



# CLASS 9 MATHEMATICS



## CHAPTER 2 – INTRODUCTION TO LINEAR POLYNOMIALS



### FREE WORKSHEET | Ganita Manjari | 2026–27

This worksheet follows the **new Chapter 2** of *Ganita Manjari*: algebraic expressions and polynomials, linear polynomials, linear patterns, linear growth and decay, linear relationships, graphs, slope and y-intercept.

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

Class: IX      Section: \_\_\_\_\_

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



### Instructions

- Answer all questions.
  - Show your working wherever required.
  - Use graph paper for graph questions.
  - **Total Marks: 30**
- 



## SECTION A – MCQs

**1 × 6 = 6 marks**

1. Which of the following is an algebraic expression?

- A. 25
  - B.  $2x + 5$
  - C.  $x = 4$
  - D.  $12 > 7$
- 

2. What is the degree of the polynomial:

$$5x^2 + 3x - 7?$$

- A. 1
  - B. 2
  - C. 3
  - D. 5
- 

3. Which of the following is a linear polynomial?

- A.  $x^2 + 3$
  - B.  $x^3 - 2$
  - C.  $4x + 7$
  - D.  $x^2 + x + 1$
- 

4. Which sequence represents a linear pattern?

- A. 2, 4, 6, 8, ...
  - B. 1, 2, 4, 8, ...
  - C. 1, 4, 9, 16, ...
  - D. 2, 6, 18, 54, ...
- 

5. In the linear relationship:

$$y = 3x + 5$$

the value 3 represents the:

- A. y-intercept
  - B. constant only
  - C. slope
  - D. x-coordinate
- 

6. The graph of a linear relationship is:

- A. A circle
- B. A parabola

- C. A straight line  
D. Always a curve
- 

## SECTION B – FILL IN THE BLANKS

**1 × 5 = 5 marks**

7. In the expression  $7x + 4$ ,  $x$  is the \_\_\_\_\_.
8. In  $7x + 4$ , 7 is the \_\_\_\_\_ of  $x$ .
9. A polynomial of degree 1 is called a \_\_\_\_\_ polynomial.
10. A pattern in which a quantity changes by a fixed amount over equal intervals is called a \_\_\_\_\_ pattern.
11. In  $y = ax + b$ ,  $b$  represents the \_\_\_\_\_.
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## SECTION C – ALGEBRAIC EXPRESSIONS & POLYNOMIALS

**2 × 4 = 8 marks**

12. For the expression:

$$5x + 3y - 8$$

identify:

- a) Variables
  - b) Coefficients
  - c) Constant
  - d) Number of terms
- 

13. Find the degree of each polynomial:

a)  $7x + 5$

b)  $3x^2 - 4x + 1$

c)  $2y^3 + y - 9$

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**14.** State whether each is a **linear polynomial** or **not a linear polynomial**.

a)  $3x + 7$

b)  $x^2 + 5$

c)  $9 - 2y$

d)  $4x^3 + 1$

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**15.** Find the value of:

**$5x - 3$**

when:

a)  $x = 0$

b)  $x = 2$

c)  $x = -1$

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## **SECTION D – LINEAR PATTERNS**

**$2 \times 3 = 6$  marks**

**16.** Consider the sequence:

**$1, 3, 5, 7, 9, \dots$**

a) Find the common difference.

b) Write the rule for the  $n$ th term.

c) Find the 20th term.

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17. A pattern has the following number of objects:

|       |   |   |   |   |   |
|-------|---|---|---|---|---|
| Stage | 1 | 2 | 3 | 4 | 5 |
|-------|---|---|---|---|---|

|         |   |   |    |    |    |
|---------|---|---|----|----|----|
| Objects | 4 | 7 | 10 | 13 | 16 |
|---------|---|---|----|----|----|

a) Find the common difference.

b) Is this a linear pattern?

c) Find the number of objects at Stage 10.

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18. A quantity starts at 50 and decreases by 6 at every step.

a) Write the first five terms.

b) Is this linear growth or linear decay?

c) Write an expression for the quantity after  $n$  steps, taking the first term as the value at step 1.

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## SECTION E – LINEAR RELATIONSHIPS

**$2 \times 2 = 4$  marks**

19. A learning platform charges a fixed fee of ₹200 and ₹50 for each module.

Let  $x$  be the number of modules and  $y$  the total cost.

a) Write the linear relationship between  $x$  and  $y$ .

b) What do 50 and 200 represent?

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20. Consider:

$$y = 4x - 3$$

- a) What is the slope?
  - b) What is the y-intercept?
  - c) Find  $y$  when  $x = 2$ .
- 



## SECTION F – GRAPH & COMPETENCY QUESTION

**1 mark**

21. Complete the table for:

$$y = 2x + 1$$

|   |       |       |       |       |
|---|-------|-------|-------|-------|
| x | 0     | 1     | 2     | 3     |
| y | _____ | _____ | _____ | _____ |

Then plot the points on a coordinate plane and join them.

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## BONUS CHALLENGE

22. 🧠 Think Carefully!

A mobile phone costs ₹20,000. Its value decreases by ₹2,000 every year.

