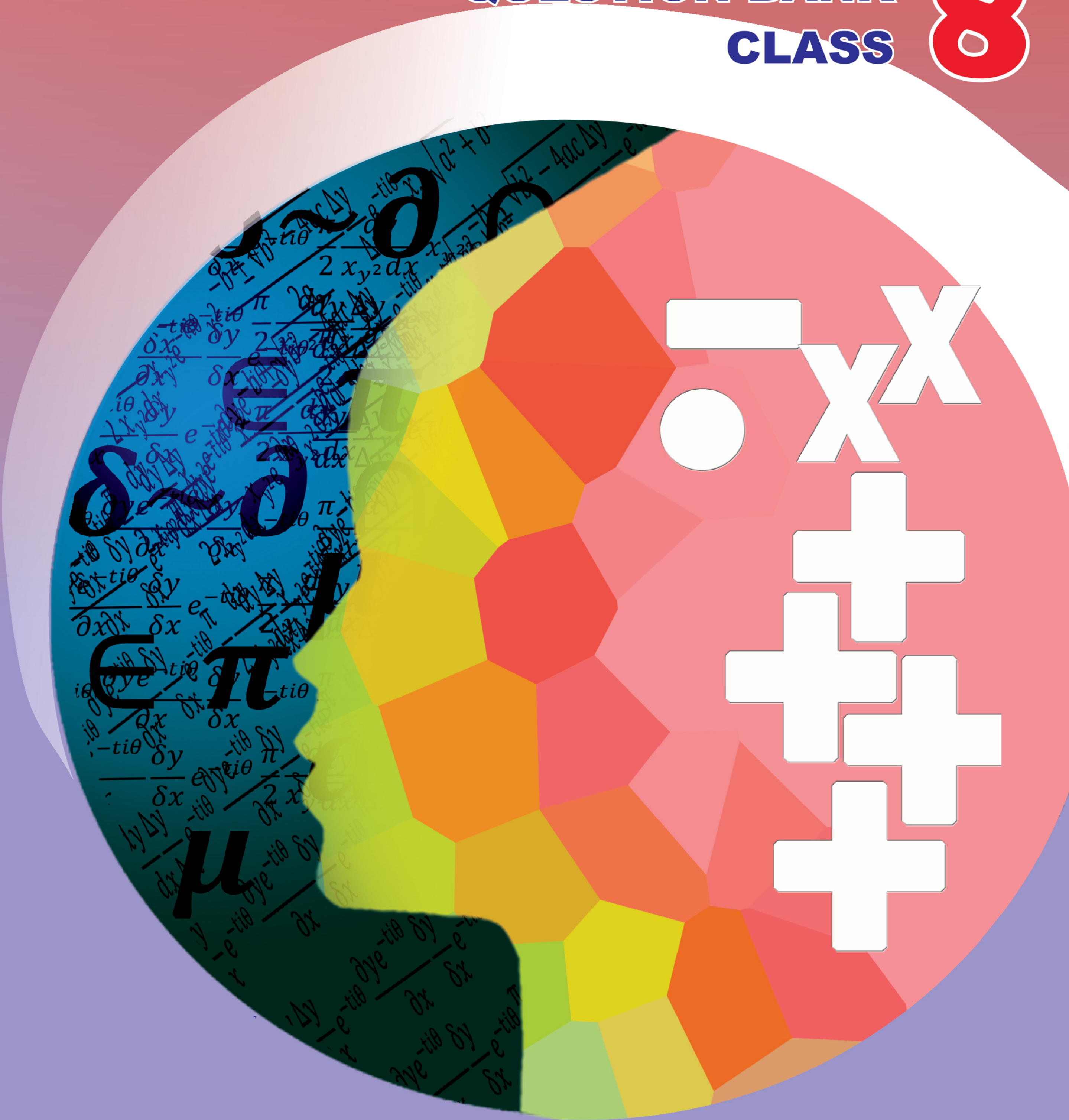
MENTAL MATHS

QUESTION BANK
CLASS 8



DIRECTORATE OF EDUCATION Govt.of N.C.T.of DELHI

MENTAL MATHS

CLASS VIII

2022-23

DIRECTORATE OF EDUCATION
GOVT. OF NCT OF DELHI

HIMANSHU GUPTA, IAS
Director, Education & Sports

सत्यमेव जयते

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MESSAGE

They say, 'Numbers are not just symbols on paper; numbers have life!'

It is not an exaggeration to place on record that numbers have played a pivotal role in the development and growth of human civilisation.

Numerical skills are very useful for students in their future life, especially when they appear in competitive exams.

Our Mental Maths Project aims at gradually developing and nurturing foundational numerical skills among our budding mathematicians. It started nearly two decades ago, and is striding, each passing year, on the path of progress.

Incidentally, I had an opportunity to witness the State Level Mental Maths Quiz Competition recently and I was spellbound by the speed, confidence and enthusiasm exhibited by the students. Indeed, it was to be seen to be believed!

I appreciate the dedication and hard work put in by the State Core Committee members and the Subject Experts under the able guidance of the Project Director (Mental Maths) in preparing the Question Banks and carrying this project forward with great zeal & fervour.

(HIMANSHU GUPTA)

विकास कालिया
परियोजना निदेशक (मेंटल मैथ्स)
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सत्यमेव जयते

VIKAS KALIA
PROJECT DIRECTOR (MENTAL MATHS)
REGIONAL DIRECTOR OF EDUCATION
(NORTH & CENTRAL)

No. PD/MMP/609

Dated 02/01/2023

'A Few Interesting Facts About Maths'

The word 'Mathematics' has its origin in the Greek word "Mathema' which means 'something that is learnt' or 'something that one gets to know'. In the same country (Greece), an ancient scholar Archimedes is considered to be the 'Father of Mathema' as he discovered methods to measures the areas of different shapes.

However, in our own country, we consider Aryabhatta as Father of Mathematics because of his original contributions made in Spherical Trigonometry. Some people believe that Aryabhatta invented Zero also, while some others credit another Vedic scholar Brahmgupta for this landmark discovery. The Western Scholars believe that Zero was first invented by the 'Mayans' (Mesopotamia) and a little later, by the Indians from which places, Zero travelled gradually to Cambodia, China and to the Arab world.

By the way, 'Arab' reminds me of an important branch of Maths named 'Algebra' which has its roots in the Arabian word 'Al-jabr' which means 'reunion of broken parts' (also used for reuniting broken bones)!

Algebra seeks to find out 'the missing values' and restoring them, just like restoring broken bones by providing missing links. In Algebra, we first 'imagine' values in the form of symbols like 'x' or 'y' and then, manipulate them to find out the 'actual' values. This is how even today, we find the 'missing' values or links through Algebra.

In short, we can conclude that unlike the 'inventions' of bulb, printing press or pen which were made by certain individuals, Mathematics is not an invention made by one person or by one civilisation. Its various branches were cultivated and nurtured by various individuals across various continents & civilizations and through different millennia.

As for Mental Maths, one can master Mental Maths through rigorous practice. Apart from learning Tables and Formulae by heart, one needs to learn various tricks for breaking longer calculations into smaller parts and making numbers 'round'. I am sure, our Maths Teachers will be able to identify students who have aptitude for numbers and groom them for Mental Maths Quiz Competitions.

I take this opportunity to thank all our Maths Teachers who devote so much of their extra time to prepare our students to sit for these competitions. I am also indebted to our Maths Teachers who have 'written' and 'reviewed' these question banks.

I thank my HoSs, Coordinators and the Core Team who, I think, are devoted much more than their Project Director to promoting Mental Maths among students!

Finally, I thank DBTB for the efforts they made for successful publication of these Question Banks.

Above all, I am indebted to my superior, the Director of Education, for his consistent support & guidance.

