

INTERNATIONAL INDIAN SCHOOL, RIYADH

CLASS: IX

SUBJECT: MATHEMATICS

1. SURFACE AREAS AND VOLUMES

1. The diagonal of a cube is $\sqrt{12}$ cm. Find its volume.
2. If the lateral surface area of a cube is 1600cm^2 , then find its edge (20cm)
3. Find the volume of a cube whose total surface area is 864cm^2 (1728 cm^3)
4. A solid cube of side 12cm is cut into 8 cubes of equal volume. What will be the side of the new cube, also find the ratio between their surface areas (4 : 1)
5. The total surface area of a cube is 216 cm^2 . Find its volume (6 cm)
6. The sum of length, breadth and height of a cuboid is 19cm and the length of its diagonal is 11cm. Find the surface area of the cuboid (240 cm^2)
7. Base perimeter of a cuboid is 25cm and its height is 10cm. What is its lateral surface area (250 cm^2)
8. The length, breadth and height of a room are 4m, 3m and 7m. Find the cost of white washing the walls of the room and the ceiling at the rate of Rs 6 per m^2 (Rs 600)
9. The length and breadth of a hall are in the ratio 4 : 3 and its height is 550cm. The cost of decorating its wall on Diwali (including doors & windows) at Rs 6.60 per sq meters is Rs 5082. Find the length and breadth of the room (area = 7700 cm^2 , l = 40cm, b = 30 cm)
10. Three cubes each of side 4 cm are joined end to end . Find the surface area of the resulting cuboid (224 sq cm)
11. Two cubes have their volumes in the ratio 1: 27. Find the ratio of their surface area (1 : 9)
12. Find the length of the longest rod that can be placed in a room 12 m long, 9 m broad and 8 m high (17 cm)
13. How many bricks will be required to construct a wall 13.5 m long, 6 m high and 22.5 cm thick, if each brick measures (27 X 12.5 X 8) cm (6750)
14. The surface area of the cuboid is 1372 cm^2 . If its dimensions are in the ratio 4 : 2 : 1, then find its length (7 cm)
15. A metallic box is in the shape of solid cuboid having dimensions 200cm x 50cm x 100cm. It is recast into a solid cube. Find the difference of surface areas of two solids (10,000 cm^2)
16. A joker cap is in the form of a right circular cone of base radius 7 cm and height 24 cm. Find the area of the sheet required to make 10 such caps (l = 25 cm, curved surface area = 5500sq cm)
17. A right triangle having sides 6cm, 8cm and 10 cm is revolved about the side of length 8cm. Find the volume of the solid so formed (301.71 cm^3)
18. Find the height of a cone of diameter 10 cm and slant height 13 cm (12 cm)
19. The height and the slant height of a cone are 21 cm and 28 cm. Find the volume of the cone (r = $7\sqrt{7}$ cm, v = 7546 cm^3)
20. A right circular cone is 5.4 cm high and radius of its base is 2 cm. It is melted and recast into another right circular cone with radius of base as 1.5 cm. Find the height of new cone formed. (9.6 cm)

