

STD 9 Maths [Manjari]
Introduction to Linear Polynomials

*** Choose the right answer from the given options. [1 Marks Each]**

[44]

1. Which of the following is true for the line with equation: $x + 0 \cdot y - 4 = 0$?
(A) The distance of the line from the x-axis is 1.
(B) The distance of the line from the y-axis is 4.
(C) The distance of the line from the y-axis is -1.
(D) The distance of the line from the x-axis changes from 1 to 4.
2. The equation of a line is $ax + by + c = 0$.
What conditions ensure that the distance of the line from an axis is constant?
(A) $c = 0$ and $a, b \neq 0$
(B) $c, < 0$ and $a, b \neq 0$
(C) $c, b \neq 0$ and $a = 1$
(D) $c, b \neq 0$ and $a = 0$
3. Which one of the following is a polynomial?
(A) $\frac{x^2}{2} - \frac{2}{x^2}$
(B) $\sqrt{2x} - 1$
(C) $x^2 + \frac{3x^{\frac{3}{2}}}{\sqrt{x}}$
(D) $\frac{x-1}{x+1}$
4. $\sqrt{2}$ is a polynomial of degree:
(A) 2
(B) 0
(C) 1
(D) $\frac{1}{2}$
5. Degree of the polynomial $4x^4 + 0 \cdot x^3 + 0 \cdot x^2 + 5x + 7$ is:
(A) 4
(B) 5
(C) 3
(D) 7
6. If $p(x) = x^2 - 2\sqrt{2}x + 1$, then $p(2\sqrt{2})$ is equal to:
(A) 0
(B) 1
(C) $4\sqrt{2}$
(D) $8\sqrt{2} + 1$
7. If $p(x) = x + 3$ then $p(x) + p(-x)$ is equal to:
(A) 3
(B) $2x$
(C) 0
(D) 6
8. How many solutions does $2x + 3 = y$ have?
(A) 0
(B) 1
(C) 2
(D) infinitely many
9. Which of the following is not a solution of the equation $2x + y = 7$?
(A) (1, 3)
(B) (3, 1)
(C) (-0, 7)
(D) (1, 5)
10. If the point (2,-1) lies on the graph of the equation $3x + ky = 4$ then the value of k is:
(A) 2
(B) -2
(C) 0
(D) -1
11. The graph of which of the following equations passes through the origin?
(A) $2x + 3y = 1$
(B) $2x + 3y = 0$
(C) $2x + 3y = 6$
(D) $3x - 2y = 5$

12. Which of the following does not pass through the origin?
 (A) $y = \frac{2}{5}x$ (B) $y = mx$ (C) $x - y = 0$ (D) $x + y = 1$
13. The equation of a line parallel to y-axis and 4 units to the left of origin, is:
 (A) $x = 4$ (B) $y = 4$ (C) $x = -4$ (D) $y = -4$
14. Any point on the line $x = y$ is of the form:
 (A) $(0, a)$ (B) $(a, 0)$ (C) $(-a, 0)$ (D) (a, a)
15. Which of the following is a linear equation in one variable?
 (A) $2x = y$ (B) $y^2 = 3y + 5$ (C) $4x - y = 4$ (D) $3t + 5 = 9t - 7$
16. The inclination of every line parallel to the x-axis is:
 (A) 0° (B) 90° (C) 180° (D) none of these
17. The slope of a vertical line is:
 (A) 0 (B) 1 (C) 90 (D) not defined
18. The slope of a line passing through two given points $A(x_1, y_1)$ and $B(x_2, y_2)$ is given:
 (A) $a = \frac{x_2 - x_1}{y_2 - y_1}$ (B) $a = \frac{y_2 \times y_1}{x_2 \times x_1}$ (C) $a = \frac{x_2 \times x_1}{y_2 \times y_1}$ (D) $a = \frac{y_2 - y_1}{x_2 - x_1}$
19. The slope of the line passing through the points $(-3, 4)$ and $B(2, -6)$ is :
 (A) $-\frac{1}{2}$ (B) -2 (C) 2 (D) $\frac{1}{2}$
20. The slope of the straight line passing through the points $A(3, -2)$ and $B(3, -4)$ is:
 (A) 0 (B) 1 (C) -2 (D) not defined
21. The slope of the line, $3x - 2\sqrt{2}y - 4 = 0$ is :
 (A) $\frac{3\sqrt{2}}{2}$ (B) $\frac{-3\sqrt{2}}{2}$ (C) $\frac{3\sqrt{2}}{4}$ (D) $-\frac{3\sqrt{2}}{4}$
22. The value of m such that the points $A(5, -2)$ $B(8, -3)$ and $C(m, -12)$ are collinear, is:
 (A) 29 (B) 33 (C) 35 (D) 41
23. Any point on the line $x = y$ is of the form :
 (A) $(0, a)$ (B) $(a, 0)$ (C) $(-a, 0)$ (D) (a, a)
24. Degree of the polynomial $4x^4 + 0.x^3 + 0.x^2 + 5x + 7$ is :
 (A) 4 (B) 5 (C) 3 (D) 7
25. How many solutions does $2x + 3 = y$ have?
 (A) 0 (B) 1 (C) 2 (D) infinitely many
26. If $p(x) = x^2 - 2\sqrt{2}x + 1$, then $p(2\sqrt{2})$ is equal to :
 (A) 0 (B) 1 (C) $4\sqrt{2}$ (D) $8\sqrt{2} + 1$
27. If $p(x) = x + 3$, then $p(x) + p(-x)$ is equal to :