02/01/23

(VIKAS KALIA)
PROJECT DIRECTOR
(MENTAL MATHS)

ACKNOWLEDGEMENT

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LEVEL-2
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SCHEDULE OF MENTAL MATHS QUIZ COMPETITIONS

FOR THE YEAR 2022-2023

DIRECTORATE OF EDUCATION

GOVT OF NCT OF DELHI

- **Practice to students from Question Bank** — **01.04.2022 to 15.10.2022**
- **School level Quiz Competition** — **17.10.2022 to 07.11.2022**
- **Cluster level Quiz Competition** — **08.11.2022 to 14.11.2022**
- **Zonal level Quiz Competition** — **21.11.2022 to 30.11.2022**
- **District level Quiz Competition** — **07.12.2022 to 14.12.2022**
- **Regional level Quiz Competition** — **26.12.2022 to 31.12.2022**
- **State level Quiz Competition** — **18.01.2023 to 31.01.2023**

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Chapter-1

Rational Numbers

Points to Remember

- **A number of the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$ is called a rational number.e.g. : - $\frac{1}{7}, \frac{3}{4}, 0, -\frac{7}{11}$ etc.**
- **All natural numbers, whole numbers, integers and fractions are rational numbers.**
- **0 is the identity for addition of rational numbers. That means if we add 0 to a rational number we get the same rational number.**

  For eg. $2 + 0 = 2$, $\frac{3}{7} + 0 = \frac{3}{7}, -\frac{5}{13} + 0 = -\frac{5}{13}$
- **The additive inverse of a rational number $\frac{a}{b}, (b \neq 0)\ is -\frac{a}{b}$. That means if we add a number of same numerical value but opposite in sign to the given rational number it yields 0.**

  e.g $\quad 7 + (-7) = 0$(The additive inverse of 7 is -7)

  $(-7) + 7 = 0$(The additive inverse of -7 is 7)

  $-\frac{2}{3} + \frac{2}{3} = 0$(The additive inverse of $-\frac{2}{3}$ is $\frac{2}{3}$ and vice versa)
- **Multiplicative inverse of a rational number $\frac{a}{b}$ is $\frac{b}{a}$, where a and b are non-zero integers. That means the multiplicative inverse of a number is a number which when multiplied by the number gives result 1.**

  For eg. $\frac{2}{3} \times \frac{3}{2} = 1$(The multiplicative inverse of $\frac{2}{3}$ is $\frac{3}{2}$)

  $-\frac{1}{7} \times (-7) = 1$(The multiplicative inverse of$-\frac{1}{7}$ is -7.

  In other words multiplicative inverse means reciprocal of a number.
- **1 is the identity for multiplication of rational numbers. That means if we multiply a rational number by 1 we get the same rational number.**

  For eg. $\frac{3}{4} \times 1 = \frac{3}{4}, -\frac{7}{11} \times 1 = -\frac{7}{11}, \frac{p}{q} \times 1 = \frac{p}{q} (q \neq 0)$
- **Every rational number represents a unique point on a number line.**
- **Division of any rational number by 0 is not defined.**

  $7 \div 0 = \frac{7}{0}$ is not defined $\qquad -\frac{2}{7} \div 0$ is not defined

- **The rational number 0 has no reciprocal.**
- **The reciprocal of 1 is 1.**
- **The reciprocal of -1 is -1.**

QUESTIONS

1. **Find the value of:** $\frac{4}{11} + (-\frac{5}{7})$
2. **Find the value of:** $\frac{4}{12} - \frac{2}{3}$
3. **Find the value of:** $-\frac{7}{12} - \frac{5}{6}$
4. **Find the value of:** $-\frac{5}{18} - (-\frac{5}{9})$
5. **Find the value of:** $-\left(\frac{-11}{-8}\right) + \left(\frac{13}{12}\right)$
6. **Find the value of:** $\frac{-7}{25} \div (\frac{7}{-25})$
7. **Find the value of:** $\frac{-29}{27} \div (-\frac{58}{87})$
8. **Find the value of:** $\frac{(-4)}{5} \times \frac{3}{10} \times \frac{(110)}{144}$
9. **Find the value of:** $\frac{-11}{21} \times \frac{4}{7} \times \frac{14}{33}$
10. **Find the value of:** $\frac{11}{15} \div (\frac{33}{-5})$
11. **Find the additive inverse of** $\left(-\frac{17}{8} + 2\right)$
12. **Find the additive inverse of** $\left(\frac{-8}{-7} - 1\right)$
13. **Find the multiplicative inverse of** $\left(-\frac{7}{24} + \frac{1}{3}\right)$.
14. **Find the multiplicative inverse of** $\left(\frac{-5}{11} \div \frac{11}{-5}\right)$.
15. **Find the value of** $-\frac{2}{5} + \frac{5}{6} + \left(-\frac{3}{5}\right) + \frac{7}{15}$
16. **The sum of two rational numbers is** $-\frac{17}{27}$**. if one of them is** $-\frac{11}{27}$**, find the other.**
17. **What number should be added to** $\frac{9}{14}$ **to get** $-\frac{3}{7}$**?**
18. **What number should be subtracted from** $-\frac{5}{8}$ **so as to get** $\frac{3}{4}$**?**
19. **What number should be subtracted from** $-\frac{5}{3}$ **to get** $\frac{5}{6}$**?**
20. **What number should be added to** $(\frac{1}{2} + \frac{1}{3})$ **to get 1?**
21. **What number should be added to -1 so as to get** $\frac{5}{7}$**?**

22. **The product of two rational numbers is $-\frac{16}{9}$. If one of the them is $-\frac{4}{3}$, find the other.**
23. **What number should be multiplied by $-\frac{8}{39}$ to obtain $\frac{1}{78}$?**
24. **Find three rational numbers between $\frac{2}{3}$ and $\frac{3}{4}$.**
25. **Find five rational numbers between $\frac{1}{4}$ and $\frac{1}{3}$.**
26. **The product of two rational numbers is $-\frac{28}{81}$. If one of them is $\frac{14}{27}$, then find the other.**
27. **Find the product of additive inverse and multiplicative inverse of $-\frac{1}{2}$.**
28. **Find the value of x: $\frac{9}{8} \div x = -\frac{3}{2}$**
29. **Find the value of x: $(-12) \div x = -\frac{6}{5}$.**
30. **Divide the sum of $\frac{18}{5}$ and $-\frac{7}{15}$ by their difference.**
31. **After reading $\frac{2}{3}$ of a book, 20 pages are left. How many pages are there in the book?**
32. **Amit has ₹ 1400 with him. He spent $\frac{1}{2}$ of his money on notebooks and $\frac{1}{4}$ of his money on stationery. How much money is left with him?**
33. **One liter of petrol costs ₹ 175. What is the cost of $3\frac{1}{5}$ litres of petrol?**
34. **If 6 shirts of equal sizes can be made out of 15 meter of cloth, how much cloth is needed for making one shirt?**
35. **$5\frac{1}{2}m$ of long rope is cut into 11 equal pieces. What is the length of each piece?**
36. **The product of two fractions is $9\frac{3}{5}$. If one of the fraction is $\frac{48}{7}$, find the other.**
37. **At a football match $\frac{3}{7}$ of the spectators were in covered place while remaining 12000 were in open. Find the total number of spectators.**
38. **A drum full of sugar weighs $30\frac{2}{5}$ kilogram. If the empty drum weighs $\frac{72}{5}$ kilogram, find the weight of sugar.**
39. **An aeroplane covers 780 kilometers in an hour. How much distance will it cover in $2\frac{1}{2}$ hours?**
40. **In a school, $\frac{5}{8}$ of the students are girls. If there are 240 boys, find the number of girls in the school.**

ANSWERS

Q. No.	Answer	Q. No.	Answer
1.	$-\frac{27}{77}$	21.	$1\frac{5}{7}$
2.	$-\frac{1}{3}$	22.	$1\frac{1}{3}$
3.	$-1\frac{5}{12}$	23.	$-\frac{1}{16}$
4.	$\frac{5}{18}$	24.	$\frac{33}{48}, \frac{34}{48}, \frac{35}{48}$ *or* any other suitable answer
5.	$-\frac{7}{24}$	25.	$\frac{19}{72}, \frac{20}{72}, \frac{21}{72}, \frac{22}{72}, \frac{23}{72}$ *or* any other suitable answer
6.	1	26.	$-\frac{2}{3}$
7.	$1\frac{11}{18}$	27.	-1
8.	$-\frac{11}{60}$	28.	$-\frac{3}{4}$
9.	$-\frac{8}{63}$	29.	10
10.	$-\frac{1}{9}$	30.	$\frac{47}{61}$
11.	$\frac{1}{8}$	31.	60 pages
12.	$-\frac{1}{7}$	32.	₹350
13.	24	33.	₹ 560
14.	$4\frac{21}{25}$	34.	2.5 m
15.	$\frac{3}{10}$	35.	0.5m or 50cm
16.	$-\frac{2}{9}$	36.	$1\frac{2}{5}$
17.	$-1\frac{1}{14}$	37.	21000
18.	$-1\frac{3}{8}$	38.	16 kilogram
19.	$-2\frac{1}{2}$	39.	1950 kilometre
20.	$\frac{1}{6}$	40.	400 girls

Chapter-2

Linear Equations in One Variable

Points to Remember

- **An equation involving only linear polynomials is called a linear equation. Degree of a linear equation is one.**

  Examples of linear equations: $\frac{5}{2}x - 7 = 4$, $\frac{y}{3} + 4 = 6$, $3t + 7 = 12$

- **Rules for solving a linear equation**

  Rule 1: Same quantity (number) can be added to both sides of an equation without changing the equality.