21. Monica has a piece of canvas whose area is 551 m^2 . She uses it to have a conical tent made, with a base radius of 7 m. Assuming that all the stitching margins and the wastage incurred while cutting, amounts to approximately 1 m^2 , find the volume of the tent that can be made with it
($h = 24 \text{ cm}$, $v = 1232 \text{ m}^3$)
22. The height of a cone is 15 cm. If its volume is 1570 cm^3 , find its radius (10 cm)
23. The curved surface area of a cone is 12320 sqcm. If the radius of its base is 56cm, find its height
($h = 42\text{cm}$)
24. A conical tent is to accommodate 11persons. Each person must have 4 sq meters of space on the ground and 20 cubic meters of air to breadth. Find the height of the tent
[S.A (πr^2) = $11 \times 4 = 44\text{m}^2$, v. of tent ($\frac{1}{3} \pi r^2 h = 11 \times 20$, $h = 15\text{m}$)]
25. The curved surface area of a cylinder is 176 cm^2 and its base area is 38.5 cm^2 . Find the volume of the cylinder (308 cm^3)
26. Volume of a right circular cylinder 1650 cm^3 . If the length of the cylinder is 21cm, find its curved surface area (660 cm^2)
27. The height of a cylinder is 15 cm. Its curved surface area is 660 cm^2 . Find its radius (7 cm)
28. The difference between the outside and inside surfaces of a cylindrical metallic pipe of height 14cm is 44cm^2 . If the pipe is made of 99cm^3 of metal, find the outer and inner radii of the pipe
($R = 2.5\text{cm}$, $r = 2\text{cm}$)
29. The curved surface area of a right circular cylinder of height 14cm is 88cm^2 . Find the diameter of the base of the cylinder ($d = 2\text{cm}$)
30. The radii of two cylinders are in the ratio 5:3 and their heights are in the ratio 2:3, find the ratio of their volumes (50 : 27)
31. In a cylinder the sum of its base radius and its height is 37cm. If the total surface area is 1628 cm^2 . Then find the volume of the cylinder (volume = 4620cm^3)
32. A hollow spherical shell is made of a metal of density 4.5 g per cm^3 . If its internal and external radii are 8 cm and 9cm, find the weight of the shell. (4.092 kg)
33. A hemispherical dome of a building needs to be painted. If the circumference of the base of the dome is 17.6m, find the cost of painting it, given the cost of painting is RS 5 per 100 cm^2 (Rs 24640)
34. Find the total surface area of a hemisphere of radius 10 cm (use $\pi = 3.14$) (942 cm^2)
35. The external and internal diameters of a hemispherical bowl are 10 cm and 8 cm. What is the total surface area of the bowl [$2\pi R^2 + 2\pi r^2 + \pi (R^2 - r^2)$] (286 sq cm)
36. The diameter of a moon is approximately one fourth of the diameter of the earth. Find the ratio of their surface areas (1 : 64)
37. The diameter of a copper sphere is 6 cm. It is melted and drawn into a long wire of uniform circular cross section. If the length of the wire is 36 cm, find the radius (1cm)
38. The volumes of two spheres are in the ratio 64 : 27, find their radii if the sum of their radii is 21cm
39. The radius of a sphere is 5cm. If the radius is increased by 20%. Find by how much percent volume is increased (72.8 %)
40. If the volume of a sphere is divided by its surface area then the result is 27. Find the radius of sphere. (81cm)
41. The surface area of a sphere of radius 5cm is 5 times the curved surface area of a cone of radius 4 cm. Find the height of the cone ($h = 3\text{cm}$)

42. A hollow cube of side 4cm contains a solid sphere touching its sides. Find the volume of gaps between sphere and walls of cube (v.of cube – v.of sphere = 30.4cm^3)
43. If the radius of the sphere is doubled, find the ratio of volume of the new sphere to the original sphere (8 : 1)
44. How many spherical lead shots each 4.2 cm in diameter can be obtained from a cuboid of lead with dimensions 66cm, 42cm and 21cm (1500)
45. Volume of a hollow sphere is $\frac{11352}{7}\text{cm}^3$. If the outer diameter is 16 cm, find its inner radius .
46. How many spherical bullets of diameter 4cm can be made out of a solid cube of lead whose edges measures 44cm (2541)
47. Metallic spheres of radii 6cm, 8cm and 10cm respectively are melted together to form a single sphere . what will be the radius of new sphere (12cm)
48. $\frac{3}{4}$ th of a cylindrical can contains milk. The height of the can is 1.4m and radius is 0.4m. The milk is poured into small cylindrical glasses of height 10 cm and radius 5cm. How many small glasses are needed to empty the can (672)
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2. HERONS FORMULA

