

CLASS X(2018-19)
SUBJECT: MATHEMATICS (041)
Minimum Learning Material:

TARGET-40Marks

Irrationality of numbers

1. Prove that $\sqrt{2}$ is an irrational number.
2. Prove that $\sqrt{3}$ is an irrational number.
3. Prove that $\frac{2\sqrt{3}}{5}$ is an irrational number.
4. Prove that $3+2\sqrt{5}$ is an irrational number.
5. Prove that $4-5\sqrt{3}$ is an irrational number.
6. Find the HCF and LCM of 126 and 156 using factorization methods.
7. Use Euclid's Division Algorithm to find the HCF of 726 and 275.
8. A sweet seller has 420 kaju burfis and 150 badam burfis. He wants to stack them in such a way that each stack has the same number, and they take up the least area of the tray. How many of these can be placed in each stack? How many stacks are formed?
9. The HCF of two numbers is 23 and their LCM is 1449. If one of the numbers is 161, find the other number.
10. The HCF and LCM of two numbers is 9 and 360. If one of the number is 45. Find the other number.
11. Find the smallest number which when divided by 28 and 32 leaves remainders 8 and 12 respectively.

2. Polynomials (Long division)

12. Find all the other zeroes of the polynomial $p(x) = 2x^4 + 7x^3 - 19x^2 - 14x + 30$ if two zeroes are $\sqrt{2}$ and $-\sqrt{2}$.
13. Find all the other zeroes of the polynomial $p(x) = 2x^4 - 3x^3 - 3x^2 + 6x - 2$ if two zeroes are $\sqrt{2}$ and $-\sqrt{2}$.
14. Find all the other zeroes of the polynomial $p(x) = x^4 + 3x^3 - x^2 - 9x - 6$ if two zeroes are $\sqrt{3}$ and $-\sqrt{3}$.
15. Obtain all the other zeroes of the polynomial $p(x) = x^4 + x^3 - 23x^2 - 3x + 60$ if two zeroes are $\sqrt{3}$ and $-\sqrt{3}$.
16. Obtain all the other zeroes of the polynomial $p(x) = 2x^4 - 6x^3 + 3x^2 + 3x - 2$ if two zeroes are $\frac{1}{\sqrt{2}}$ and $-\frac{1}{\sqrt{2}}$.
17. Obtain all the other zeroes of the polynomial $p(x) = x^4 + 4x^3 - 2x^2 - 20x - 15$ if two zeroes are $\sqrt{5}$ and $-\sqrt{5}$.
18. Find other two other zeroes of the polynomial $p(x) = 3x^4 + 6x^3 - 2x^2 - 10x - 5$ if two zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$.

3. Quadratic equations

19. Find the roots of the following quadratic equations:

(i) $3x^2 - 5x + 2 = 0$ (ii) $x^2 + 4x + 5 = 0$ (iii) $x^2 + x - 156 = 0$ (iv) $2x^2 - 2\sqrt{2}x + 1 = 0$ Rs.

20. The product of two consecutive positive integers is 306. We need to find the integers.

21. Find two numbers whose sum is 27 and product is 182.

22. Find two consecutive positive integers, sum of whose squares is 365.

23. The sum of two numbers is 15, if the sum of their reciprocals is $\frac{3}{10}$, find the numbers.

24. Solve the quadratic equations:

(i) $\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}$ (ii) $\frac{3x-4}{7} + \frac{7}{3x-4} = \frac{5}{2}$ (iii) $\frac{4}{x} - 3 = \frac{5}{2x+3}$ $3x^2 + 2kx - 3 = 0$

25. If the roots of the quadratic equations: $(a-b)x^2 + (b-c)x + (c-a) = 0$ are equal. Prove that $2a=b+c$.

26. For what value of k does $2x^2 + kx + 3 = 0$ have equal roots?

27. For what value of k does $(k-12)x^2 + 2(k-12)x + 2 = 0$ have equal roots?

28. Show that $x=-3$ is a solution of the quadratic equation $x^2 + 6x + 9 = 0$

29. Find the value of k, so that quadratic equation has two equal roots $kx(x-2) + 6 = 0$.

30. If $x=1/2$, is a solution of the quadratic equation $3x^2 + 2kx - 3 = 0$

31. A shopkeeper buys a number of books for Rs.80. If he had bought 4 more books for the same amount, each book would have cost Rs. . How many books did he buy.

4. Graphical method of solution of linear equations in two variables

32. Draw the graphs of the equations $x-y=0$ and $3x-2y=0$. Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis and shade the triangle region.

33. Solve the following system of linear equations graphically: $2x-3y-17=0$ and $4x+y-12=0$. Shade the region bounded by the above lines and x-axis.