  Rule 2: Same quantity can be subtracted from both sides of an equation without changing the equality.

  Rule 3: Both sides of an equation may be multiplied by the same non zero number without changing the equality.

  Rule 4: Both sides of an equation may be divided by the same non zero number without changing the equality.

  Rule 5: Transposition

  Any term of an equation may be taken to the other side with the sign changed. This process is called transposition.

- **It should be noted that some complicated equations can be solved by using two or more of these rules together.**

- **If** $\frac{ax+b}{cx+d} = \frac{m}{n}$**, then** $n(ax+b) = m(cx+d)$ **is a linear equation. The process of obtaining the above linear equation from** $\frac{ax+b}{cx+d} = \frac{m}{n}$ **is called cross multiplication.**

QUESTIONS

1. **Find the value of x: $3x + 4 = 6(x - 1) + 7$**
2. **Find the value of y: $\frac{4}{7}(y + 7) = 4$**
3. **Find the value of z: $\frac{7-z}{14-3z} = \frac{5}{8}$**
4. **Find the value of a: $\frac{a}{3} - \frac{a}{4} = \frac{7}{12}$**
5. **Find the value of b: $\frac{b}{2} + \frac{b}{3} = \frac{1}{6}$**
6. **Find the value of c: $2(c - 3) = 5(2c + 2)$**
7. **Solve: $0.16(5x + 1) = 0.4x + 0.16$**
8. **Solve for x: $x^2 - (x + 1)(x - 2) = 0$**
9. **What is the number which when added to 15 times of itself gives 208.**
10. **A number is as much greater than 84 as it is less than 108. What is the number?**
11. **The sum of three consecutive natural numbers is 33. Find the numbers.**
12. **Two consecutive sides of a rectangle are in the ratio 3:2. If its perimeter is 150cm, then find its area?**
13. **A number consists of two digits whose sum is 9. If 27 is added to the number its digits are reversed. Find the number.**
14. **A man sold an umbrella for ₹495 and gained 10% on it. Find its cost price.**
15. **$\frac{3}{4}^{th}$ of a number is 20 more than half of the same number. What is the number?**
16. **Three fourth of a number exceeds its one third by 60. What is the number?**
17. **Sum of three consecutive multiples of 4 is 108. Find the numbers.**
18. **A box of toffees is divided among 24 children. They will get 5 toffees each. How many would each get, if the number of children is reduced by 4?**
19. **Four fifth of a certain number is 64. What will be half of that number?**
20. **Sides of a triangle are in the ratio 2:3:4. If its perimeter is 225m, find the length of smallest side.**
21. **Find the number whose fifth part increased by 5 is equal to its fourth part decreased by 5.**
22. **Find three consecutive odd natural numbers whose sum is 147.**

23. Find three consecutive even natural numbers whose sum is 234.
24. The sum of two numbers is 95. If one number exceeds the other by 15, find the smaller number.
25. The sum of three consecutive natural numbers is 108. Find the middle number.
26. The base of an isosceles triangle is 8 cm and its perimeter is 20 cm. Find the length of equal sides.
27. Four fifth of a number is greater than three fourth of the same number by 4. Find the number.
28. The width of a rectangle is two third of its length. If the perimeter is 180m, find its dimensions.
29. If 10 is added to four times a certain number, the result is 5 less than five times the number. Find the number.
30. The average age of 3 girls is 20 years and their ages are in the ratio 3:5.7. Find the age of the eldest girl.
31. The perimeter of a rectangle is numerically equal to the area of the rectangle. If the width of the rectangle is 3cm, find its length.
32. An angle is double of its supplementary angle. Find the complementary angle of its supplementary angle.
33. The number of boys and girls in a class are in the ratio 4:7. If the number of boys are 6 less than the number of girls. Find the number of students in the class.
34. After 4 years 'A' will be 3 times as old as he was 4 years ago. Find his present age.
35. In an examination a student scores 4 marks for every correct answer and loses 1 mark for every wrong answer. If he attempts 75 questions and scores 125 marks, then find the number of correct questions he answered.
36. 'A' is 20 years older than B, he is also 6 times as old as B. What are their ages?
37. One third of a number is 10 less than two third of the number. Find the number.
38. One of the angles of a triangle is equal to the sum of the other two angles. If the ratio of the other two angles is 2:3, find the angles of the triangles.
39. Find three consecutive even natural numbers whose sum is 216.
40. Find a number whose double is 45 greater than its half.

ANSWERS

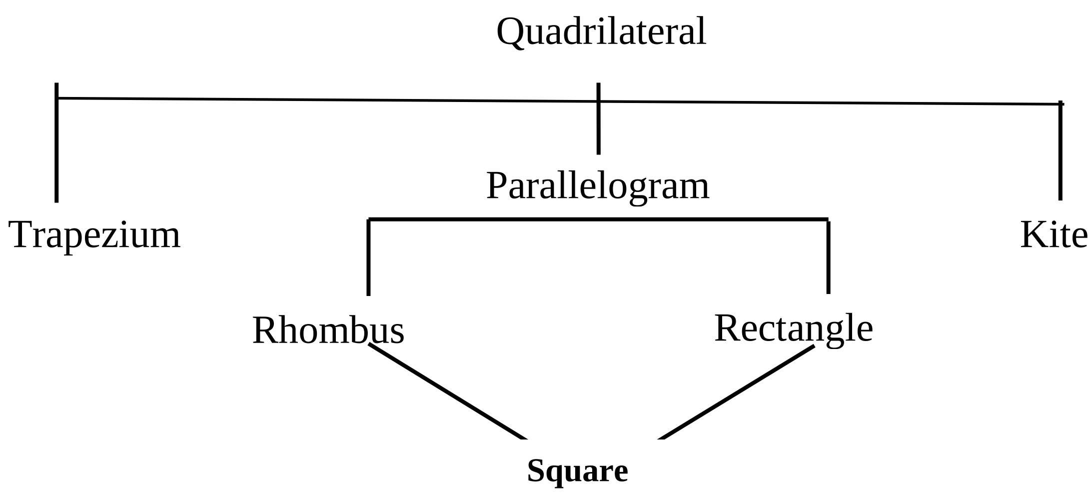
Q. No.	Answer	Q. No.	Answer
1	1	21	200
2	0	22	47, 49, 51
3	2	23	76, 78, 80
4	7	24	40
5	$\frac{1}{5}$	25	36
6	-2	26	$6\ cm$
7	0	27	80
8	-2	28	$54\ m, 36\ m$
9	13	29	15
10	96	30	28 years
11	10,11,12	31	$6\ cm$
12	1350 sq.cm	32	$30°$
13	36	33	22
14	₹450	34	8 years
15	80	35	40
16	144	36	A's age = 24 years B's age = 4 years
17	32, 36, 40	37	30
18	6	38	$36°, 54°, 90°$
19	40	39	70,72,74
20	$50\ m$	40	30

Chapter-3

Understanding Quadrilaterals

Points to Remember

- **When we join a number of points without lifting a pen/pencil from the paper we get a plane curve.**
- **A simple closed curve made up of only line segments is called a polygon e.g. triangle, quadrilateral, pentagon etc. are polygons.**
- **Sum of interior angles of a polygon of n sides= $(n-2)\times180^{\circ}$.**
- **Sum of all exterior angles of a polygon=360°.**
- **Number of sides of a regular polygon × measure of each exterior angle = 360°.**
- **A parallelogram is a quadrilateral whose opposite sides are parallel.**
- **The adjacent angles of a parallelogram are supplementary.**
- **The diagonals of a parallelogram bisect each other.**
- **The diagonals of a rhombus bisect each other at right angle.**
- **The diagonals of a square are equal and bisect each other at right angle.**
- **The diagonals of a rectangle are equal and bisect each other.**
- **Number of diagonals in a n-sided polygon= $\frac{n(n-3)}{2}$.**