1. The sides of a triangle are in the ratio 5 : 12 : 13 and its perimeter is 150 cm. Find the area of triangle (area = 75 sqcm)
2. Find the area of isosceles triangle each of whose equal sides is 13cm and whose base is 24cm (area = 60 sqcm)
3. Find the area of triangle two sides of which are 8cm and 11cm and the perimeter is 32 cm (area = $8\sqrt{30}\text{sqcm}$)
4. The lengths of two adjacent sides of a parallelogram are 51cm and 37cm and one of its diagonal is 20 cm. Find its area (612sqcm)
5. One of the diagonals of a rhombus of perimeter 140 m is 60 m. Find its area (1081.5 cm^2)
6. Find the cost of laying grass in a triangular field of sides 50m, 65m and 65m at the rate of Rs 7/ m^2 (area = 1500m^2 , cost = Rs 10, 500)
7. Using Herons formula find the area of equilateral triangle whose perimeter is 24 cm ($16\sqrt{3}\text{cm}^2$)
8. Find the area of a quadrilateral ABCD in which AB = 3cm, BC = 4cm, CD = 6cm and AD = 5cm and diagonal AC = 5cm (18 cm^2)
9. A field is in the shape of a trapezium whose parallel sides are 25cm and 10 cm, the non-parallel sides are 14m and 13m. Find the area of the field. (area of $\Delta = 84\text{m}^2$, h = $56/5\text{m}$, area = 196m^2)
10. Two parallel sides of a trapezium are 120cm and 154cm and other sides are 50cm and 52cm. Find its area
11. Find the area of a triangle whose perimeter is 180cm and two of its sides are 80cm and 18cm (720 cm^2)
12. A park in the shape of a quadrilateral ABCD has $\angle C = 90^\circ$, AB = 9m, BC = 12m, CD = 5cm, and AD = 8 m. How much area does it occupy
14. The base of an isosceles triangle is 16 cm and its area is 48sqcm. Find the perimeter of a Δ (36cm)
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3. STATISTICS

1. Find the range of first 5 composite numbers (6)
2. Find the mean of first six prime numbers (6.83)

3. If the mean of five observations $x, x + 2, x + 4, x + 6$ and $x + 8$ is 13. Find the value of x (9)
4. The mean of observations 7, 5, 8, p and 10 is 7.2. Find the value of p
5. The mean of 15 numbers is 9. If each observation is multiplied by 4, what will be the new
6. The mean of 25 observations is 36. If the mean of first 13 observations is 32 and that of last 13 observations is 39, find the 13th observation (23)
7. The mean of 40 numbers was found to be 38. Later on, it was detected that a number 56 was misread as 36. Find the correct mean of the given numbers (38.5)
8. There are 100 students in a class. The mean height of the class is 150cm. If the mean height of 60 boys is 170cm, find the mean height of the girls in the class

$$\left[\begin{array}{l} \text{mean weight of 40 girls} = \frac{100 \times 150 - 60 \times 170}{40} = 120 \end{array} \right]$$

9. Construct a grouped frequency table with class intervals 0 – 5, 5 – 10 and so on for the following marks : 0, 5, 6, 7, 10, 12, 14, 15, 20, 22, 25, 26, 27, 8, 11, 17, 3, 6, 9, 17, 19, 21, 22, 29, 31, 35, 37, 40, 42, 45, 49, 4, 50, 16 and 20
10. Ten observations 6, 14, 15, 17, $x + 1, 2x - 13, 30, 32, 34, 43$ are written in ascending order. If the median of the data is 24, find the value of x
11. Find the median of first 11 multiples of 3 (18)
12. Determine the median of 24, 23, $a, a-1, 12, 16$ where a is the mean of 10, 20, 30, 40 & 50 (23.5)
13. The class marks of a distribution are given below: 8, 14, 20, 26, 32, 38, 44, and 50. Find the class size and class interval
14. Find the median of the following data : 41, 43, 127, 99, 61, 92, 71, 58 and 57. If 58 is replaced 85, what will be the new median (61, 71)
15. The mean of five numbers is 28. If one of the number is excluded, the mean gets reduced by 2. Find the excluded number (36)
16. Find the mean of the following distribution:

x	10	30	50	70	89
f	7	8	10	15	10

17. If mean = 20.2, find p ($p = 20$)

X	10	15	20	25	30
F	6	8	p	10	6

18. Draw the frequency polygon for the following data:

Frequency	25 – 35	35 – 45	45 – 55	55 – 65	65 – 75	75 – 85
Class	5	10	15	20	12	8

19. Draw a histogram for the following data

Class	1 – 4	4 – 6	6 – 8	8 – 12	12 – 20
Frequency	6	30	44	16	4

20. Construct a grouped frequency table with class intervals 0 – 5, 5 – 10 and so on for the following marks obtained in math's out of 50 by group of students : 0, 5, 6, 7, 10, 12, 14, 15, 20, 22, 25, 26, 27, 8, 11, 17, 3, 6, 9, 17, 19, 21, 22, 29, 31, 35, 37, 40, 42, 45, 48, 4, 50, 16 and 20