- (A) 3 (B) $2x$ (C) 0 (D) 6
28. If the point (2,-1) lies on the graph of the equation $3x + ky = 4$, then the value of k is :
 (A) 2 (B) -2 (C) 0 (D) -1
29. $\sqrt{2}$ is a polynomial of degree :
 (A) 2 (B) 0 (C) 1 (D) $\frac{1}{2}$
30. The equation of a line is $ax + by + c = 0$.
 What conditions ensure that the distance of the line from an axis is constant?
 (A) $c = 0$ and $a, b \neq 0$ (B) $c < 0$ and $a, b \neq 0$ (C) $c, b \neq 0$ and $a = 1$ (D) $c, b \neq 0$ and $a = 0$
31. The equation of a line parallel to y-axis and 4 units to the left of origin, is :
 (A) $x = 4$ (B) $y = 4$ (C) $x = -4$ (D) $y = -4$
32. The graph of which of the following equations passes through the origin?
 (A) $2x + 3y = 1$ (B) $2x + 3y = 0$ (C) $2x + 3y = 6$ (D) $3x - 2y = 5$
33. The inclination of every line parallel to the x-axis is :
 (A) 0° (B) 90° (C) 180° (D) none of these
34. The slope of a line passing through two given points $A(x_1, y_1)$ and $B(x_2, y_2)$ is given by :
 (A) $a = \frac{x_2 - x_1}{y_2 - y_1}$ (B) $a = \frac{y_2 \times y_1}{x_2 \times x_1}$ (C) $a = \frac{x_2 \times x_1}{y_2 \times y_1}$ (D) $a = \frac{y_2 - y_1}{x_2 - x_1}$
35. The slope of a vertical line is :
 (A) 0 (B) 1 (C) 90 (D) not defined
36. The slope of the line, $3x - 2\sqrt{2}y - 4 = 0$ is :
 (A) $\frac{3\sqrt{2}}{2}$ (B) $\frac{-3\sqrt{2}}{2}$ (C) $\frac{3\sqrt{2}}{4}$ (D) $-\frac{3\sqrt{2}}{4}$
37. The slope of the line passing through the points $A(-3, 4)$ and $B(2, -6)$ is :
 (A) $-\frac{1}{2}$ (B) -2 (C) 2 (D) $\frac{1}{2}$
38. The slope of the straight line passing through the points $A(3, -2)$ and $B(3, -4)$ is :
 (A) 0 (B) 1 (C) -2 (D) not defined
39. The value of m such that the points $A(5, -2)$, $B(8, -3)$ and $C(m, -12)$ are collinear, is :
 (A) 29 (B) 33 (C) 35 (D) 41
40. Which of the following does not pass through the origin?
 (A) $y = \frac{2}{5}x$ (B) $y = mx$ (C) $x - y = 0$ (D) $x + y = 1$
41. Which of the following is a linear equation in one variable?
 (A) $2x = y$ (B) $y^2 = 3y + 5$ (C) $4x - y = 4$ (D) $3t + 5 = 9t - 7$

42. Which of the following is not a solution of the equation $2x + y = 7$?
 (A) (1, 3) (B) (3, 1) (C) (-0, 7) (D) (1, 5)
43. Which of the following is true for the line with equation: $1.x + 0.y - 4 = 0$?
 (A) The distance of the line from the x-axis is 1.
 (B) The distance of the line from the y-axis is 4.
 (C) The distance of the line from the y-axis is -1.
 (D) The distance of the line from the x-axis changes from 1 to -4.
44. Which one of the following is a polynomial?
 (A) $\frac{x^2}{2} - \frac{2}{x^2}$ (B) $\sqrt{2}x - 1$ (C) $x^2 + \frac{3x^{\frac{3}{2}}}{\sqrt{x}}$ (D) $\frac{x-1}{x+1}$

* A statement of Assertion (A) is followed by a statement of Reason (R). [10]
 Choose the correct option.

Directions: In each question below, there are two statements labelled as Assertion (A) and Reason (R). Choose the correct answer as per the options given below:

- (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

45. Assertion (A): Degree of polynomial $(ax + b)(cx + d)$ is 2.
 Reason (R): Product of two linear polynomials is a quadratic polynomial.
46. Assertion (A): Every monomial is a linear polynomial.
 Reason (R): A monomial has only one term.
47. Assertion (A): $x = 4, y = 5$ is a solution of equation $2x + y = 3$
 Reason (R): At $x = 4, y = 5$ the LHS of equation $2x + y = 3$ is equal to the RHS of the equation.
48. Assertion (A): (0,2), (1, 0) and (3, 4) are the three solutions of equation $2x - y - 2 = 0$
 Reason (R): $x = y$ is the equation of the line passing through (1, 0).
49. Assertion (A) : The slope of the line passing through the points (3, -2) and (-7, -2) is 0.
 Reason (R) : The slope of a line passing through the points (x_1, y_1) and (x_2, y_2) is $\frac{y_2 - y_1}{x_2 - x_1}$.
50. Assertion (A) : (0, -2), (1, 0) and (3, 4) are the three solutions of equation $2x - y - 2 = 0$.
 Reason (R) : $x = y$ is the equation of the line passing through (1, 0).

51. Assertion (A) : Degree of polynomial $(ax + b)(cx + d)$ is 2.
Reason (R) : Product of two linear polynomials is a quadratic polynomial.
52. Assertion (A) : Every monomial is a linear polynomial.
Reason (R) : A monomial has only one term.
53. Assertion (A) : The slope of the line passing through the points (3, -2) and (-7, -2) is 0.
Reason (R) : The slope of a line passing through the points (x_1, y_1) and (x_2, y_2) is $\frac{y_2 - y_1}{x_2 - x_1}$.
54. Assertion (A) : $x = 4, y = 5$ is a solution of equation $2x + y = 3$.
Reason (R) : At $x = 4, y = 5$, the LHS of equation $2x + y = 3$ is equal to the RHS of the equation.