34. Solve the following system of linear equations graphically: $2x+3y=4$ and $3x-y=-5$. Shade the region bounded by the above lines and y-axis.

35. For what value of k, will the system of equations $x+2y=5$ and $3x+ky-15=0$ has no solution.

36. 5 pen and 6 pencils together cost Rs.9 and 3 pen and 2 pencils together cost Rs.5. Find the cost of 1 pen and 1 pencil.

37. Solve $3x-5y=-1$ and $x-y=-1$ by elimination method.

5. Arithmetic Progression

The nth term of the AP $a_n + (n-1)d$.

38. The first term of an AP is -7 and the common difference 5, find its 18th term and general term.

39. If the nth Term of A.P is $4n-3$. Find three terms.

40. Determine the AP whose 3rd term is 5 and 7th term is 9.

41. If the 7th term of an AP is $\frac{1}{9}$ and 9th term is $\frac{1}{7}$, find its 36th term.

42. For what value of P are $2p+1$, $13, 5p-3$ are three consecutive terms of an AP.

43. Determine the AP whose 3rd term is 16 and 7th term exceeds the 5th term by 12.

44. Which term of the AP: 21, 18, 15...is-81?

45. Which term of the AP: 50, 55, 60.....is 255.

46. Which term of the AP: 3, 15, 27, 39.....will be 132 more than its 54th term?

47. Find the 9th term from the end of the A.P. 5,9,13,.....185.

48. How many multiples of 4 lie between 10 and 250?

49. How many term three-digit numbers are divisible by 7?

50. An AP consists of 50 terms of which 3rd term is 12 and the last term is 106. Find the 29th term.

Sum of the nth terms of AP. $S_n = \frac{n}{2}[2a + (n-1)d]$ and $S_n = \frac{n}{2}[a + a_n]$ or $S_n = \frac{n}{2}[a + l]$

51. Find the sum of first 22 terms of an AP in which $d=7$ and 22nd term is 149.

52. Find the sum of first 51 terms of an AP whose second and third terms are 14 and 18.

53. How many terms of the AP: 24, 21, 18... must be taken so that their sum is 78?

54. How many terms of the AP: 9, 17, 25,..... must be taken to give a sum of 636?

55. Find the sum of the first 40 positive integers divisible by 6.

56. The sum of 5th term and 9th term of an AP is 72 and the sum of 7th term and 12th term is 97. Find the AP.

57. Find the sum of series $103+101+99+\dots+49$.

58. Find the sum of AP in $-5+(-8)+(-11)+\dots+(-230)$.

59. If sum of nth terms of an AP is $S_n = 2n^2 + 5$, then prove that $a_n = 4n + 3$.

60. Find the sum of all multiples of 7 lying between 500 and 900.

6. Geometry-(Theorems)

61. State and prove Basic Proportionality Theorem.

62. State and prove Pythagoras Theorem.

63. State and prove Converse of Pythagoras Theorem.

64. The ratio of the areas of two similar triangles is equal to the square of the ratio of their Corresponding sides.

65. Prove that a tangent at any point on the circle is perpendicular to the radius through the point of contact.

66. Prove that the lengths of the tangents from an external point to a circle are equal.

7. Construction

Type-I

67. Construct a triangle of sides 4cm, 5cm and 6cm and then a triangle similar to it whose sides are $\frac{2}{3}$ of corresponding sides of the first triangle.

68. Draw a line segment of length 8cm and divide it in the ratio 5:7. Measure the two parts.

69. Construct an isosceles triangle whose base is 8cm and altitude 4cm and then another triangle whose sides are $1\frac{2}{3}$ times the corresponding sides of the isosceles triangle.

70. Draw a triangle ABC with side $BC=8\text{cm}$, and $\angle B = 45^\circ$, $\angle C = 30^\circ$. Then construct a similar triangle whose sides are $\frac{3}{4}$ of corresponding sides of the triangle ABC.

71. Draw a triangle ABC with side $BC=7\text{cm}$, $\angle B = 45^\circ$ and $\angle A = 105^\circ$. Then construct a similar triangle whose sides are $\frac{4}{3}$ of corresponding sides of the triangle ABC.

72. Draw a triangle in which the sides (other than hypotenuse) are of lengths 4cm and 3cm. Then construct another triangle whose sides are $\frac{5}{3}$ of corresponding sides of the given triangle.

73. Draw two tangents to a circle of radius 5cm from a point P at a distance of 6.5cm from its center.

Type-II

74. Construct a tangent to a circle of radius 4cm from a point on the concentric circle of radius 6cm and measure its length. Also verify the measurement by actual calculation.