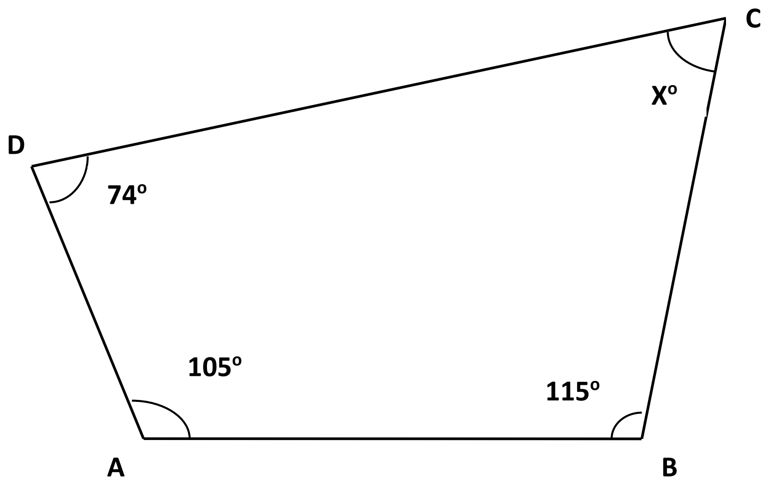


(Square is a rhombus and rectangle both but the converse may not be true)

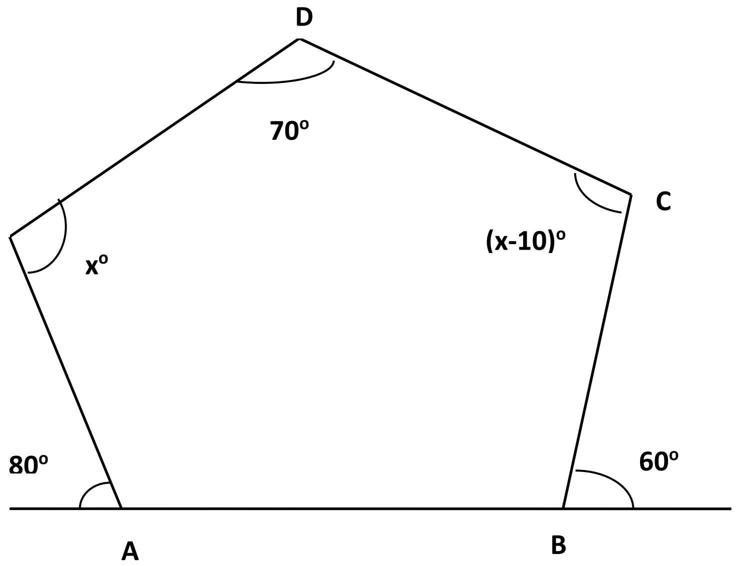
QUESTIONS

1. **What is the maximum number of obtuse angles that a quadrilateral can have?**
2. **What is the sum of all interior angles of a hexagon?**
3. **How many non over lapping triangles can we make in a polygon having n sides by joining the vertices?**
4. **If two adjacent angles of a parallelogram are $(5x - 5°)$ and $(10x + 35°)$, then find the ratio of these angles.**
5. **The angles of a quadrilateral are in the ratio 1:2:3:4. Find the difference between the smallest and the largest angle.**
6. **If PQRS is a ∥gm, then find $\angle Q - \angle S$.**
7. **What is the number of sides of a regular polygon whose exterior angle measures 72°?**
8. **If only one diagonal of a quadrilateral bisects the other, then which type of quadrilateral is it?**
9. **The interior angles of a triangle are in the ratio 3:2:1, then what is the ratio of its exterior angles?**
10. **If the area of a square is 289 sq.cm, then find the length of its diagonal.**
11. **If a square has a diagonal of length $12\sqrt{12}$ cm, find its area.**
12. **How many sides does a regular polygon have if each of its interior angle is 160^o ?**
13. **If the sum of all interior angles of a polygon is 1080^o, then how many sides does a polygon have?**
14. **How many diagonals does a regular hexagon have?**
15. **What is the measure of each interior angle of a regular polygon having 12 sides?**
16. **The ratio of each exterior angle to each interior angle of a regular polygon is 2:3. What is the number of sides of the polygon?**
17. **The longer side of a parallelogram is 8cm. If the shorter side is $\frac{3}{4}$ times of the longer side, then what is the perimeter of the parallelogram?**
18. **What is the number of diagonals in a polygon of 12 sides?**
19. **A polygon has 27 diagonals. How many sides does it have?**

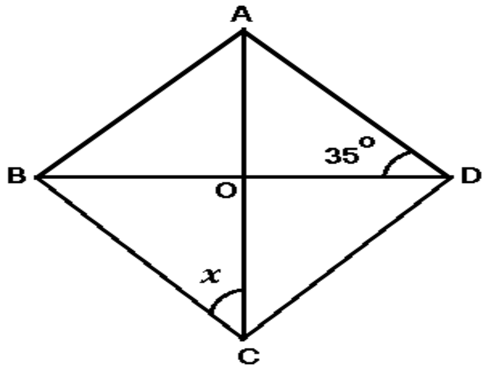
20. In parallelogram ABCD, $\angle A$ is greater than $\angle B$ by 5°. What is the measure of $\angle D$?
21. The length of two diagonals of a rectangle are (x+3) cm and (2x-7) cm, find the value of x.
22. The angles of a quadrilateral are in the ratio 1:3:4:4, then what is the sum of two greatest angles of the quadrilateral?
23. In a regular polygon, each interior angle is thrice the exterior angle. What is the number of sides of a polygon?
24. The interior angle of a regular polygon is 100° more than its exterior angle. What is the number of sides of the polygon?
25. The interior angle of a regular polygon exceeds its exterior angle by 108°. What is the number of sides of the polygon?
26. Two adjacent angles of a parallelogram are (2x+30)° and (3x-15)°, what is the value of x?
27. The lengths of the diagonals of a rhombus are 16 cm and 12 cm. what is the perimeter of the rhombus?
28. Find the value of x.



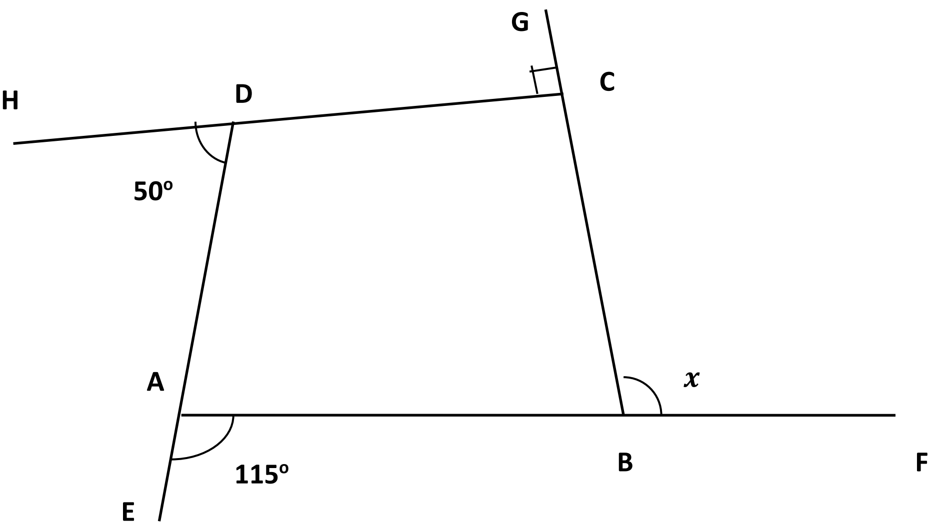
29. Find the value of x.



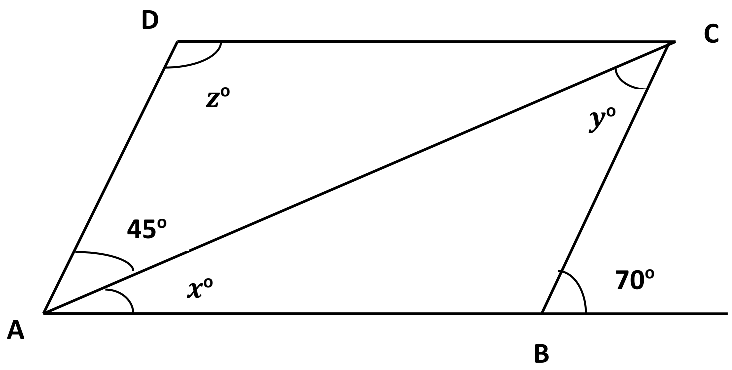
30. ABCD is a rhombus. If ∠ABD = 35°, find the value of x.