*** Answer the following short questions. [2 Marks Each]**

[80]

55. Write polynomials of degrees 1, 2 and 3.
56. What are the coefficients of x^2 and x^3 in the polynomial $x^4 - 3x^3 + 6x^2 - 2x + 7$?
57. What is the coefficient of z in the polynomial $4z^3 + 5z^2 - 11$?
58. The difference between two positive integers is 63. The ratio of the two integers is 2:5. Find the two integers.
59. Write a polynomial of degree 3 in the variable x , in which the coefficient of the x^2 term is -7.
60. Find the slope of a line passing through the points $A(-2, -3)$ and $B(2, 4)$.
61. Given the point (1, 2), find the equation of a line on which it lies. How many such equations are there?
62. Express the following statements in linear equations in two variables.
(i) The cost of a notebook is ₹20 more than the cost of a pen.
(ii) The cost of a pencil is ₹2 less than half of the cost of fountain pen.
63. Write the coefficient of x^3 in $\frac{-x^3 + 3x^2 + 5}{2}$.
64. Write the co-efficient of x^2 in each of the following :
(i) $2 - x^2 + x^3$, (ii) $\frac{\pi}{2}x^2 + x$
65. Find the slope and the equation of the line passing through the points :
(i) $A(-2, 1)$ and $B(3, -4)$, (ii) $A(4, -2)$ and $B(2, -3)$
66. Find the equation of a line :
(i) whose slope is 4 and which passes through the point (3, 7),
(ii) whose slope is -3 and which passes through the point (-2, 3).
67. Find the slope of the line passing through the point :
 $A(2, 5)$ and $B(-4, -4)$

68. Find the slope of the line passing through the point :
 $A(4, -9)$ and $B(-2, -1)$
69. Find the slope of the line passing through the point :
 $A(-2, 1)$ and $B(3, -4)$
70. Draw the graph of the following equation:
 $x - 8 = 0$
71. Draw the graph of the following equation:
 $3y = 8$
72. Draw the graph of the following equation:
 $2x = -7$
73. Draw the graph of the following equation:
 $y = 4$
74. Draw the graph of the following equation:
 $x = 1$
75. If the point $(2, -1)$ lies on the graph of the equation $2y = ax - 6$, then find the value of a .
76. Draw the graph of the equation $2x - 3y = 5$. From the graph, find
 (i) the value of y , where $x = 4$, (ii) the value of x where, $y = 3$."
77. Check whether $x = 2, y = 1$ is a solution of the following equation or not.
 (i) $2x - 3y = 1$, (ii) $x + y + 4 = 0$
78. For what value of c , the linear equation $3x - cy = 8$ has equal values of x and y for its solution.
79. How many solutions does the equation $3x - 5y = 6$ have?
80. Find two solution of the following equation:
 $2x + 5y = 15$
81. Write a solution of the linear equation $2x + 0.y + 8 = 0$ in two variables.
82. Write of the following as an equation in two variable.
 $x = -1.3$
83. Write of the following as an equation in two variable.
 $x = -\frac{2}{3}$
84. Write of the following as an equation in two variable.
 $\frac{2}{5}y = -3$
85. Write of the following as an equation in two variable.
 $x = \frac{3}{2}$
86. Write of the following equation in the form $ax + by + c = 0$ and indicate the value of a, b and c in case.

$$\frac{x}{\sqrt{3}} + y = 1$$

87. Write of the following equation in the form $ax + by + c = 0$ and indicate the value of a, b and c in case.

$$\frac{\sqrt{2}x}{3} + 3y = \sqrt{5}$$

88. Write of the following as an equation in two variable.

$$\frac{y}{6} = 12$$

89. A phone battery is 90% charged and decreases by 4% every hour.

(i) Write expression for battery after x hours.

(ii) Find battery level after 5 hours.

90. A plant is 12 cm tall and grows 3 cm every week.

(i) Write expression for height after x weeks.

(ii) Find height of the plant after 6 weeks.

91. A tank contains 120 l water and leaks 5 l per hour.

(i) Form expression for water left after x hours.

(ii) Find the volume of water after 12 hours.

92. Height of a plant growth is given in the table. Find whether the pattern is linear or not.

Week	0	1	2	3
Money (₹)	10	14	18	22

93. In the given table, Riya's savings each week is given. Is the pattern linear?

Week	0	1	2	3
Money (₹)	200	240	280	320

94. Taxi fare is given in the table. Is the pattern linear?

Distance	0	1	2	3
Fare (₹)	50	65	80	95

*** Answer the following questions. [3 Marks Each]**

[165]