75. Draw a circle of radius 3cm. take two points P and Q on one of its extended diameter each at a distance of 7cm from its centre. Draw tangents to the circle from these two points P and Q.
76. Draw a pair of tangents to a circle of radius 5cm which are inclined to each other at an angle of 60° .
77. Draw a line segment AB of length 8cm. Taking A as centre, draw a circle of radius 4cm and taking B as centre, draw another circle of radius 3cm. Construct tangents to each circle from the centre of the other circle.

8. Coordinate geometry-(two questions)

Type-I(Distance Formula)

78. Show that the points (1,7),(4,2),(-1,-1)and (-4,4) are the vertices of a square.
79. Prove that the points (3,0),(4,5),(-1,4)and (-2,-1) taken in order form a rhombus.
80. Find the value of P if the point A(0,2) is equidistant from (3,p) and (p,3).
81. Find the value of x for which the distance between the points P(2,-5)and (-2,9).
82. Find the value of y for which the distance between the point P(2,-3) and Q(10,y) is 10units.

Type-II (Section Formula)

83. Find the coordinates of the point which divides the join of (-1,7) and (4,-3) in the ratio 2:3
84. Find the coordinates of the points of trisection of the line segment joining (4,-1) and (-2,-3)
85. Find the ratio in which the line segment joining A (1,-5) and B(-4,5) is divided by the x-axis. Also find the coordinates of the point of division.
86. Find to ratio in which the line segment joining the points (-3, 10) and (6,-8) is divided by (-1,6).
87. Find the coordinates of the points which divided the line segment joining A (-2, 2) and B (2, 8) into four equal parts.

TYPE-3(Mid-point Formula)

88. If P(2,p) is the mid-point of line segment joining the point A(6,-5) and B(-2,11), Find the value of p?
89. If P(4,-2) is the mid-point of line segment joining the points A(5k,3) and B(-k,-7), find the value of k.
90. If A (1, 2), B (4, 3) and C (6, 6) are the three vertices of a parallelogram ABCD, find the coordinates of fourth vertex D.
91. If (1, 2), (4, y), (x, 6) and (3, 5) are the vertices of parallelogram taken in order, find x and y.
92. Find the length of median AD if vertices are A(1,-1), B(-4,6) and C(-3,-5)

TYPE-4(Area of a triangle)

93. Find the area of a triangle whose vertices are (1,-1), (-4,6) and (-3,-5).
94. Find the area of the quadrilateral whose vertices taken in order, are (-4,-2), (-3,-5), (3,-2) and (2,3).
95. For what value of P are the points (2,1) (P,-1)and (-1,3) collinear?
96. In each of the following find the value of k for which the points are collinear.
 (i)(7,-2), (5,1) (3,k) (ii) (8,1), (k,-4) (2,-5)
97. Find the area of the triangle formed by joining the mid-points of the sides of the triangle whose vertices are (0,-1), (2,1) and (0,3). Find the ratio of this area to the area of the given triangle.

9. Statistics

98. Find the mean of the following frequency distribution by a suitable method:

C.I	50-70	70-90	90-110	110-130	130-150	150-170
Frequency	8	12	13	27	18	22

99. The mean of the following frequency distribution is 50. Find the missing frequency P.

C.I	0-20	20-40	40-60	60-80	80-100
Frequency	7	6	9	13	P

100. Find the mode of the following frequency distribution.

C.I	25-35	35-45	45-55	55-65	65-75	75-85
Frequency	7	31	33	17	11	1

101. The following table shows the ages of the patients admitted in a hospital during a year: Find the men

Age(in years)	5-15	15-25	25-35	35-45	45-55	55-65
No. of Participants	6	11	21	23	14	5

102. Find the median of the following frequency distribution.

C.I	1-4	4-7	7-10	10-13	13-16	16-19
Frequency	6	30	40	16	4	4

103. Find the mean, mod and median of the following frequency distribution by a suitable method:

C.I	50-70	70-90	90-110	110-130	130-150	150-170
Frequency	8	12	13	27	18	22

104. Find the missing frequency in the following frequency distribution table if $n=100$ and median is 32.

C.I	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	10	F1	25	30	F2	10

105. Find mode following distribution gives the daily income of 50 workers of factory:

Daily income (in Rs.)	100-120	120-140	140-160	160-180	180-200
No.of workers	12	14	8	6	10

105. The following table gives production yield per hectare of wheat of 100 farms of a village: Draw the less than ogive.

