

PRACTICE PAPER 05 (2026-27)
CHAPTER 02 INTRODUCTION TO LINEAR POLYNOMIALS

SUBJECT: MATHEMATICS

MAX. MARKS : 40

CLASS : IX

DURATION : 1½ hrs

General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 20 questions divided into five Sections A, B, C, D and E.
- (iii). **Section A** comprises of 10 MCQs of 1 mark each. **Section B** comprises of 4 questions of 2 marks each. **Section C** comprises of 3 questions of 3 marks each. **Section D** comprises of 1 question of 5 marks each and **Section E** comprises of 2 Case Study Based Questions of 4 marks each.
- (iv). There is no overall choice.
- (v). Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. A company manufactures school bags. The fixed monthly factory expenditure is ₹45,000 and the cost of producing each bag is ₹320.
Which linear polynomial represents the total monthly production cost for producing x bags?
(a) $45000x + 320$ (b) $320x + 45000$ (c) $45320x$ (d) $45000 + 320$
2. A graph passes through the points (0, 12) and (4, 28). The slope of the graph is:
(a) 2 (b) 3 (c) 4 (d) 5
3. The admission fee in a sports academy consists of a fixed amount of ₹2,500 and ₹600 per month. The total fee after n months is:
(a) $2500n + 600$ (b) $600n + 2500$ (c) $3100n$ (d) $2500 + 600$
4. The coefficient of x in $-13x + 27$ is:
(a) -13 (b) 13 (c) 27 (d) -27
5. A water reservoir contains 15,000 litres of water. Every day, 350 litres are supplied to nearby villages. The amount of water remaining after d days is:
(a) $15000 + 350d$ (b) $350d - 15000$ (c) $15000 - 350d$ (d) $15350d$
6. The value of $p(x) = 9x - 14$ at $x = 6$ is:
(a) 30 (b) 34 (c) 40 (d) 42
7. The graph of $y = 7x$ passes through:
(a) (0, 0) (b) (0, 7) (c) (7, 0) (d) (1, 0)
8. A school library already has 8,500 books. Every year, 450 new books are added. The total number of books after t years is:
(a) $450t + 8500$ (b) $8500t + 450$ (c) $8950t$ (d) $8500 + 450$

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

9. **Assertion (A):** The graph of $y = 3x + 11$ cuts the y-axis at (0,11).
Reason (R): For any linear polynomial $y = ax + b$, the value of y when $x = 0$ equals b.
10. **Assertion (A):** The lines $y = 5x + 8$ and $y = 5x - 12$ are parallel.
Reason (R): Lines having equal slopes are parallel.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. A school organises a science exhibition. The total collection from visitors is represented by $C = 35x + 250$, where x represents the number of visitors.
Find: (i) The total collection from 40 visitors.
(ii) The increase in collection if the number of visitors rises from 40 to 55.
12. A mathematics club purchases notebooks for participants. The total cost is represented by $P = 18n + 120$, where n represents the number of notebooks.
Find: (i) The cost of purchasing 25 notebooks.
(ii) The cost of purchasing 40 notebooks.
(iii) How much extra amount is required for purchasing 40 notebooks instead of 25 notebooks?
13. The nth term of a pattern is given by $15n - 8$
Find: (i) The 18th term.
(ii) The 30th term.
(iii) By how much does the 30th term exceed the 18th term?
14. A straight road is represented by the equation $y = 9x - 5$
Find: (i) The slope of the road.
(ii) The y-intercept.
(iii) State whether the graph rises or falls from left to right.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. A city taxi service charges a fixed booking fee and ₹28 per kilometre travelled.
A customer travels 25 km and pays ₹850.
Find: (i) The fixed booking fee.
(ii) The linear equation representing the fare.
(iii) The fare for a journey of 40 km.
16. The graph of a linear relationship passes through the points (3, 11) and (7, 27)
Find: (i) The slope of the graph.
(ii) The equation of the graph.
(iii) The value of y when $x = 12$.
17. Draw the graph of the linear equation $x + 2y = 8$ and find the point on the graph where abscissa is twice the value of ordinate.

SECTION – D

Questions 18 carry 5 marks each.

18. A digital learning platform charges a one-time registration fee and ₹180 per month as subscription charges. A student pays ₹3,420 for 14 months.
Find: (i) The registration fee.