- a) what is the range of the data
 - b) determine the class size
 - c) construct a cumulative frequency table
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4. NUMBER SYSTEMS

1. Visualize 3.756 on the number line, using successive magnification
2. Represent $\sqrt{3.5}$ on the number line
3. Locate $\sqrt{5}$ on the number line.
4. Express 0.12333.....in the form p/q (37/300)
5. Express 0.00323232..... in the form p/q (8/2475)
6. Express $0.6 + 0.777..... + 0.4777.....$ in the form p/q
7. Find two rational numbers between -1 and $\frac{1}{2}$
8. Find two irrational numbers between $\frac{2}{5}$ and $\frac{3}{4}$
9. If $x = 3 + 2\sqrt{2}$, find the value of $x^2 + 1/x^2$ (34)
10. If $x = 9 - 4\sqrt{5}$, find the value of $x^2 + \frac{1}{x^2}$ (322)
11. If $x = 3 - 2\sqrt{2}$, find $x^3 - 1/x^3$
12. If $x = 5 - \sqrt{24}$, find the value of $(x^3 + 1/x^3) - 10(x^2 + 1/x^2) + 4(x + 1/x) - 30$ (0)
13. If $x = 3 - 2\sqrt{2}$, find the value of $x^4 - \frac{1}{x^4}$
14. If $x^4 + 1/x^4 = 47$, find the value of $x^3 + 1/x^3$ (18)
15. If $x^2 + 1/x^2 = 83$, find the value of $x^3 - 1/x^3$ (756)
16. Rationalise the denominator $\frac{1}{7\sqrt{6} + 6\sqrt{7} + \sqrt{546}}$ $\left\{ \frac{\sqrt{7} + \sqrt{6} - \sqrt{13}}{84} \right\}$
17. If a and b are rational numbers, find a and b (a = 3, b = 0)

$$\frac{\sqrt{5} - 1}{\sqrt{5} + 1} + \frac{\sqrt{5} + 1}{\sqrt{5} - 1} = a + b\sqrt{5}$$
18. Simplify: $\frac{1}{1 + \sqrt{2}} + \frac{1}{\sqrt{2} + \sqrt{3}} + \frac{1}{\sqrt{3} + \sqrt{4}}$ (1)
19. If $x = \frac{\sqrt{3} + 1}{\sqrt{3} - 1}$, $y = \frac{\sqrt{3} - 1}{\sqrt{3} + 1}$, then find the value of $x^2 + y^2 + xy$ (15)
20. If $x = 1 - \sqrt{2}$, find the value of $\left[x - \frac{1}{x} \right]^3$ (8)
21. If $x = 3 + 2\sqrt{2}$, find the value of $\sqrt{x} - 1/\sqrt{x}$ (2)
22. If $a = 7 - 4\sqrt{3}$, find the value of $\sqrt{a} + 1/\sqrt{a}$ (4)
23. Simplify: $\frac{\sqrt{32} + \sqrt{48}}{\sqrt{8} + \sqrt{12}}$ (2)
24. Simplify: $\left[\frac{x^a}{x^{-b}} \right] a - b - \left[\frac{x^b}{x^{-c}} \right] b - c - \left[\frac{x^c}{x^{-a}} \right] c - a$ (1)
25. Find the value x, if $5^{x-3} \times 3^{2x-8} = 225$ (x = 5)
26. If $(a/b)^{x-1} = (b/a)^{x-3}$, then find x (x = 2)
27. If $49 \times 7^x = (343)^{1/3}$, find x (x = -1)
28. given that $\sqrt{3} = 1.732$ and $\sqrt{5} = 2.236$, find the value of $\frac{6}{\sqrt{5} - \sqrt{3}}$ (11.904)
29. Simplify: $(\sqrt{3} + 1)(1 - \sqrt{12}) + \frac{9}{\sqrt{3} + \sqrt{12}}$ (-5)
30. Evaluate: a) $125^{-1/3} \times 27^{1/3} (6^2 + 8^2)^{1/2}$ (6)
 b) $7.\sqrt{6} - \sqrt{252} - \sqrt{294} + 6.\sqrt{7}$ (0)

$$c) 4\sqrt{81} - 8 \cdot 3\sqrt{216} + 15.5\sqrt{32} + \sqrt{225} \quad (0)$$

31. Give an example of two irrational numbers whose:
- (A) Sum is rational
 - (B) Product is rational
 - (C) Quotient is rational
 - (D) Difference is a rational number