Production yield (in kg/ha)	50-55	55-60	60-65	65-70	70-75	75-80
No.of farms	2	8	12	24	38	16

106. Write the following frequency distribution as 'less than type' and 'more than type' cumulative frequency distribution. Also find the median:

C.I	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	5	15	20	23	17	10

10. Probability

107. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting:

- | | | |
|--------------------------|----------------------------------|-------------------------------|
| (i) a king of red colour | (ii) a face card | (iii) a red face card |
| (iv) the jack of hearts | (v) a spade | (vi) the queen of diamonds |
| (vii) a black queen | (viii) a Jack a queen or a king | (ix) neither an ace nora king |
| (x) a non-face card | (xi) a black king or a red queen | (xii) a black face card |

108. a well shuffled pack of 52 cards black aces and black queens are removed. From the remaining cards a

card is drawn at random find the probability of drawing (i) a king or a queen. (ii) a red card

109. From a pack of 52 playing cards, Jacks, queens, kings and aces of red colour are removed. From the remaining a card is drawn at random. Find the probability that the card drawn is (i) a black queen (ii) a red card (iii) a black Jack (iv) a honorable card

110. All the three face cards of spade are removed from a well shuffled pack of 52 cards & card is drawn from the remaining pack. Find the probability of getting
 a) a black face card b) a queen of diamond c) a spade d) a black card
111. In a single throw of two dice, find probability of getting a) doublets b) a total of 11
112. A black die and a white die are thrown at the same time. Write all the possible outcomes.
 (a) What is the probability that the sum of the two numbers that turn up is 8?
 (b) Find the probability of obtaining (i) a total of 6 (ii) a total of 10 (iii) The same no. on both dice
113. A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be
 (i) red ? (ii) white? (iii) Not green? (iv) not red? (v) Either red or green
114. Cards marked with numbers 1,2,3,...,25 are placed in a box and mixed thoroughly and one card is drawn at random from the box what is the probability that the number on the card is (i) a prime number?
 (ii) a multiple of 3 or 5? (iii) an odd number? (iv) Neither divisible by 5 nor by 10? (v) Perfect square
 (vi) a two digit number.
115. Find the probability of having 53 Sundays in (i) a leap year (ii) a non-leap year
116. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, determine the number of blue balls in the bag.
117. In a single throw of two dice, find the probability of: (i) getting a total of 10
 (ii) Getting of total of 9 or 11 (iii) getting a sum greater than 9 (iv) getting a doublet of even numbers
 (v) not getting the same number on the two dice

11. Trigonometry

118. If $\sin 3A + \cos (A-26)$, where $3A$ is an acute angle. Find the value of A .
119. The angle of elevation of an aeroplane from a point on the ground is 45° . After flight for 15 seconds the elevation changes to 30° . If the aeroplane is flying at a height of 3000 m. find the speed of the aeroplane.
120. Without using trigonometric tables, evaluate

$$\frac{\cos^2 20^\circ + \cos^2 70^\circ}{\sec^2 - \cot^2 40^\circ} \times 2 \sec^2 60^\circ - 2 \cot 58^\circ \cot 32^\circ - 4 \tan 13^\circ \tan 37^\circ \tan 45^\circ \tan 53^\circ \tan 77^\circ$$
121. The angle of elevation of the top of a hill from foot of a tower is 60° and the angle of elevation of the top of the tower from the foot the hill is 30° . If tower is 50m high, then find the height of the hill.
122. The angle of elevation of a cloud from a point 60m above a lake is 30° . and the angle of depression of the reflection of the cloud in the lake is 60° . Find the height of the cloud from the surface of the lake.
123. Two pillars of equal height are on either sides of a road, which is 100m wide. The angles of the top of the pillars are 60° and 30° at a point on the road between the pillars. Find the position of the point between the pillars. Also, find the height of each pillar.

12. Mensuration

124. The slant height of a frustum of a cone is 5cm. If the difference between the radii of its two circular ends is 4cm. Write the height of the frustum.
125. Volume and surface area of a solid hemisphere are numerically equal. What is the diameter of the hemisphere.
126. A container, shaped like a right circular cylinder, having diameter 12 cm and height 15 cm is full of ice-cream. This ice-cream is to be filled into cones of height 12 cm and diameter 6 cm having a hemispherical shape on the top. Find the number of such cones which can be filled with ice-cream.
127. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder. If the Height of the cylinder is 20 cm and radius of the base is 3.5 cm. find the total surface area of the article.
128. A container open at the top, is in the form of frustum of a cone of height 24 cm with radii of its lower and circular ends as 8 cm and 20 cm respectively. Find the cost of milk which can completely fill the container at the rate of Rs. 21 per litre.

P.No: 241 Example:14,6,7,9,10

Exercise:13.1-Q.NO: 1,2,3,9 Exercise:13.2-Q.NO: 1,6 Exercise:13.3-Q.NO: 1,2,3,4,8 &9

Exercise:13.3-Q.NO: 1,2,3 Exercise:13.5-Q.NO: 1,