- (ii) The linear equation representing the total payment.
- (iii) The payment for 24 months.
- (iv) The number of months corresponding to a payment of ₹5,760.
- (v) Explain why the relationship between payment and duration is linear.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. Case Study - 1: Solar Energy Installation Project

A residential society decided to install solar panels to reduce electricity expenses and promote clean energy. A solar company charges a fixed installation cost of ₹20,000 and ₹8,500 for each solar panel installed. During the first phase of the project, 12 solar panels were installed. The society management used mathematical models to estimate future expenses and compare different installation plans. Students were asked to represent the installation cost using linear polynomials and analyse how the total cost changes with the number of solar panels installed. Such applications demonstrate the usefulness of mathematics in sustainable development projects.



Answer the following Questions:

- (a) Write the linear equation representing the installation cost.
- (b) Calculate the cost of installing 18 solar panels.
- (c) Determine the number of panels that can be installed for ₹1,90,000.
- (d) Identify the slope of the equation and explain its practical meaning.

20. Case Study - 2: Glacier Conservation Study

Environmental scientists are studying a glacier whose present thickness is 320 metres. Due to rising global temperatures, the glacier loses 8 metres of thickness every year. Researchers use linear mathematical models to estimate future glacier thickness and predict environmental changes. These predictions help governments and environmental organisations design conservation measures. Students participating in a climate awareness programme analyse the data and learn how linear polynomials are used to model real-life situations involving uniform increase or decrease. The glacier thickness changes at a constant rate, making it an excellent example of a linear relationship in environmental science.



Answer the following Questions:

- (a) Write the linear equation representing glacier thickness after t years.
- (b) Find the glacier thickness after 15 years.
- (c) Determine after how many years the glacier thickness will reduce to 120 metres.
- (d) State whether the situation represents linear growth or linear decay.

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PRACTICE PAPER 05 (2026-27)
CHAPTER 02 INTRODUCTION TO LINEAR POLYNOMIALS
(ANSWERS)

SUBJECT: MATHEMATICS

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- (iii). **Section A** comprises of 10 MCQs of 1 mark each. **Section B** comprises of 4 questions of 2 marks each. **Section C** comprises of 3 questions of 3 marks each. **Section D** comprises of 1 question of 5 marks each and **Section E** comprises of 2 Case Study Based Questions of 4 marks each.
- (iv). There is no overall choice.
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SECTION – A

Questions 1 to 10 carry 1 mark each.

1. A company manufactures school bags. The fixed monthly factory expenditure is ₹45,000 and the cost of producing each bag is ₹320.

Which linear polynomial represents the total monthly production cost for producing x bags?

- (a) $45000x + 320$ (b) $320x + 45000$ (c) $45320x$ (d) $45000 + 320$

Ans: (b) $320x + 45000$

Fixed cost = ₹45,000

Variable cost = ₹320 per bag

Hence, $C = 320x + 45000$

2. A graph passes through the points (0, 12) and (4, 28). The slope of the graph is:

- (a) 2 (b) 3 (c) 4 (d) 5

Ans: (c) 4

$$m = \frac{28 - 12}{4 - 0}$$

$$= \frac{16}{4}$$

$$= 4$$

3. The admission fee in a sports academy consists of a fixed amount of ₹2,500 and ₹600 per month. The total fee after n months is:

- (a) $2500n + 600$ (b) $600n + 2500$ (c) $3100n$ (d) $2500 + 600$

Ans: (b) $600n + 2500$

4. The coefficient of x in $-13x + 27$ is:

- (a) -13 (b) 13 (c) 27 (d) -27

Ans: (a) -13

5. A water reservoir contains 15,000 litres of water. Every day, 350 litres are supplied to nearby villages. The amount of water remaining after d days is:

- (a) $15000 + 350d$ (b) $350d - 15000$ (c) $15000 - 350d$ (d) $15350d$

Ans: (c) $15000 - 350d$

6. The value of $p(x) = 9x - 14$ at $x = 6$ is:

- (a) 30 (b) 34 (c) 40 (d) 42

Ans: (c) 40

$$p(6) = 9(6) - 14 = 54 - 14 = 40$$

7. The graph of $y = 7x$ passes through:

(a) (0, 0) (b) (0, 7) (c) (7, 0) (d) (1, 0)

Ans: (a) (0,0)

8. A school library already has 8,500 books. Every year, 450 new books are added.

The total number of books after t years is:

(a) $450t + 8500$ (b) $8500t + 450$ (c) $8950t$ (d) $8500 + 450$

Ans: (a) $450t + 8500$

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true but R is not the correct explanation of A.
 (c) A is true but R is false.
 (d) A is false but R is true.

9. **Assertion (A):** The graph of $y = 3x + 11$ cuts the y-axis at (0,11).

Reason (R): For any linear polynomial $y = ax + b$, the value of y when $x = 0$ equals b .

Ans: (a) Both A and R are true and R is the correct explanation.

