CLASS IX – MATHEMATICS

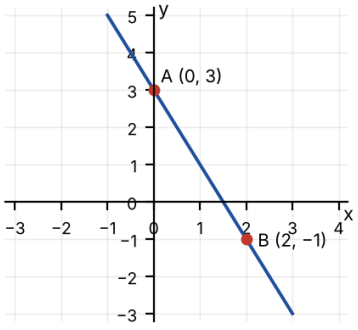
Chapter Test: Introduction to Linear Polynomials

(Ganita Manjari, Grade 9, Part I – Chapter 2)

Time: 1½ Hours **M. M.: 40**

General Instructions:

1. This paper contains 21 questions. All questions are compulsory.
2. This paper is divided into 5 sections: **A, B, C, D** and **E**.
3. In **Section A**, Questions no. **1** to **10** are MCQs and questions no. **11** and **12** are Assertion-Reason based questions of 1 mark each.
4. In **Section B**, Questions no. **13** to **16** are Very Short Answer type questions carrying 2 marks each.
5. In **Section C**, Questions no. **17** and **18** are Short Answer type questions carrying 3 marks each.
6. In **Section D**, Questions no. **19** and **20** are Long Answer type questions carrying 5 marks each.
7. In **Section E**, Question no. **21** is a case based question carrying 4 marks. Internal choice is provided in the 2 marks part of the case study.
8. There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 1 part of Section E.
9. Show all the steps of your working. Figures are not drawn to scale.
10. Use of calculator is **not** allowed.

Q. No.	Section – A	Marks
1.	Which of the following is a linear polynomial? (A) $x^2 + 1$ (B) $3 - 4y$ (C) $5y^3$ (D) 7	**[1]**
2.	The coefficient of x^2 in the polynomial $3x^4 - 5x^3 + 8x^2 - x + 9$ is (A) 5 (B) -5 (C) 8 (D) 4	**[1]**
3.	The value of the linear polynomial $4x - 7$ at $x = -2$ is (A) -15 (B) -1 (C) 1 (D) 15	**[1]**
4.	The value of the polynomial $2s^2 - 3s + 5$ at $s = 3$ is (A) 20 (B) 8 (C) 17 (D) 14	**[1]**
5.	The y-intercept of the line $y = 5x - 8$ is (A) 8 (B) -8 (C) 5 (D) -5	**[1]**
6.	The relationship $y = -3x + 2$ represents (A) linear growth (B) a constant function (C) linear decay (D) a quadratic relation	**[1]**
7.	Which of the following lines is parallel to $y = 3x + 4$? (A) $y = 3x - 7$ (B) $y = 4x + 3$ (C) $y = -3x + 4$ (D) $y = x + 4$	**[1]**
8.	The line in the figure passes through A (0, 3) and B (2, −1). Its equation is  (A) $y = 2x + 3$ (B) $y = 2x - 3$ (C) $y = -2x + 3$ (D) $y = -2x - 3$	**[1]**

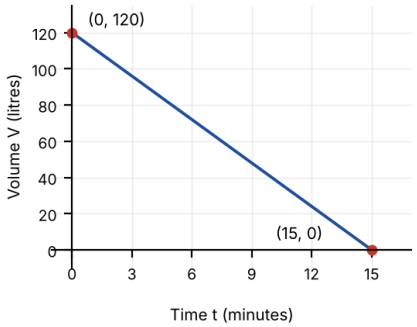
Q. No.	Section – A	Marks
9.	Squares are made in a row using matchsticks, as shown. The number of matchsticks needed for Stage 10 is  (A) 30 (B) 31 (C) 40 (D) 28	**[1]**
10.	The nth term of the linear pattern 7, 11, 15, 19, ... is (A) $4n - 3$ (B) $7n$ (C) $3n + 4$ (D) $4n + 3$	**[1]**
	Questions number 11 and 12 are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the options (A), (B), (C) and (D) as given below. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). (B) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A). (C) Assertion (A) is true but Reason (R) is false. (D) Assertion (A) is false but Reason (R) is true.	
11.	**Assertion (A):** The line $y = 4x - 5$ passes through the origin. **Reason (R):** The line $y = ax + b$ passes through the origin when $b = 0$.	**[1]**
12.	**Assertion (A):** The lines $y = 3x + 2$ and $y = 3x - 5$ are parallel. **Reason (R):** Lines with equal slopes and different y-intercepts are parallel.	**[1]**