32. Prove that $\frac{2^{30} + 2^{29} + 2^{28}}{2^{31} + 2^{30} - 2^{29}} = \frac{7}{10}$

33. Which is the greatest among $\sqrt{2}$, $\sqrt[3]{4}$, $\sqrt[4]{3}$

34. Divide: $16\sqrt{75}$ by $5\sqrt{12}$ (8)

35. If $x = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$ and $y = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$, then find the value of $x^2 + y^2$ (98)

36. Simplify: $\left[5(8^{1/3} + 27^{1/3})^3 \right]^{1/4}$ (5)

37. If $\frac{(9)^x \times (3)^5 \times (27)^3}{3 \times (81)^4} = 27$, then find the value of x (3)

38. Simplify: $\frac{4}{(216)^{-2/3}} - \frac{1}{(256)^{-3/4}}$ (80)

39. Simplify: $\frac{4}{(2187)^{-3/7}} - \frac{5}{(256)^{-3/4}} + \frac{2}{(1331^2)^{-1/3}}$ (30)

40. Show that $(2+\sqrt{5})(2-\sqrt{5})(3+\sqrt{2})(3-\sqrt{2})$ is a rational number

5. PROBABILITY

1. Three coins are tossed once, find the probability of getting at least one head (7/8)
2. Three coins are tossed simultaneously 200 times with the following frequencies of Different Outcomes:

Out comes	3 Heads	2 Heads	1Head	No Head
Frequency	23	72	77	28

- Find the probability of getting:
- a) 2 Heads (9/25)
 - b) At least 2 Heads (19/40)
3. A die is thrown once, find the probability of getting:
- a) prime number (1/2)
 - b) An even number (1/2)
 - c) A number greater than 4 (1/3)
 - d) a number more than or equal to 3 (2/3)
 - e) a multiple of 3 (1/3)
4. Two sections of class IX having 30 students each appeared for maths Olympiad. The marks obtained by them are shown below:
 46, 31, 74, 68, 42, 54, 14, 61, 83, 48, 37, 26, 8, 64, 57, 93, 72, 53, 59, 38, 16, 88, 75, 56, 46, 66, 45, 61, 54, 27, 27, 44, 63, 43, 81, 64, 67, 36, 49, 50, 76, 38, 47, 55, 77, 62, 53, 40, 71, 60, 58, 45, 42, 34, 46, 40, 59, 42, 29
- A student is selected at random. Find the probability that the student selected from the class is :
- a) having marks more than 59 (20/60)

- b) having marks more than 49 but less than 100 (32/60)
5. A letter of English alphabet is chosen at random. Calculate the probability that the letter chosen is a vowel (5/26)
6. A bag contains 15 balls numbered 1 to 15. Find the probability of drawing a prime number, When one ball is drawn from the bag at random (2/5)
7. Marks obtained by 50 students in a class test of 100 marks are given below:
Find the probability that a student obtained less than 50% marks (8/25)

Marks	0 - 25	25 - 50	50 - 75	75 - 100
No of students	4	12	18	16

8. In a one day international cricket match, a batsman played 40 balls. The runs scored as follows: Find the probability that the batsmen will score: a) 6 runs (1/20)
b) A four or a six run (3/20)

Runs scored	0	1	2	3	4	6
No of balls	13	15	5	1	4	2

9. One number is chosen at random from numbers 1 to 100. Find the probability that it is divisible by 4 or 6 (33/100)
10. In a survey of 80 people, 60 people like apple juice and remaining dislike it. Find the Probability that people dislike apple juice (1/4)
11. Family with 2 children were selected randomly and the following data was recorded
Compute probability of a family chosen at random having
a) At most 1 girl (41/60)
b) At least 2 girls (19/60)