10. **Assertion (A):** The lines $y = 5x + 8$ and $y = 5x - 12$ are parallel.

Reason (R): Lines having equal slopes are parallel.

Ans: (a) Both A and R are true and R is the correct explanation.

SECTION - B

Questions 11 to 14 carry 2 marks each.

11. A school organises a science exhibition. The total collection from visitors is represented by $C = 35x + 250$, where x represents the number of visitors.

Find: (i) The total collection from 40 visitors.

(ii) The increase in collection if the number of visitors rises from 40 to 55.

Ans: Given: $C = 35x + 250$

For 40 visitors,

$$C = 35(40) + 250 = 1400 + 250 = 1650$$

Thus, collection from 40 visitors = ₹1650.

For 55 visitors,

$$C = 35(55) + 250 = 1925 + 250 = 2175$$

$$\text{Increase in collection} = 2175 - 1650 = 525$$

12. A mathematics club purchases notebooks for participants. The total cost is represented by $P = 18n + 120$, where n represents the number of notebooks.

Find: (i) The cost of purchasing 25 notebooks.

(ii) The cost of purchasing 40 notebooks.

(iii) How much extra amount is required for purchasing 40 notebooks instead of 25 notebooks?

Ans: For 25 notebooks,

$$P = 18(25) + 120 = 450 + 120 = 570$$

For 40 notebooks,

$$P = 18(40) + 120 = 720 + 120 = 840$$

$$\text{Difference: } 840 - 570 = 270$$

13. The n th term of a pattern is given by $15n - 8$

Find: (i) The 18th term.

(ii) The 30th term.

(iii) By how much does the 30th term exceed the 18th term?

Ans: For the 18th term:

$$T_{18} = 15(18) - 8 = 270 - 8 = 262$$

For the 30th term:

$$T_{30} = 15(30) - 8 = 450 - 8 = 442$$

$$\text{Difference: } 442 - 262 = 180$$

14. A straight road is represented by the equation $y = 9x - 5$

Find: (i) The slope of the road.

(ii) The y-intercept.

(iii) State whether the graph rises or falls from left to right.

Ans: Comparing $y = 9x - 5$ with $y = ax + b$ we get

$$a = 9, b = -5$$

Therefore, Slope = 9 and Y-intercept = -5

Since slope is positive, the graph rises from left to right.

SECTION - C

Questions 15 to 17 carry 3 marks each.

15. A city taxi service charges a fixed booking fee and ₹28 per kilometre travelled.

A customer travels 25 km and pays ₹850.

Find: (i) The fixed booking fee.

(ii) The linear equation representing the fare.

(iii) The fare for a journey of 40 km.

Ans: Let the fixed booking fee be ₹b.

The fare equation is: $y = 28x + b$

$$\text{Given: } 850 = 28(25) + b = 700 + b$$

$$\Rightarrow b = 150$$

Therefore, the fixed booking fee is ₹150.

The required equation is $y = 28x + 150$

For a journey of 40 km,

$$y = 28(40) + 150 = 1120 + 150 = 1270$$

16. The graph of a linear relationship passes through the points (3, 11) and (7, 27)

Find: (i) The slope of the graph.

(ii) The equation of the graph.

(iii) The value of y when x = 12.

Ans: Slope:

$$m = \frac{27 - 11}{7 - 3}$$

$$= \frac{16}{4}$$

$$= 4$$

Equation: $y = 4x + b$

Using point (3, 11),

$$11 = 4(3) + b \Rightarrow 11 = 12 + b \Rightarrow b = -1$$

Equation: $y = 4x - 1$

For x = 12

$$y = 4(12) - 1 = 48 - 1 = 47$$

17. Draw the graph of the linear equation $x + 2y = 8$ and find the point on the graph where abscissa is twice the value of ordinate.

Ans. $x + 2y = 8$... (i)

x	0	8	6
y	4	0	1

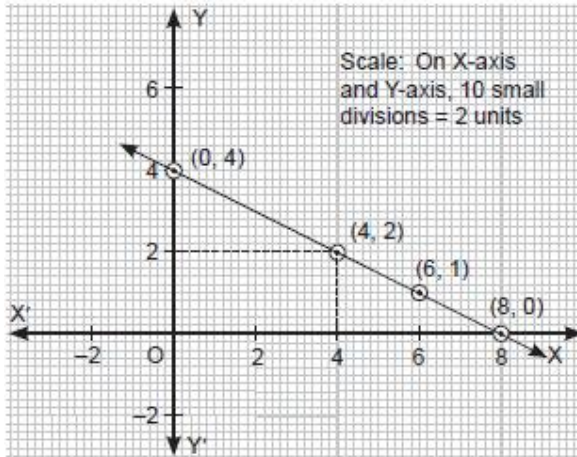
Given, $x = 2y$

Putting $x = 2y$ in (i), we have

$$2y + 2y = 8 \Rightarrow 4y = 8 \Rightarrow y = 2$$

$$\therefore x = 2 \times 2 \Rightarrow x = 4$$

Hence, point (4, 2) is the required point on the graph.