- a) Write the value after 1 year.
- b) Write the value after 2 years.
- c) Write a linear expression for its value after  $x$  years.
- d) What will its value be after 5 years?

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## ANSWER KEY

### Section A

1. B
  2.  $B - 2$
  3.  $C - 4x + 7$
  4.  $A - 2, 4, 6, 8, \dots$
  5. C – slope
  6. C – straight line
- 

### Section B

7. variable
  8. coefficient
  9. linear
  10. linear
  11. y-intercept
- 

### Section C

12.

$$5x + 3y - 8$$

- a) Variables:  $x, y$
  - b) Coefficients:  $5, 3$
  - c) Constant:  $-8$
  - d) Number of terms:  $3$
-

**13.**

a)  $7x + 5 \rightarrow$  **Degree 1**

b)  $3x^2 - 4x + 1 \rightarrow$  **Degree 2**

c)  $2y^3 + y - 9 \rightarrow$  **Degree 3**

---

**14.**

a)  $3x + 7 \rightarrow$  **Linear**

b)  $x^2 + 5 \rightarrow$  **Not linear**

c)  $9 - 2y \rightarrow$  **Linear**

d)  $4x^3 + 1 \rightarrow$  **Not linear**

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**15.**

$$5x - 3$$

a)  $x = 0$

$$= 5(0) - 3$$

$$= -3$$

b)  $x = 2$

$$= 10 - 3$$

$$= 7$$

c)  $x = -1$

$$= -5 - 3$$

$$= -8$$

---

## Section D

**16.**

Sequence:

1, 3, 5, 7, 9, ...

a) Common difference:

$$d = 2$$

b) nth term:

$$a = 1$$

$$t = a + (n-1)d$$

$$= 1 + 2(n-1)$$

$$t = 2n - 1$$

c) 20th term:

$$2(20) - 1$$

$$= 39$$

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**17.**

Sequence:

4, 7, 10, 13, 16

a) Common difference:

$$3$$

b) Yes, it is a **linear pattern**.

c)

$$a = 4$$

$$d = 3$$

$$t_{10} = 4 + (10-1)3$$

$$= 4 + 27$$

$$= 31$$

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**18.**

Starting value = 50

Decrease = 6

a) First five terms:

**50, 44, 38, 32, 26**

b) **Linear decay**

c)

$$t = 50 + (n-1)(-6)$$

$$t = 56 - 6n$$

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## **Section E**

**19.**

Fixed fee = ₹200

Cost per module = ₹50

Therefore:

$$y = 50x + 200$$

a)  $y = 50x + 200$

b)

50 → cost per module / slope

200 → fixed fee / y-intercept

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**20.**

$$y = 4x - 3$$

a) Slope = 4

b) y-intercept = -3

c) When  $x = 2$ :

$$y = 4(2) - 3$$

$$= 8 - 3$$

$$y = 5$$

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## Section F

**21.**

$$y = 2x + 1$$

|   |   |   |   |   |
|---|---|---|---|---|
| x | 0 | 1 | 2 | 3 |
|---|---|---|---|---|

|   |   |   |   |   |
|---|---|---|---|---|
| y | 1 | 3 | 5 | 7 |
|---|---|---|---|---|

Points:

$$(0, 1), (1, 3), (2, 5), (3, 7)$$

These points lie on a **straight line**.

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## **BONUS**

**22.**

Initial value = ₹20,000

Decrease per year = ₹2,000

a) After 1 year:

**₹18,000**

b) After 2 years:

**₹16,000**

c) After  $x$  years:

$$y = 20,000 - 2,000x$$

d) After 5 years:

$$20,000 - 2,000(5)$$

$$= 20,000 - 10,000$$

**₹10,000**

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## **QUICK REVISION BOX**

### **Algebraic Expression**

Combination of numbers, variables and operations.

### **Variable**

A quantity whose value can vary.

### **Coefficient**

Numerical factor of a variable.

### **Degree**

Highest power of the variable in a polynomial.

### ★ **Linear Polynomial**

A polynomial of degree 1.

Example:

$$3x + 5$$

### **Linear Growth**

Increases by a fixed amount over equal intervals.

### **Linear Decay**

Decreases by a fixed amount over equal intervals.

### **Linear Relationship**

$$y = ax + b$$

where:

**a = slope**

**b = y-intercept**

### **Graph**

A linear relationship produces a:

**straight line.**

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# STUDENT SELF-CHECK

- ☐ I can identify terms, variables, coefficients and constants.
- ☐ I can find the degree of a polynomial.
- ☐ I can identify a linear polynomial.
- ☐ I can recognise a linear pattern.
- ☐ I can distinguish linear growth and decay.
- ☐ I can form a linear relationship.
- ☐ I understand slope and y-intercept.
- ☐ I can plot a linear relationship on a graph.

★ **MY SCORE:** \_\_\_\_\_ / 30

**25–30:** 🌟 Excellent!

**20–24:** 👏 Very Good!

**15–19:** 👍 Good – keep practising!

**Below 15:** 📖 Revise Chapter 2 and try again!