Number of girls in family	2	1	0
Number of family	475	814	211

12. A bag contains 3 red balls, 5 black balls and 4 white balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is:
a) white b) red c) not a black ball d) blue
13. Out of 35 students participating in a debate 10 are girls, find the probability that winner is a boy (5/7)
14. A die is rolled 250 times and its outcomes are recorded as below:

Outcome	1	2	3	4	5	6
Frequency	40	45	35	38	52	40

- Find the probability of getting: a) an even number (123/250)
b) a multiple of 3 (3/10)
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6. CONSTRUCTION

1. Construct a ΔABC , in which base $BC = 3\text{cm}$, $\angle B = 30^\circ$ and $AB + AC = 5.2\text{cm}$
2. Construct a right triangle whose base is 6cm and the sum of its hypotenuse and the other side 8cm
3. Construct ΔPQR such that $QR = 8\text{cm}$, $\angle Q = 45^\circ$ and $PQ - PR = 3\text{cm}$.
4. Construct an equilateral ΔLMN , one of whose side is 5cm . Bisect angle m of the triangle
5. Construct a ΔABC in which $\angle B = 60^\circ$, $\angle C = 45^\circ$ and $AB + BC + CA = 11\text{cm}$
6. Construct a triangle with perimeter 10cm and base angles 60° and 45°
7. Construct ΔXYZ in which $\angle Y = 90^\circ$, $\angle Z = 30^\circ$ and perimeter is 13cm
8. Draw a line segment SR of length 10 cm . Divide it into 4 equal parts, using ruler and compass
9. Construct an equilateral triangle one of whose altitudes measure 5 cm
10. Construct a ΔABC in which $\angle B = 45^\circ$, $\angle C = 60^\circ$ and the perpendicular from the vertex A to the base BC is 4.5 cm
11. Why we cannot construct a ΔABC , if $\angle A = 60^\circ$, $AB = 6\text{cm}$, $AC + BC = 5\text{cm}$ but Construction of ΔABC is possible if $\angle A = 60^\circ$, $AB = 6\text{cm}$ & $AC - BC = 5\text{cm}$
12. Construct an angle of measure 135° (using ruler and compasses only)
13. Draw a line segment AB of length 10cm . Divide it into 4 equal parts, using compass and ruler
14. Construct a ΔABC whose perimeter is 14 cm and sides are in the ratio $2 : 3 : 4$