95. Find the value of the linear polynomial $5x - 3$ if:

(i) $x = 0$

(ii) $x = -1$

(iii) $x = 2$

96. Find the value of the quadratic polynomial $7s^2 - 4s + 6$ if:

(i) $s = 0$

(ii) $s = -3$

(iii) $s = 4$

97. The present age of Salil's mother is three times Salil's present age. After 5 years, their ages will add up to 70 years. Find their present ages.
98. Ruby has 3 times as many two-rupee coins as she has five-rupee coins. If she has a total ₹88, how many coins does she have of each type?
99. A farmer cuts a 300 feet fence into two pieces of different sizes. The longer piece is four times as long as the shorter piece. How long are the two pieces?
100. If the length of a rectangle is three more than twice its width and its perimeter is 24 cm, what are the dimensions of the rectangle?
101. A student has ₹500 in her savings bank account. She gets ₹150 every month as pocket money. How much money will she have at the end of every month from the second month onwards?
Find a linear expression to represent the amount she will have in the n^{th} month.
102. A rally starts with 120 members. Each hour, 9 members drop out of the group. How many members will remain after 1, 2, 3, ... hours? Find a linear expression to represent the number of members at the end of the n^{th} hour.
103. Suppose the length of a rectangle is 13 cm. Find the area if the breadth is (i) 12 cm, (ii) 10 cm, (iii) 8 cm. Find the linear pattern representing the area of the rectangle.
104. Suppose the length of a rectangular box is 7 cm and breadth is 11 cm. Find the volume if the height is (i) 5 cm, (ii) 9 cm, (iii) 13 cm. Find the linear pattern representing the volume of the rectangular box.
105. Sarita is reading a book of 500 pages. She reads 20 pages every day. How many pages will be left after 15 days? Express this as a linear pattern.
106. If we multiply a number by $\frac{5}{2}$ and add $\frac{2}{3}$ to the product, we get $-\frac{7}{12}$. Find the number.
107. A positive number is 5 times another number. If 21 is added to both the numbers, then one of the new numbers becomes twice the other new number. What are the numbers?
108. The equation of a line is $2x - 2\sqrt{3}y - \sqrt{3} = 0$. Find :
(i) the slope of the line; (ii) the y-intercept of the line.
109. Find the equation of the line passing through the point $P(-2,4)$ and making an intercept of 3 on the y -axis.
110. Find the points where the graph of the equation $3x + 4y = 12$ cuts the x -axis and the y -axis.
111. Show that (4, 0) as well as (6, 1) is a solution of $x - 2y = 4$.
112. Write two solutions of the linear equation $ax - by = 2ab$.
113. Find four different solutions of the equation $x + 2y = 6$.

114. Write each of the following as an equation in two variables :

(i) $x = -5$, (ii) $y = 2$, (iii) $2x = 3$

115. Classify the following as linear, quadratic and cubic.

(i) $x - x^3$, (ii) $1 + x$, (iii) $3p$

116. Write the degree of each of the following polynomials :

(i) $5x^3 + 4x^2 + 7x$, (ii) $5t - \sqrt{7}$, (iii) 3

117. Find the slope and the y-intercept of the following line :

$$\frac{x}{6} + \frac{y}{9} = 1$$

118. Find the slope and the y-intercept of the following line :

$$5x - 10y = 3$$

119. Find the value of k such that the points $P(k, 1)$, $Q(2, -5)$ and $R(k - 2, -3)$ are collinear.

120. Without using distance formula, prove that the points $A(1, 4)$, $B(3, -2)$ and $C(-3, 16)$ are collinear.

121. If the slope of the line joining $P(k, 3)$ and $Q(8, -6)$ is $-\frac{3}{4}$, find the value of k .

122. Find the slope and the y-intercept of the following line :

$$y = 6$$

123. $A(2, 3)$ and $B(-2, 5)$ are two given points.

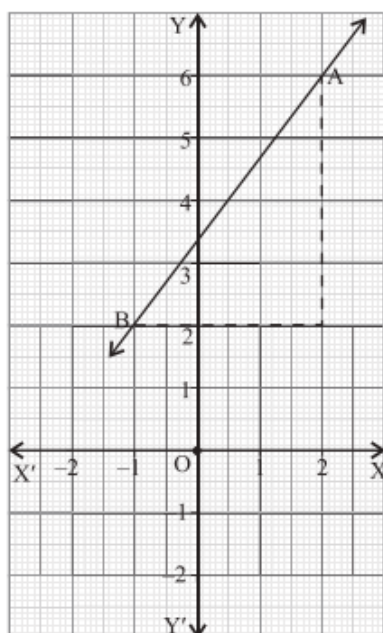
Find : (i) the slope of AB , (ii) the equation of AB , (iii) the co-ordinates of the point, where AB intersects x -axis.

124. Find the slope and the y-intercept of the following line :

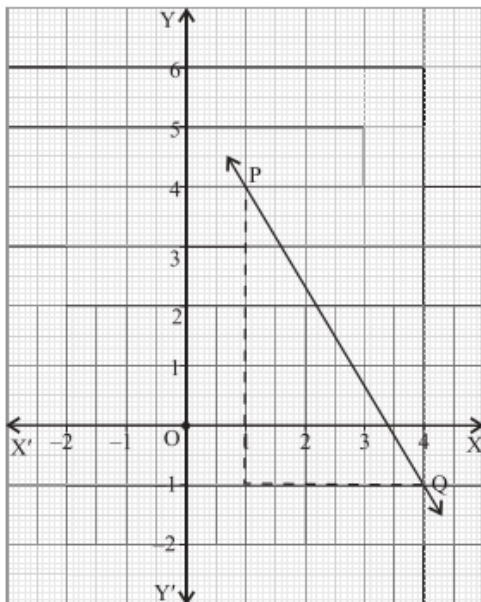
$$x + 4 = 0$$

125. Find the slope of the following lines given in the graph :

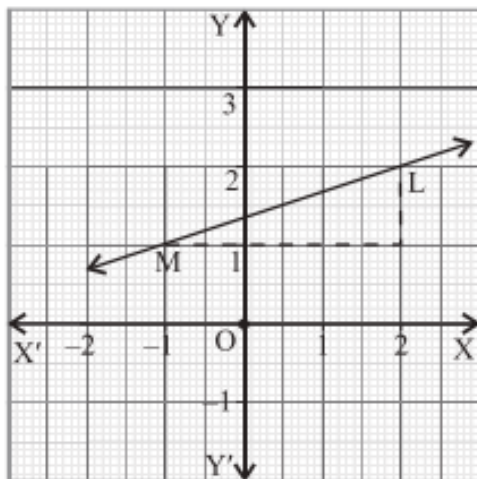
(i)