18. A water storage tank initially contains 18,000 litres of water. Every day, 450 litres are supplied to nearby villages.

Find: (i) A linear equation representing the amount of water remaining after d days.

(ii) Water remaining after 20 days.

(iii) After how many days will only 4,500 litres remain?

Ans: Initial water = 18,000 litres

Daily decrease = 450 litres

$$\text{Equation: } W = 18000 - 450d$$

For 20 days,

$$W = 18000 - 450(20) = 18000 - 9000 = 9000$$

For remaining water = 4500 litres,

$$18000 - 450d = 4500$$

$$\Rightarrow 450d = 13500$$

$$\Rightarrow d = 30$$

SECTION - D

Questions 18 carry 5 marks each.

19. A digital learning platform charges a one-time registration fee and ₹180 per month as subscription charges. A student pays ₹3,420 for 14 months.

Find: (i) The registration fee.

(ii) The linear equation representing the total payment.

(iii) The payment for 24 months.

(iv) The number of months corresponding to a payment of ₹5,760.

(v) Explain why the relationship between payment and duration is linear.

Ans: Let registration fee = ₹ b .

$$\text{Total payment: } y = 180x + b$$

$$\text{Given: } 3420 = 180(14) + b = 2520 + b$$

$$\Rightarrow b = 900$$

Registration fee = ₹900.

Equation: $y = 180x + 900$

For 24 months:

$$y = 180(24) + 900 = 4320 + 900 = 5220$$

For payment ₹5760:

$$180x + 900 = 5760$$

$$\Rightarrow 180x = 4860$$

$$\Rightarrow x = 27$$

The payment increases by a fixed amount of ₹180 every month. Therefore, the rate of increase remains constant and the relationship is linear.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

20. Case Study - 1: Solar Energy Installation Project

A residential society decided to install solar panels to reduce electricity expenses and promote clean energy. A solar company charges a fixed installation cost of ₹20,000 and ₹8,500 for each solar panel installed. During the first phase of the project, 12 solar panels were installed. The society management used mathematical models to estimate future expenses and compare different installation plans. Students were asked to represent the installation cost using linear polynomials and analyse how the total cost changes with the number of solar panels installed. Such applications demonstrate the usefulness of mathematics in sustainable development projects.



Answer the following Questions:

- Write the linear equation representing the installation cost.
- Calculate the cost of installing 18 solar panels.
- Determine the number of panels that can be installed for ₹1,90,000.
- Identify the slope of the equation and explain its practical meaning.

Ans: (a) Fixed installation cost = ₹20,000

Cost per panel = ₹8,500

Equation: $y = 8500x + 20000$

(b) For 18 panels:

$$y = 8500(18) + 20000 = 153000 + 20000 = 173000$$

(c) For ₹190000:

$$8500x + 20000 = 190000$$

$$\Rightarrow 8500x = 170000$$

$$\Rightarrow x = 20$$

(d) Slope = 8500.

It represents the increase in installation cost for every additional solar panel installed.

21. Case Study - 2: Glacier Conservation Study

Environmental scientists are studying a glacier whose present thickness is 320 metres. Due to rising global temperatures, the glacier loses 8 metres of thickness every year. Researchers use linear mathematical models to estimate future glacier thickness and predict environmental changes. These predictions help governments and environmental organisations design conservation measures. Students participating in a climate awareness programme analyse the data and learn how linear polynomials are used to model real-life situations involving uniform increase or decrease. The glacier thickness changes at a constant rate, making it an excellent example of a linear relationship in environmental science.



Answer the following Questions:

- Write the linear equation representing glacier thickness after t years.
- Find the glacier thickness after 15 years.
- Determine after how many years the glacier thickness will reduce to 120 metres.
- State whether the situation represents linear growth or linear decay.

Ans: (a) Initial thickness = 320 m

Loss per year = 8 m

Equation: $T = 320 - 8t$

(b) For 15 years:

$$T = 320 - 8(15) = 320 - 120 = 200$$

(c) For thickness = 120 m,

$$320 - 8t = 120$$

$$\Rightarrow 8t = 200$$

$$\Rightarrow t = 25$$

(d) Since thickness decreases uniformly every year, the situation represents linear decay.