1. POLYNOMIALS

1. Find the value of a if $(x - 1)$ is a factor of the polynomial $a^2x^3 - 4ax + 4a - 1$ (a = 1)
2. Find the value of k if $2x - 3$ is a factor of $2x^3 + kx^2 + x + 12$ (k = - 9)
3. Find the remainder when $2x^3 - 11x^2 + 19x - 10$ is divided by $2x - 5$ (0)
4. Divide the polynomial $x^4 + x^3 - 2x^2 - x + 1$ by $x + 1$ and verify remainder by using remainder theorem
5. Without actual division prove that $x^4 + 2x^3 - 2x^2 + 2x - 3$ is exactly divisible by $x^2 + 2x - 3$
6. If $p(x) = x^2 - 5x + 7$, evaluate $p(2) - p(-1) + p(1/3)$ (- 59/9)
7. The polynomial $ky^3 + 3y^2 - 3$ and $2y^3 - 5y + k$ when divided by $(y - 5)$ leave the same remainder in each case. Find the value of k (k =153/124)
8. Show that $x - \sqrt{2}$ is a factor of the polynomial $x^3 - 2\sqrt{2}x^2 - 10x + 12\sqrt{2}$
9. Let A and B are the remainders when the polynomial $y^3 + 2y^2 - 5ay - 7$ and $y^3 + ay^2 - 12y + 6$ are divided by $(y + 1)$ and $(y - 2)$. If $2A + B = 6$, find a (a = 2)
10. If $t^2 - 1$ is a factor of $at^3 + t^2 + 2t + b$, find the values of a and b (a = -2, a = - 1)
Factorise: $ab + ac - b^2 - bc$ (a - b) (b+ c)
11. Factorise : $p^4 - 81q^4$ (p + 3q) (p - 3q) (p² + pq²)
12. Factorise : $4x^2 - y^2/9$ (2x + y/3)(2x - y/3)
13. Factorise : $3 - 12(a - b)^2$ $3[1 + 2a - 2b][1 - 2a + 2b]$
14. Factorise : $2x^5 + 432x^2y^3$ $2x^2(x + 6y)(x^2 + 36y^2 - 6xy)$
15. Factorise : $(p - q)^3 + (q - r)^3 + (r - p)^3$
16. Factorise : $x^3 - 10x^2 - 53x - 42$ (x+1) (x+3) (x-14)
17. Factorise : $2x^2 + y^2 + 8z^2 - 2\sqrt{xy} + 4\sqrt{2yz} - 8xz$ $(\sqrt{2x} - y + 2\sqrt{2z})^2$
18. Expand by using suitable identity: $\left\{ \frac{1}{4}a - \frac{1}{2}b + 1 \right\}^2$
19. Factorise : a) $(a^2 - 2a)^2 - 23(a^2 - 2a) + 120$
b) $5(3x + y)^2 + 6(3x + y) - 8$
20. Factorise : a) $\sqrt{5}x^2 + 2x - 3\sqrt{5}$ b) $x^2 + 3\sqrt{3}x - 30$
21. Using suitable identity evaluate $(99)^3$. (970299)
22. Without calculating the cubes find the value of $5^3 + 11^3 - 16^3$ (- 2640)
23. Find the value of $1.5^3 - 0.9^3 - 0.6^3$ (2.430)
24. If $a + b + c = 9$ and $a^2 + b^2 + c^2 = 35$, find the value of $a^3 + b^3 + c^3 - 3abc$ (108)
25. Find the value of $a^3 - 8b^3 - 36ab - 216$ when $a = 2b + 6$ (0)
26. Find the value of $8a^3 - 27b^3 + 90ab + 125$, if $2a = 3b - 5$
27. If $x + y = 12$ and $xy = 27$, then find the value of $x^3 + y^3$ (756)
28. If $x + y = 4$, $xy = 5$, find the value of $x^3 + y^3$ (4)
29. Find the value of $64x^3 + 125z^3$, if $4x + 5z = 19$ and $xz = 5$ (1159)
30. If $x + y + z = 0$, show that $x^3 + y^3 + z^3 = 3xyz$
31. If $3x + y + z = 0$, show that $27x^3 + y^3 + z^3 = 9xyz$
32. Verify : $x^3 + y^3 + z^3 - 3xyz = \frac{1}{2}(x + y + z)[(x - y)^2 + (y - z)^2 + (z - x)^2]$
33. Prove that $(x + y)^3 + (y + z)^3 + (z + x)^3 - 3(x + y)(y + z)(z + x) = 2(x^3 + y^3 + z^3 - 3xyz)$
34. Simplify: $(2x - 5y)^3 - (2x + 5y)^3$ (- 120x²y - 250y³)

35. Simplify : $(2x + p - q)^2 - (2x - p + q)^2$ $8x(p - q)$
36. Find the value of $\frac{7.83 \times 7.83 - 1.17 \times 1.17}{6.66}$ (9)
37. Find the value of : $\frac{(2.3)^3 - 0.027}{(2.3)^3 + 0.69 + 0.09}$ (2)
38. Find the value of $\frac{85^3 + 15^3}{85^2 + 15^2 - 85 \times 15}$ (100)
39. Simplify: $\frac{(x^2 - y^2)^3 + (y^2 - z^2)^3 + (z^2 - x^2)^3}{(x - y)^3 + (y - z)^3 + (z - x)^3}$ $(x + y)(y + z)(z + x)$
40. If $(x - a)$ is a factor of $2x^2 - mx + na$, prove that $a = \frac{m - n}{2}$
41. Without actual calculating the cubes, find the value of $(38)^3 - (12)^3$ (53144)