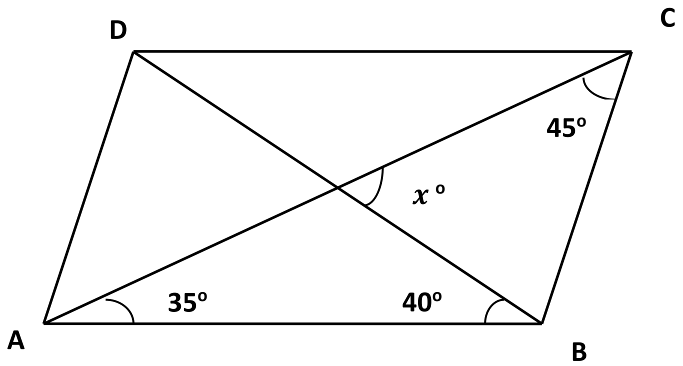
31. Find the value of x.



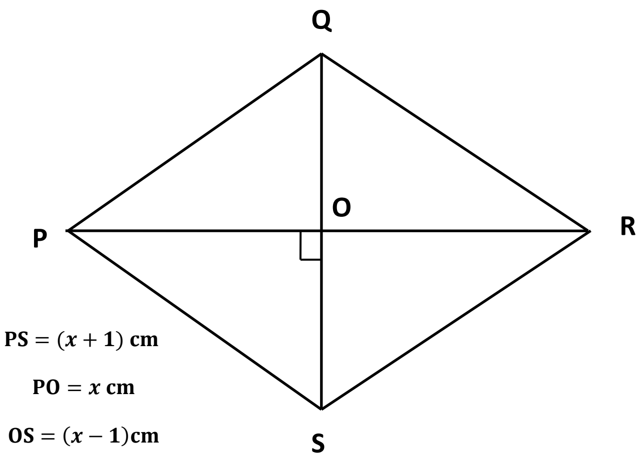
32. ABCD is a parallelogram, Find the values of x, y and z.



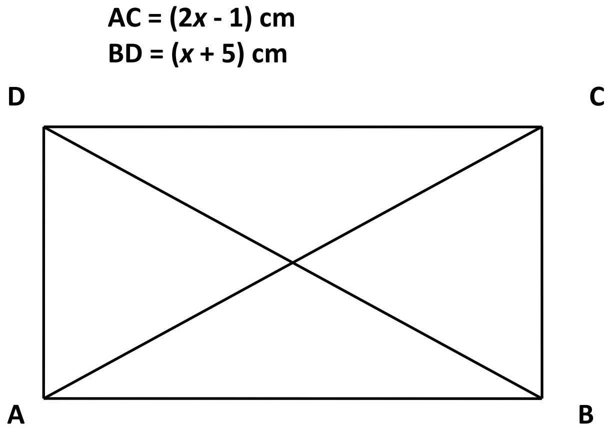
33. ABCD is a parallelogram, Find the value of x.



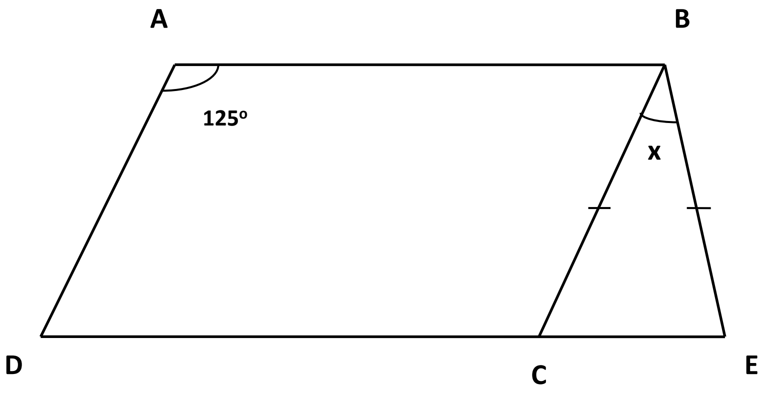
34. If PQRS is a rhombus, find x.



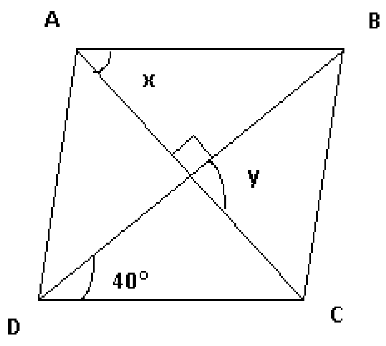
35. If ABCD is a rectangle, find x.



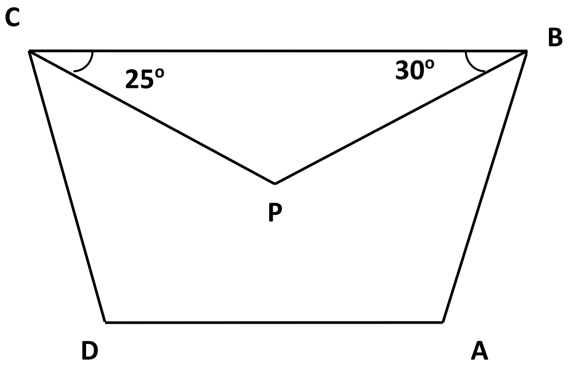
36. ABCD is a parallelogram, BC=BE, find *x*.



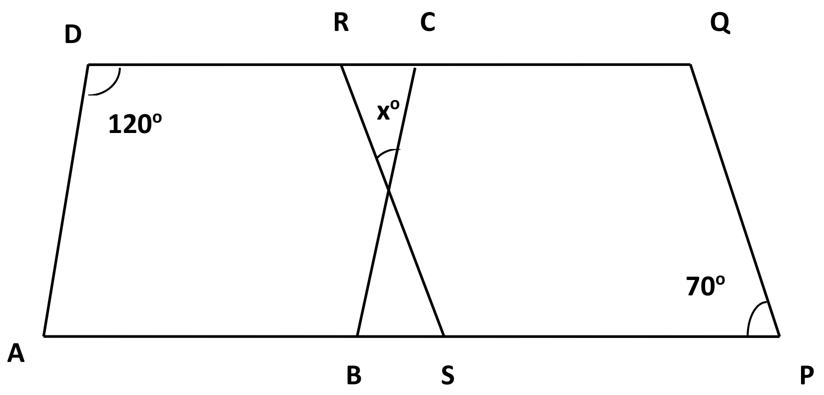
37. ABCD is a rhombus, find the value of y-x.



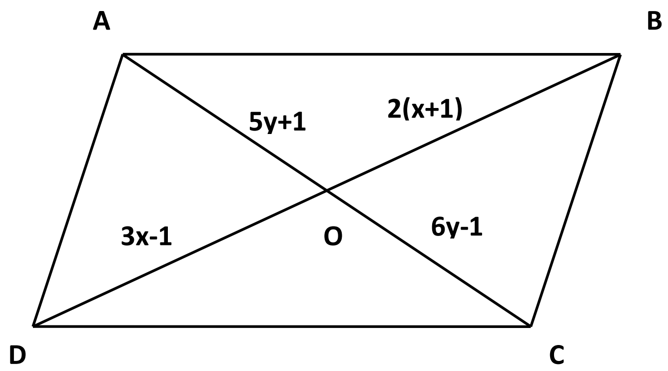
38. ABCD is a trapezium, in which CB||DA, CP and BP are bisectors of $\angle C$ and $\angle B$ respectively, find $\angle A$ and $\angle D$.