(ii)



(iii)



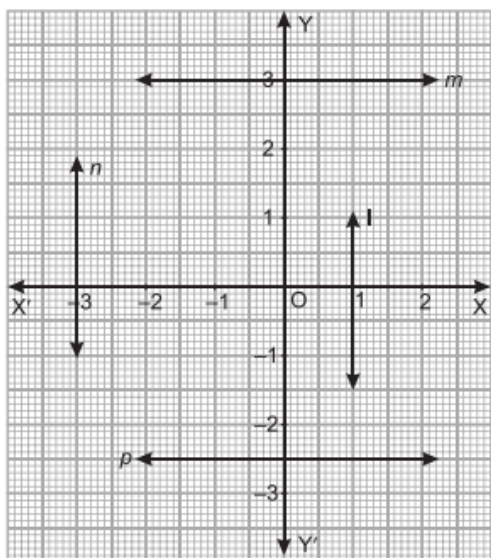
126. Write the equation of the line that is parallel to y -axis and passing through the point

(i) $(2, 0)$, (ii) $(-8, -4)$, (iii) $(2, -5)$

127. Write the equation of the line that is parallel to x -axis and passing through the point

(i) $(0, 5)$, (ii) $(2, -7)$, (iii) $(4, 1)$

128. Look at the graph given below and write the equations of lines l , m , n , and p .



129. Write the linear equation such that each point on its graph has ordinate 4 times its abscissa.

130. Write the linear equation such that each point on its graph has an abscissa that is $2\frac{1}{2}$ times its ordinate.

131. Determine the point on the graph of the equation $5x + y = 27$ whose x -coordinate is $\frac{5}{2}$ times its ordinate.

132. Find the points where the graph of the equation $-5x + 3y = 15$ cuts the x -axis and the y -axis.

133. Find the point where the graph of the equation $2x + y = 7$ cuts the x -axis and the y -axis.

134. Find the point where the graph of the equation $x + y = 7$ cuts the x -axis and the y -axis.

135. Find the point where the graph of the equation $3 = 2x + y$ cuts the x -axis and the y -axis.

136. Express y in terms of x in the equation $2x - 3y = 12$. Find the points where the line represented by this equation cuts x -axis and y -axis.

137. If the point $(1, 2)$ lies on the graph of the equation $5y - ax = 7$, then find the value of a .

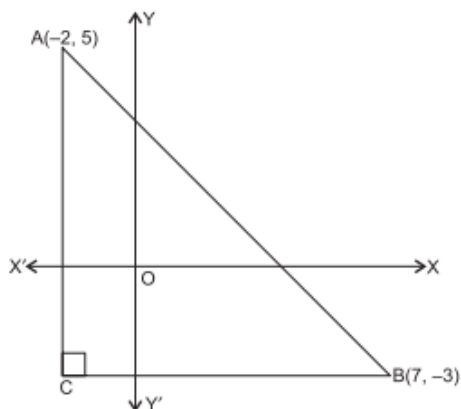
138. Find the point where the graph of the equation $2x - 3y = 5$ cuts the x -axis and the y -axis.

139. Find two solutions of the linear equation $3x + 5y = 15$ and check whether $(2, 3)$ is its solution.

140. Write four solutions of the equation : $x + \pi y = 3$.

141. Find three solutions of the equation $5x - 4y + 8 = 0$.

142. Find the value of a for which the equation $2x + ay = 5$ has $(1, -1)$ as a solution. Find two more solutions for the equation obtained.
143. Find the value of m , if $(5, 8)$ is a solution of the equation $11x - 2y = 3m$. Then find one more solution of this equation.
144. If $(1, -2)$ is a solution of the equation $2x - y = p$, find the value of p .
145. Give an example of each of the following :
(i) Binomial of degree 37, (ii) Trinomial of degree 2, (iii) Monomial of degree 500
146. Determine the degree of each of following polynomials :
(i) $x^4 - 3x + 5x^2 + x$, (ii) $y^2(1 - y^3)$, (iii) $(y + 2)(y - 2)$
147. For the polynomial $\frac{3x^3 + 5x^2 + 2}{5} - \frac{7}{2}x + 6$ write :
(i) the coefficient of x^3 , (ii) the coefficient of x^2 , (iii) the coefficient of x
148. A candle is 20 cm long and burns 2 cm every hour.
(i) Form expression for remaining length after x hours.
(ii) Find the length of the candle after 5 hours.
(iii) When will it finish?
149. A right angled triangle ABC is drawn on the coordinate plane as shown below. Find the area of the right triangle.



*** Questions with calculation. [4 Marks Each]**

[68]

150. Find the degrees of the following polynomials:
(i) $2x^2 - 5x + 3$
(ii) $y^3 + 2y - 1$
(iii) -9
(iv) $4z - 3$
151. A telecom company charges ₹600 for a certain recharge scheme. This prepaid balance is reduced by ₹15 each day after recharge.
(i) Write an equation that models the remaining balance $b(x)$ after using the scheme for x days. Explain why it represents linear decay.
(ii) After how many days will the balance run out?