2. LINEAR EQUATIONS IN TWO VARIABLES

- Plot the points A (0, 5), B (8, 0), C (8, 5) and join them. What figure do you obtain?
- Using a single graph, draw the graph of the following equations: $x = 4$, $y = 2$ and $x + y = 8$. Hence find the vertices of the triangle so formed
- Draw the graph of the two lines whose equations are $x + 3y = 6$ and $2x - 3y = 12$, on the same Graph paper. Find the area of the triangle formed by the two lines and y axis
- Draw the graph of $y = x$ and $y = -x$ on the same Cartesian plane. What do you observe
(Both the lines intersect at the origin)
- Draw the graphs of the following equations on the same graph paper:
 $X = 4$, $x = 2$, $y = 1$, $y - 3 = 0$. Also find the area enclosed between these lines.
(4sq units)
- The taxi fare for the first km is Rs10 and fare for subsequent distance is Rs 6 per km. If The Distance covered is x km and the total fare is Rs y. Write a linear equation for this statement.
 $(6x - y + 4 = 0)$
- Solve the equation $2x + 1 = x - 3$ and represent the solution on number line and Cartesian plane
 $(x = -4)$
- Find x and y so that the points A $(2x - 3, y + 3)$, and B $(x/2, 3y)$ coincide each other
 $(x = 2, y = 3/2)$
- In which quadrant or axis do the following points lie:
a) Abscissa = 0, ordinate = 8, b) (7, 0) c) (-1, 0) d) (2,-5) e) (-1,-2) f) (-2, 5)
- If the points $(2k - 3, k + 2)$ lies on the line $2x + 3y = 15$, hence find the value of k
 $(k = -15/7)$
- Express y in terms of x: $2x + 3y = 11$
- If $x + 3y = 25$, Write y in terms of x and also find two solutions of this equation
- Express x in terms of y, given that $3x + 4y = 6$ $(x = 6 - 4y/3)$
- Express x in terms of y, given that $x - \frac{3y}{4} = 7$
- What is the value of c if the graph of the equation $3x + 2y + c = 0$ passes through the origin
 $(c = 0)$
- Draw the graph of $x + y = 6$ and $x - y = 2$ on the same graph paper and find the coordinates of the point where the straight line intersect
- Draw the graph of the lines $x = 4$, $y = 2$ and $x = y$ on the same graph paper and then identify what type of figure obtained
- Solve the equation $2(2x - 1) = 5x - 8$ and give the geometrical representation
a) in one variable b) in two variables $(x = 6)$

18. Find the value of k , so that $x = -1$ and $y = -1$ is the solution of the linear equation $9kx + 12ky = 63$ ($k = -3$)
19. If $x = 2$ and $y = 3$ is a solution of $(p + 1)x - (2p + 3)y - 1 = 0$. Find the value of p ($p = -2$)
20. Write $13x - 12y = 25$ as $y = mx + c$. Hence find m and c ($m = 13/12, c = -25/12$)
21. A has x apples and B has y . If A gives his 10 apples to B, then the number of apples left with A will be twice of apples, B will be having then write this information as a linear equation in two variables [$x - 10 = 2(y + 10)$]
22. When a numerator of a fraction is increased by 2, the fraction reduces to $1/3$. Let numerator and denominator be x and y respectively. Write the data in the form of a linear equation in two variables ($3x - y + 6 = 0$)
23. Two years later a father will be 8 years more than 3 times the age of the son. Taking the present age of the father and son as x and y respectively, write a linear equation for the above ($x - 3y - 12 = 0$)
24. When 5 times the larger of the two numbers is divided by the smaller, the quotient and The remainder are 9 and 2 respectively. Form a linear equation in two variables for the above and give its two solutions
(let larger no = x , smaller no = y , dividend = $dx + q + r$, $5x = y \times 9 + 2$)
25. If the cost of 5 tables exceeds the cost of 8 chairs by Rs150. Write the linear equation In two variables to represent statement. Also find the cost of one table if the cost of one Chair is Rs 240 ($5x = 8y + 150, x = 414$)
26. Solve the linear equation for x : $\frac{2x - 3}{5} + \frac{x + 3}{4} = \frac{2x + 3}{4}$ ($x = 4$)
27. Solve for x : $\frac{3x - 7}{5} - \frac{x + 1}{6} = \frac{2x + 2}{12} - 1$ ($x = 11/4$)
28. Solve: $\frac{3t - 2}{4} - \frac{2t + 3}{3} = \frac{2}{3} - t$ ($t = 2$)
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