39. Find x, if ABCD and PQRS are parallelograms.



40. ABCD is a parallelogram, find x and y.



ANSWERS

Question No.	Answer	Question No.	Answer
1.	3	21.	x=10
2.	720º	22.	240º
3.	n-2	23.	8
4.	1:3	24.	9
5.	108º	25.	10
6.	0º	26.	x=33
7.	5	27.	40 cm
8.	kite	28.	66
9.	3:4:5	29.	x=130
10.	$17\sqrt{2}$ cm	30.	55°
11.	864 sq. cm	31.	105°
12.	18	32.	$x = 25, y = 45,$ $z = 110$
13.	8	33.	x =75
14.	9	34.	x =4
15.	150º	35.	x =6
16.	5	36.	x =70º
17.	28cm	37.	40º
18.	54	38.	$\angle A = 120°,$ $\angle D = 130°$
19.	9	39.	x =50
20.	87.5º	40.	x = 3 units, y= 2 units

Chapter-4

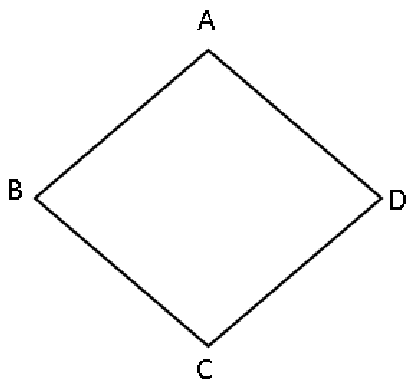
Practical Geometry

Points to Remember

- **To construct a quadrilateral uniquely, we must know at least five of its parts.**
- **The Five parts of a quadrilateral that are sufficient to construct a quadrilateral are:**
  - **4 sides and 1 diagonal.**
  - **4 sides and 1 angle.**
  - **3 sides and both diagonals.**
  - **3 sides and 2 included angles.**
  - **3 angles and 2 included sides.**
- **The Five parts required for constructing a quadrilateral must also satisfy:**
  - **The triangle inequality(i.e. sum of two sides is greater than the third side)**
  - **Angle sum property of a triangle, wherever applicable.**
- **It is possible to construct a quadrilateral with other sufficient data (other than above five simple cases) where less than five parts but some other relations between the parts are given.**

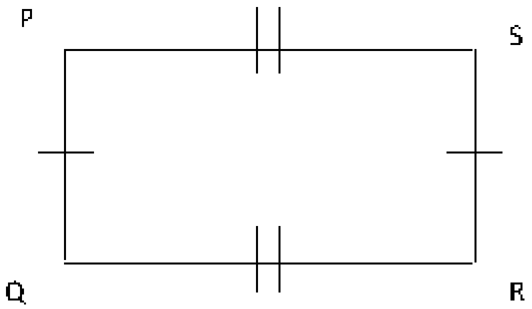
QUESTIONS

1. **What is the minimum number of measurements required to construct a parallelogram?**
2. **How many elements are required for constructing a quadrilateral uniquely?**
3. **In the figure given below AB=** $AD\ and\ BC = CD$**, name the angles which are equal.**



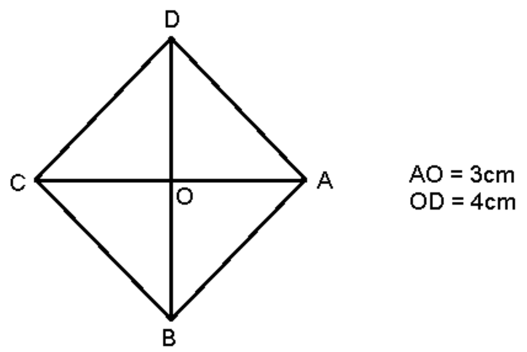
4. **If the diagonals of a quadrilateral bisect each other at right angles, then which type of a quadrilateral is it?**

5. **In the given figure, PQRS is a parallelogram if $\angle Q = 90^o$, then what will be the name of the quadrilateral?**



6. **At least how many measurements are required to construct a square?**

7. **ABCD is a rhombus. If OD=4cm and AO=3cm, then find the value of AC+BD.**

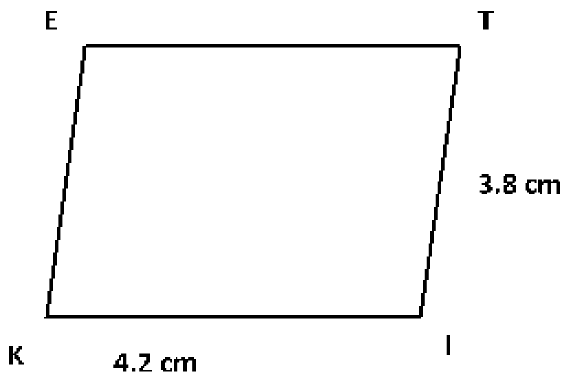


8. **At least how many measurements are required for constructing rhombus?**

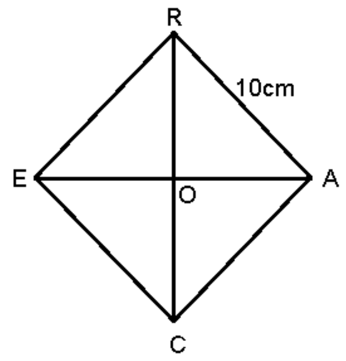
9. **Name the property which is used to construct a parallelogram if it's one side and both diagonals are given.**

10. **Name the property which is used to construct a rhombus, if it's both diagonals are given.**

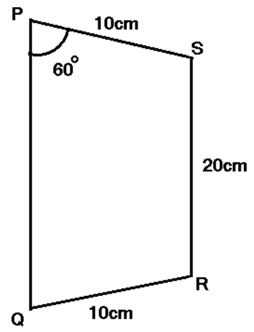
11. **In the given figure KITE is a parallelogram then find KE+ET.**



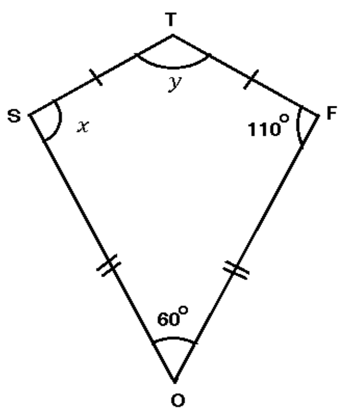
12. **Two sticks each of length 5cm are crossing each other such that they bisect each at right angles. What shape is formed by joining their end points?**
13. **CARE is a rhombus whose diagonals intersect at O. If AR=10cm and diagonal AE=16cm then find the length of CR.**



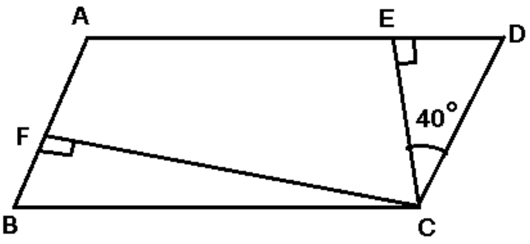
14. **If the diagonals of a quadrilateral are of length 10cm and 12cm and they bisect each other at right angles then what is the length of each side of the quadrilateral?**
15. **In the given figure PQ//SR and PS = QR. Find PQ.**



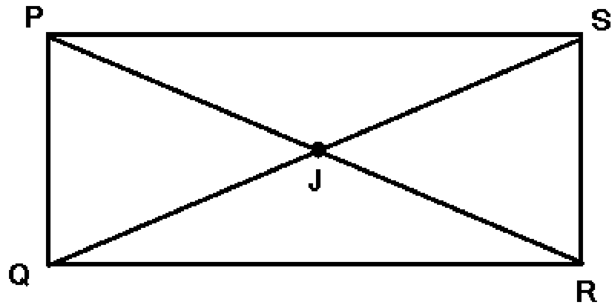
16. **Three angles of a quadrilateral are equal. If the measure of fourth angle is 150°, then find the measure of equal angles.**
17. **From the given figure find x and y.**



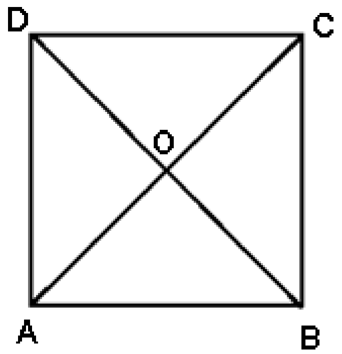
18. **In the given parallelogram ABCD, CE $\perp$ AD, CF $\perp$ AB. If $\angle ECD = 40°$, then find $\angle$ECF.**



19. **PQRS is a rectangle in which diagonals intersect at J. Find the value of x if JR = (8x+4) units and PR = (24x- 8) units.**



20. **In the given figure, ABCD is a square. If OC = $\sqrt{8}$cm. Find AB + BC.**