Q. No.	Section – B	Marks
13.	Find the value of the polynomial $2t^2 - 3t + 7$ at $t = -3$.	**[2]**
14.	(A) The sum of two numbers is 91 and one number is 13 more than the other. Find the numbers. **OR** (B) The length of a rectangle is 5 cm more than its width and its perimeter is 46 cm. Find its length and width.	**[2]**
15.	An auto-rickshaw charges ₹30 for the first 2 km and then ₹12 for every additional km. Find the fare for a journey of 9 km.	**[2]**
16.	(A) Write the slope and the y-intercept of the line $3y = 9x - 15$. **OR** (B) A line passes through the points (0, 4) and (2, 10). Find its equation in the form $y = ax + b$.	**[2]**

Q. No.	Section – C	Marks
17.	(A) A gym charges a fixed monthly fee and an additional amount per class attended. For 8 classes the bill is ₹1,100 and for 14 classes it is ₹1,700. If the bill y for x classes is given by $y = ax + b$, find a and b. **OR** (B) A car-rental company charges a fixed fee plus a rate per km. For 120 km the bill is ₹1,500 and for 200 km it is ₹2,300. If the bill y for x km is $y = ax + b$, find a and b.	**[3]**

Q. No.	Section – C	Marks
18.	(A) A scooter bought for ₹60,000 loses ₹4,000 of its value every year. (i) Write an expression for its value v after t years. [1] (ii) Find its value after 5 years. [1] (iii) After how many years will its value be ₹12,000? [1] **OR** (B) A plant is 2.5 ft tall and grows 0.75 ft every month. (i) Write an expression for its height h after t months. [1] (ii) Find its height after 8 months. [1] (iii) After how many months will it be 10 ft tall? [1]	**[3]**

Q. No.	Section – D	Marks
19.	(A) The graph of a linear polynomial $p(x)$ passes through the points $(1, -4)$ and $(4, 2)$. (i) Find $p(x)$. [2] (ii) Find the coordinates of the points where the graph cuts the axes. [2] (iii) Is the line $y = 2x + 5$ parallel to the graph of $p(x)$? Give a reason. [1] **OR** (B) Let $p(x) = ax + b$ and $q(x) = cx + d$ be linear polynomials such that (i) $p(0) = 4$, (ii) $p(x) + q(x) = 7x + 10$ for all x, and (iii) the graph of $p(x) - q(x)$ cuts the x-axis at $(2, 0)$. Find $p(x)$ and $q(x)$.	**[5]**
20.	(A) The number of tiles in the first four stages of a growing pattern is 5, 8, 11, 14. (i) Find a rule for the number of tiles at Stage n. [2] (ii) How many tiles are there at Stage 20? [1] (iii) Which stage has 80 tiles? [1] (iv) Can a stage have exactly 100 tiles? Justify. [1] **OR** (B) Company A charges a taxi fare of ₹40 plus ₹12 per km. Company B charges ₹100 plus ₹6 per km. (i) Write the fare of each company for d km. [2] (ii) For what distance are the two fares equal? [2] (iii) Which company is cheaper for a 15 km journey? [1]	**[5]**

Q. No.	Section – E	Marks
21.	**Case Study:** A water tank holds 120 litres of water. At time $t = 0$ a tap at the bottom is opened and water drains out at a steady rate of 8 litres per minute. The volume of water V (in litres) left after t minutes is given by $V = 120 - 8t$, and its graph is shown.  (i) Find the volume of water left after 5 minutes. **[1]** (ii) After how many minutes will the tank be empty? **[1]** (iii) (A) State the slope and the V-intercept of the line and explain what each represents in this situation. **[2]** **OR** (iii) (B) After how many minutes will 40 litres remain? Is this linear growth or linear decay? Give a reason. **[2]**	**[4]**