- (iii) Make a table of values for x varying from 1 to 10 days and show how the balance $b(x)$ reduces with time.
152. A learning platform charges a fixed monthly fee and an additional cost per digital learning module accessed. A student observed that when she accessed 10 modules, her bill was ₹400. When she accessed 14 modules, her bill was ₹500. If the monthly bill y depends on the number of modules accessed, x , according to the relation $y = ax + b$, find the values of a and b .
153. A gym charges a fixed monthly fee and an additional cost per hour for using the badminton court. A student using the gym observed that when she used the badminton court for 10 hours, her bill was ₹800. When she used it for 15 hours, her bill was ₹1100. If the monthly bill y depends on the hours of the use of the badminton court, x , according to the relation $y = ax + b$, find the values of a and b .
154. If you have ₹800 and you save ₹250 every month, find the amount you have after (i) 6 months (ii) 2 years. Express this as a linear pattern.
155. The digits of a two-digit number differ by 3. If the digits are interchanged, and the resulting number is added to the original number, we get 143. Find both the numbers.
156. If the temperature of a liquid can be measured in Kelvin units as x K and in Fahrenheit units as y °F, the relation between the two systems of measurement of temperature is given by the linear equation $y = (9/5)(x - 273) + 32$
 (i) Find the temperature of the liquid in Fahrenheit if the temperature of the liquid is 313 K.
 (ii) If the temperature is 158° F, then find the temperature in Kelvin.
157. Write each of the following equations in the form $ax + by + c = 0$ and indicate the values of a, b and c in each case.
 (i) $2x + 3y = 4.37$, (ii) $x - 4 = \sqrt{3}y$, (iii) $4 = 5x - 3y$, (iv) $2x = y$
158. Which of the following expressions are polynomials and which are not?
 (i) $4x^2 - 3x + 7$, (ii) $3\sqrt{t} + t\sqrt{2}$, (iii) $y + \frac{2}{y}$, (iv) $x^{10} + y^3 + t^{50}$
159. Give the geometrical representation of (a) $x = -4$ (b) $5x = 9$ as an equation in
 (i) one variable (ii) two variables
160. The ratio of girls and boys in a class is 1 : 3. Set up an equation between the students of a class and boys and then draw its graph. From the graph, find the number of boys in the class of 40 students.
161. The taxi fare in a city is ₹20 for first kilometre and ₹8 per kilometre for subsequent distance covered. Write the linear equation to represent the above statement. Draw the graph of the linear equation.

162. Draw the graphs of the equations $x + y - 10 = 0$ and $x - y + 4 = 0$ on the same graph paper and find the coordinates of their points of intersection.
163. Which of the following are linear equations in two variables?
 (i) $(x + 1) + (y + 3) = 2(x + 3) - (2y + 5)$, (ii) $2x^2 + x + y = 2x(x + 5) + 3y$, (iii) $3x^2 + 5x = 2y(y + 2)$, (iv) $-x(y + 3) = y(y + 2)$
164. Which of the following are linear equations?
 (i) $y(y - 3) = y^2 + 3y + 5$, (ii) $(y - 5)(y + 5) = 0$, (iii) $3y + y^2 - 2y = y^2 + 22$, (iv) $2(x + 1) + 5 = 5(x - 2) + 3$
165. Which of the following expressions are polynomials ?
 (i) $\frac{1}{x^2} + \frac{1}{x^1} + \frac{1}{2}$, (ii) $x^2(x^3 - 1)$, (iii) $\frac{(x^2+x+1)(x+1)}{(x+1)}$, (iv) $x^2 + \frac{1}{x^2}$
166. Write the coefficient of x^3 in each of the following :
 (i) $-x^3 - x^2 + 3x + 2$, (ii) $\frac{\pi}{3}x^3 + 8x^2 - 9$, (iii) $\frac{5x^3+3}{2} + x^2$, (iv) $\frac{-3x^3}{7} + 5x^2 + 2x$

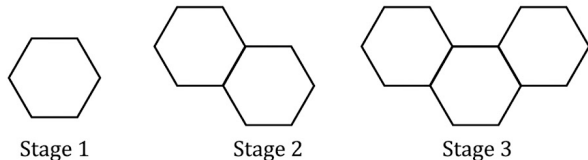
*** Answer the following questions. [5 Marks Each]**

[140]

167. Suppose a plant has height 1.75 feet and it grows by 0.5 feet each month.
 (i) Find the height after 7 months.
 (ii) Make a table of values for t varying from 0 to 10 months and show how the height, h , increases every month.
 (iii) Find an expression that relates h and t , and explain why it represents linear growth.
168. A mobile phone is bought for ₹10,000. Its value decreases by ₹800 every year.
 (i) Find the value of the phone after 3 years.
 (ii) Make a table of values for t varying from 0 to 8 years and show how the value of the phone, v , depreciates with time.
 (iii) Find an expression that relates v and t , and explain why it represents linear decay.
169. The initial population of a village is 750. Every year, 50 people move from a nearby city to the village.
 (i) Find the population of the village after 6 years.
 (ii) Make a table of values for t varying from 0 to 10 years and show how the population, P , increases every year.
 (iii) Find an expression that relates P and t , and explain why it represents linear growth.
170. Consider the relationship between temperature measured in degrees Celsius ($^{\circ}C$) and degrees Fahrenheit ($^{\circ}F$), which is given by $^{\circ}C = a^{\circ}F + b$. Find a and b , given that ice melts at 0 degrees Celsius and 32 degrees Fahrenheit, and water boils at 100 degrees Celsius and 212 degrees Fahrenheit.