ANSWERS

Question No.	Answer	Question No.	Answer
1.	3	11.	8 cm
2.	5	12.	Square
3.	$\angle B$ and $\angle D$	13.	12 cm
4.	Rhombus or square	14.	$\sqrt{61}$cm
5.	Rectangle	15.	30 cm
6.	One side or one diagonal	16	70°
7.	14 cm	17.	$x = 110°$, $y = 80°$
8.	2 (one side and one diagonal)	18.	50°
9.	The diagonals of a parallelogram bisect each other	19.	2
10.	The diagonals of a rhombus bisect each other at right angle	20.	8 cm

Chapter-5

Data Handling

Points to Remember

- **Data in an unorganized form is called raw data.**
- **Frequency gives the number of times that a particular entry occurs in the data.**
- **The difference of highest value and the lowest value of observation is known as range.**
- **Each entry collected as a numerical fact in the given data is known as observation.**
- **Grouped data can be represented using histogram.**
- **Histogram is a type of bar diagram with class intervals shown on horizontal axis and height of the bar shows the frequency of the class interval. Also, there is no gap between the bars.**
- **A pie chart is also called a circle graph that shows the relationship between a whole and its parts.**

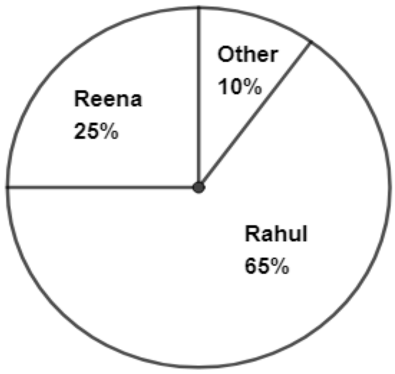
$$\boxed{\text{Central angle of a component} = \frac{\text{Value of the component}}{\text{Sum of all component values}} \times 360^\circ}$$

- **A random experiment is one whose outcome cannot be predicted exactly in advance.**
- **An operation which can produce some well-defined outcomes is called an Experiment.**
- **Each outcome of the experiment is called an event.**
- **Outcomes of an experiment are called "Equally likely" if each has the same chance of occurring.**
- **When the outcomes are equally likely:**

$$\boxed{\text{Probability of an event} = \frac{\text{Number of favourable outcomes}}{\text{Total Number of possible outcomes}}}$$

QUESTIONS

1. **Data available in an unorganized form is called ____ data.**
2. **Data represented using circle is known as _______.**
3. **In the class interval 26-33, 33 is known as ______.**
4. **The number of times a particular observation occurs in a given data is called its _______.**
5. **Numbers 1 to 15 are written on separate slips i.e. one number on one slip and they are put in a box. Radha pick a slip from the box without looking at it. What is the probability that slip bears an odd number?**
6. **A dice is thrown once. Find the probability of getting a multiple of 2 or 3.**
7. **A family plays a game with a dice. In a single thrown of dice, getting a prime number means father wins and getting an even number means son wins. Find the probability that both will win simultaneously.**
8. **Find the range of the data 8, 15, 51, 62, 8, 72, 0 and 35.**
9. **A bag contains 80 red balls, 30 white balls and few blue balls. Find the number of blue balls in the bag if the probability of a getting a red ball is $\frac{2}{3}$.**
10. **The given pie chart shows the percentage breakdown of 800 votes in student's elections. How many votes did Reena receive?**



11. **A card is drawn from a well shuffled pack of 52 cards. Find the probability of getting neither a red card nor a queen.**
12. **Cards are marked from 10 to 100. A card is chosen at random. What is the probability of getting a perfect number?**
13. **Two coins are thrown simultaneously. Find the probability of getting atmost one head.**
14. **Two dice are thrown simultaneously. Find the probability of getting the same**

number on both the dice.

15. Ravi scored 12, 92, 0 and 16 runs in the 4 innings. Find the average runs scored by him.
16. Find the class mark of class Interval 1000-1100.

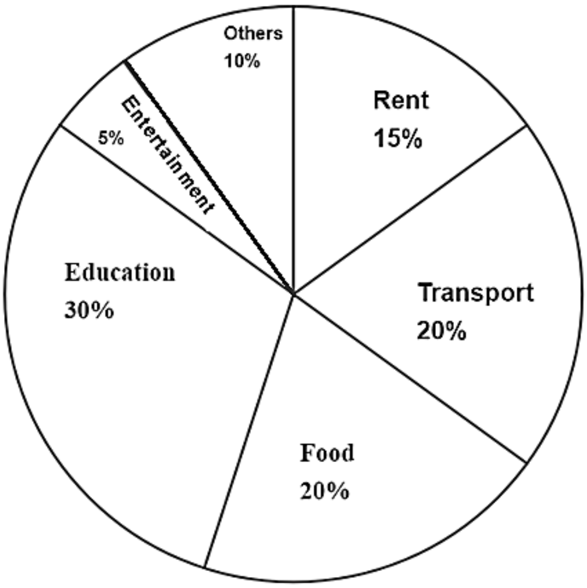
Wages (₹)	Number of workers
800-900	7
900-1000	13
1000-1100	2
1100-1200	8
1200-1300	10

17. In a multiple choice question with 5 options, Ranjeet randomly answered one question. Find the probability that he answered it correctly.
18. In a hostel the following students speak different languages. If a pie chart is formed, find the central angle made by Bengali speaking students.

Language spoken	English	Hindi	Marathi	Bengali
Number of students	34	12	16	10

19. Find the probability that a leap year selected at random will have 53 Tuesdays.
20. Find the probability that a number selected from the numbers 1,2,3,4.....30, is a perfect square number.
21. In a box of 600 electric bulbs, 15 bulbs are defective. One bulb is taken out at random. Find the probability that it is a non-defective bulb.

The following pie chart shows the expenditure done by a family in different heads as percentage of its income. Answer the questions from 22 to 27.



22. On which item, the expenditure is double than the expenditure on rent?

23. In which head, the expenditure is least?

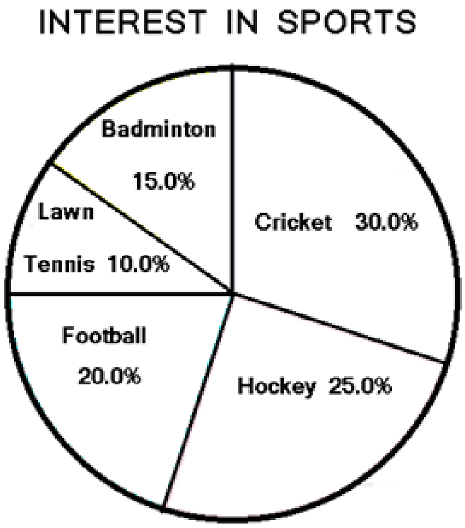
24. If expenditure on food items is ₹ 5000, find the expenditure done by the family on entertainment.

25. What is the ratio of the amount spent on education to that on the others?

26. Expenditure on which two heads are equal.

27. Find the difference of expenditures done on education and transport, if the expenditure on rent is ₹ 4500.

In a school, a sports survey on 720 students shows the following results in the form of a Pie chart. Answer the questions from 28 to 33.



28. **Which is the least popular game in the school?**

29. **How many students do not like football?**

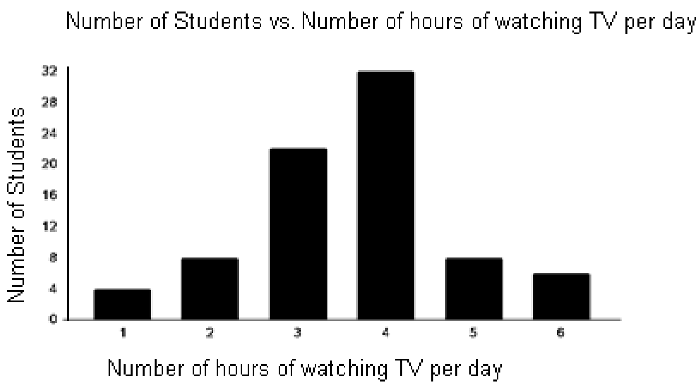
30. **How many students play football and lawn tennis?**

31. **Find the central angle made by cricket.**

32. **How many students like either cricket or football?**

33. **Find the number of students who like badminton.**

Study the given bar graph and answer the following questions from 34 to 36.

