$ hours.

Q13: $P(2) = 2a + b = 7$ and $P(4) = 4a + b = 11$.

Subtracting the equations: $(4a + b) - (2a + b) = 11 - 7$

$$2a = 4 \rightarrow a = 2.$$

Substitute $a = 2$: $2(2) + b = 7 \rightarrow b = 3$.

Q14: (a) Perimeter = $3 \times \text{side}$. $L = 3(x + 2) = 3x + 6$. (b) $3x + 6 \leq 30$ means $3x \leq 24$, so $x \leq 8$. The maximum whole value is 8.

Q15: No, it cannot be classified as a linear polynomial. When split, the expression becomes $3 + 5x^{-1}$. A polynomial cannot contain variables with negative exponents; powers must always be non-negative integers. [1]