(Hint: When $^{\circ}C = 0, ^{\circ}F = 32$ and when $^{\circ}C = 100, ^{\circ}F = 212$. Use this information to find a and b, and thus, the Linear relationship between $^{\circ}C$ and $^{\circ}F$.)

171. Draw the graphs of the following sets of lines. In each case, reflect on the role of 'a' and 'b'.
- (i) $y = 4x, y = 2x, y = x$
 - (ii) $y = -6x, y = -3x, y = -x$
 - (iii) $y = 5x, y = -5x$
 - (iv) $y = 3x - 1, y = 3x, y = 3x + 1$
 - (v) $y = -2x - 3, y = -2x, y = 2x + 3$
172. Draw the graph of the following equations, and identify their slopes and y-intercepts. Also, find the coordinates of the points where these lines cut the y-axis.
- (i) $y = -3x + 4$
 - (ii) $2y = 4x + 7$
 - (iii) $5y = 6x - 10$
 - (iv) $3y = 6x - 11$
- Are any of the lines parallel?
173. The work done by a body on the application of a constant force is the product of the constant force and the distance travelled by the body in the direction of the force.
- Express this in the form of a linear equation in two variables (work w and distance d), and draw its graph by taking the constant force as 3 units. What is the work done when the distance travelled is 2 units? Verify it by plotting it on the graph.
174. The graph of a linear polynomial $p(x)$ passes through the points (1, 5) and (3, 11).
- (i) Find the polynomial $p(x)$.
 - (ii) Find the coordinates where the graph of $p(x)$ cuts the axes.
 - (iii) Draw the graph of $p(x)$ and verify your answers.
175. Let $p(x) = ax + b$ and $q(x) = cx + d$ be two linear polynomials such that:
- (i) $p(0) = 5$
 - (ii) The polynomial $p(x) - q(x)$ cuts the x-axis at (3, 0).
 - (iii) The sum $p(x) + q(x)$ is equal to $6x + 4$ for all real x .
- Find the polynomials $p(x)$ and $q(x)$.
176. Look at the first three stages of a growing pattern of hexagons made using matchsticks. A new hexagon gets added at every stage which shares a side with the last hexagon of the previous stage.



(i) Draw the next two stages of the pattern. How many matchsticks will be required at these stages?

(ii) Complete the following table.

Stage Number	1	2	3	4	5	...	n
Number of matchsticks							

(iii) Find a rule to determine the number of matchsticks required for the n^{th} stage.

(iv) How many matchsticks will be required for the 15th stage of the pattern?

(v) Can 200 matchsticks form a stage in this pattern? Justify your answer.

177. Let $p(x) = ax + b$ and $q(x) = cx + d$ be two linear polynomials such that:

(i) The graph of $p(x)$ passes through the points (2, 3) and (6, 11).

(ii) The graph of $q(x)$ passes through the point (4, -1).

(iii) The graph of $q(x)$ is parallel to the graph of $p(x)$.

Find the polynomials $p(x)$ and $q(x)$. Also, find the coordinates of the point where these lines meet the x -axis.

178. What do all linear functions of the form $f(x) = ax + a$, $a > 0$, have in common?

179. The taxi fare in a city is as follows:

For the first kilometre, the fare is ₹8 and for the subsequent distance it is ₹5 per km. Taking the distance covered as x km and total fare as ₹ y , write a linear equation for this information and draw its graph.

180. In countries like USA and Canada, temperature is measured in Fahrenheit, whereas in countries like India, it is measured in Celsius. Here is a linear equation that converts Fahrenheit to Celsius : $F = \frac{9}{5}C + 32$.

(i) Draw the graph of the linear equation given above using the Celsius for x -axis and Fahrenheit for y -axis.

(ii) If the temperature is 30°C , what is the temperature in Fahrenheit?

(iii) If the temperature is 95°F , what is the temperature in Celsius?

(iv) If the temperature is 0°C , what is the temperature in Fahrenheit and if the temperature is 0°F , what is the temperature in Celsius?

(v) Is there a temperature which is numerically the same in both Fahrenheit and Celsius. If yes, find it.

181. Yamini and Fatima, two students of class IX of a school, together contributed ₹100 towards the Prime Minister's Relief Fund to help earthquake victims. Write

a linear equation which satisfies this data. Draw the graph of the same.

182. Draw the graph of the equation $y = 3x$.
183. Draw the graph of the equation $3x + 4y = 6$. At what point does the graph cut the x-axis and the y-axis?
184. Give the geometric representations of $y = 3$ as an equation
(i) in one variable, (ii) in two variables
185. Draw the graph of the following equations.
(i) $x = -2$, (ii) $y = 4$
186. Check which of the following are solutions of the equations $x - 2y = 4$ and which are not:
(i) $(0, 2)$, (ii) $(2, 0)$, (iii) $(4, 0)$, (iv) $(\sqrt{2}, 4\sqrt{2})$, (v) $(1, 1)$
187. The linear equation that converts Fahrenheit (F) to Celsius (C) is given by the relation, $C = \frac{5F - 160}{9}$.
(i) If the temperature is $86^\circ F$, what is the temperature in Celsius?
(ii) If the temperature is $35^\circ C$, what is the temperature in Fahrenheit?
(iii) If the temperature is $0^\circ C$, what is the temperature in Fahrenheit and if the temperature is $0^\circ F$, what is the temperature in Celsius?
(iv) What is the numerical value of the temperature which is same in both the scales?
188. Express the following linear equations in the form $ax + by + c = 0$ and indicate the values of a, b and c in each case.
(i) $-2x + 3y = 6$, (ii) $2x = -5y$, (iii) $3x + 2 = 0$, (iv) $y - 2 = 0$, (v) $5 = 2x$
189. Which of the following are linear equations?
(i) $3x(x - 1) = x(3x + 5) - 2$, (ii) $(y + 2) = 2y - 3$, (iii) $(x - 1) = (2x + 3)$, (iv) $y - 5 = 2y + (y - 1)$, (v) $2x - (y + 5) = y + 2x - 3$
190. Find the slope and the y-intercept of each of the following lines :
(i) $5x - 10y = 3$, (ii) $\frac{x}{6} + \frac{y}{9} = 1$, (iii) $x + 4 = 0$, (iv) $y = 6$
191. Express the following statement in linear equations in two variables.
(i) An obtuse angle of a parallelogram is twice its acute angle.
(ii) I am three times as old as my son.
(iii) 7 audio cassettes and 3 video cassettes cost ₹1110.
(iv) In a cyclic quadrilateral ABCD, $\angle A = (2x + 4)^\circ$ and $\angle C = (2y + 10)^\circ$.
(v) When both the numerator and denominator decrease by 6, then the denominator becomes 12 times the numerator.
192. Express the following statements in linear equations in two variables.
(i) The larger of two supplementary angles exceeds the smaller by 18 degrees.
(ii) The coach of a cricket team buys 7 bats and 6 balls for ₹3800.
(iii) A lady has only 25 paise and 50 paise coins in her purse, totalling ₹12.50.

(iv) A and B are friends and their ages differ by 2 years.

(v) The denominator of a fraction is 4 more than twice the numerator.

193. Classify the following as linear, quadratic, cubic, constant and bi-quadratic polynomials:

(i) $5z^3$, (ii) $-7x + \frac{9}{2}$, (iii) $\frac{7}{4}$, (iv) $x^2 - \frac{\pi}{2}x$, (v) $7x^4 + 4x^3 + 3x - 2$, (vi) $x^3 - 3x^2 + 4x - 5$

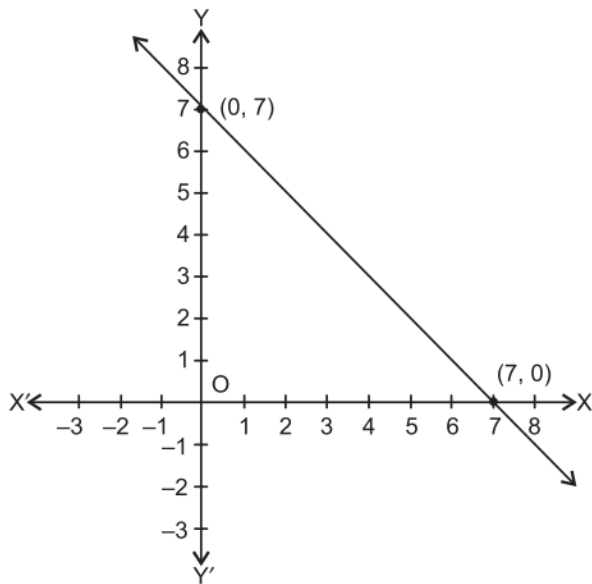
194. Which of the following expressions are polynomials and which are not?

(i) $y^2 + \sqrt{2}$, (ii) $x^{20} + y^3 + t^{31}$, (iii) $7\sqrt{z} + \sqrt{8}x$, (iv) $5x^2 - \frac{9}{x} + 2x + 6$, (v) $7x^5 - \sqrt{5}x^4 + 2x - 5$

*** Case study based questions.**

[8]

Aditya purchased two types of chocolates A and B at the rate of x and y respectively. The total amount spent is 7. After reaching home, he forms a linear equation in two variables for two types of chocolates. He prepares a table and a graph of the linear equation as shown in adjoining graph:



Based on the above information, answer the following questions :

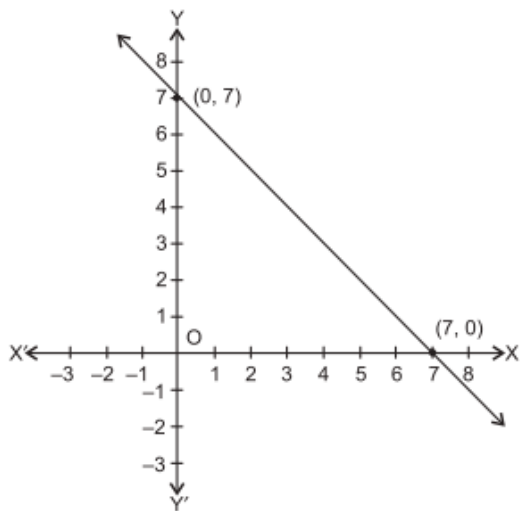
195. How to represent the above situation in linear equations in two variables?

196. If the cost of chocolate A is ₹5, then find the cost of chocolate B?

197. Does the point (3, 4) lie on the line $x + y = 7$?

198. Where does the line $x + y = 7$ intersect y-axis?

199. Aditya purchased two types of chocolates A and B at the rate of ₹ x and ₹ y respectively. The total amount spent is ₹ 7. After reaching home, he forms a linear equation in two variables for two types of chocolates. He prepares a table and a graph of the linear equation as shown in adjoining graph:



Based on the above information, answer the following questions :

- (i) How to represent the above situation in linear equations in two variables?
- (ii) If the cost of chocolate A is ₹5, then find the cost of chocolate B?
- (iii) Does the point (3, 4) lie on the line $x + y = 7$?
- (iv) Where does the line $x + y = 7$ intersect y-axis?

----- Maths By Shailendra Gangwar I 9988117385 -----