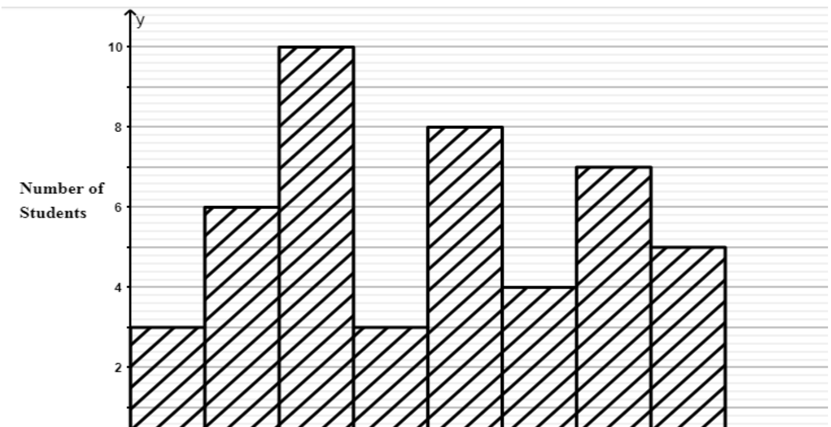


34. **For how many hours the least number of students watch T.V.**

35. **How many students watch T.V. less than 4 hours?**

36. **How many students spend more than 4 hours watching T.V.?**

Study the given histogram and answer the following questions from 37 to 41.



37. What is the class size?

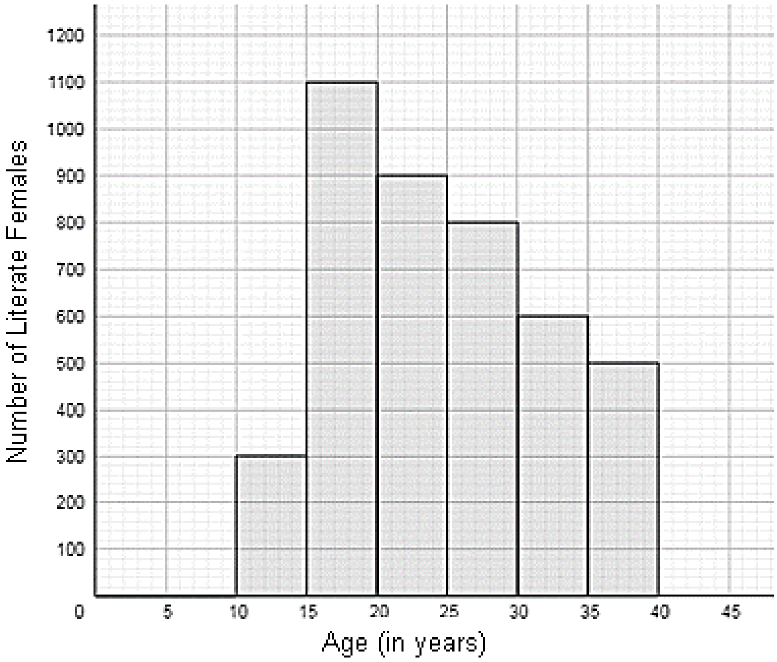
38. How many students obtain less than 20 marks?

39. How many students obtain 30 or more marks but less than 50?

40. How many students got more than 60 marks?

41. If the passing marks is 30, what is the number of failure students?

Study the given histogram and answer the following questions from 42 to 46.



42. Tell the age group in which the number of literate females is the highest.

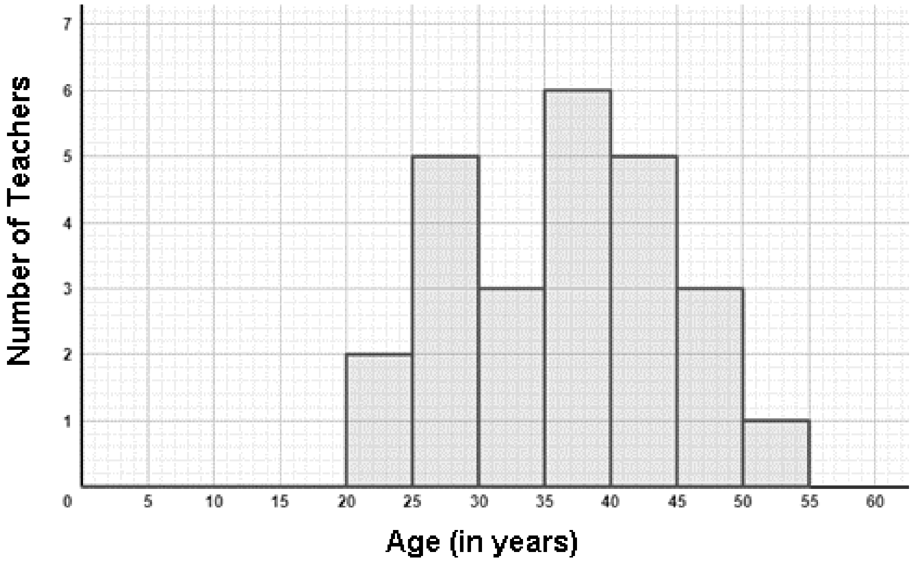
43. What is the class width?

44. What is the lowest frequency?

45. In which age group literate females are least?

46. How many females are literate in the age group 20 to 30?

The following histogram shows the frequency distribution of ages of 25 teachers in a school. Answer the following questions from 47 to 50.



47. What is the number of teachers in the group 25 to 45?

48. Find the size of classes.

49. How many teachers are in the age group 40-45?

50. How many teachers are in the age group 30-45?

ANSWERS

Question No.	Answer	Question No.	Answer
1	raw	26	Transport and Food
2	Pie chart	27	₹ 3000
3	upper class limit	28	Lawn tennis
4	frequency	29	576
5	$\frac{8}{15}$	30	216
6	$\frac{2}{3}$	31	$108°$
7	$\frac{1}{6}$	32	360
8	72	33	108
9	10	34	1 hour
10	200	35	34 students
11	$\frac{6}{13}$	36	14 students
12	$\frac{1}{91}$	37	10
13	$\frac{3}{4}$	38	9
14	$\frac{1}{6}$	39	11
15	30	40	12
16	₹1050	41	19
17	$\frac{1}{5}$	42	15-20
18	$50°$	43	5
19	$\frac{2}{7}$	44	300
20	$\frac{1}{6}$	45	10-15
21	$\frac{39}{40}$	46	1700
22	Education	47	19
23	Entertainment	48	5
24	₹ 1250	49	5
25	3:1	50	14

Chapter-6

Square and Square Roots

Points to Remember

- **A Natural number x is a perfect square if there exists a natural number y such that $x=y^2$.**
- **A number ending in 2, 3, 7 or 8 is never a perfect square.**
- **The number of zeros in the end of a perfect square is never odd.**
- **Square of even numbers are always even.**
- **Square of odd numbers are always odd.**
- **Sum of first n natural numbers= $\frac{n(n+1)}{2}$**
- **Sum of first n natural even numbers=$n(n+1)$**
- **Sum of first n natural odd numbers=n^2**
- **The square of a natural number other than 1 is either a multiple of 4 or exceeds a multiple of 4 by 1.**
- **The square of a natural number other than 1 is either a multiple of 3 or exceeds a multiple of 3 by 1.**
- **For any number n greater than 1, $(2n, n^2-1, n^2+1)$is a Pythagorean triplet.**

QUESTIONS

1. **How many perfect squares lie between 100 and 1000?**
2. **Write the smallest four digit perfect square number.**
3. **Find the value of x, if $(3)^2+(4)^2+(12)^2=(x)^2$**
4. **Simplify:$\sqrt{12\times 8+12\times 4}$**
5. **Simplify:$\sqrt{(0.01)+\sqrt{0.0064}}$**
6. **Simplify:$\sqrt{320+\sqrt{9+\sqrt{49}}}$**
7. **Simplify:$\sqrt{1000}\times\sqrt{\frac{4410}{4.41}}$**
8. **Find the value of $(502)^2-(499)^2$**
9. **Simplify: $5^2-4^2+3^2-2^2+1^2$**

10. Simplify:$(\sqrt{324} \div 6)^2$

11. Simplify:$\sqrt{100} + \sqrt{0.09}$

12. Simplify:$\sqrt{\frac{5}{24.2}}$

13. How many 2's are there in the prime factorization of 4000?

14. Find the least number that should be added to 221 to get a perfect square.

15. If area of a square field is 1764 sq. m. Find its perimeter.

16. How many numbers lie between $(10)^2$ and $(15)^2$?

17. Find the value of$(12 + 7 + 3 + 2 + 1 + 0)^2$.

18. Simplify: $(\sqrt{1024} - \sqrt{961})^2$

19. How many digits are there in the square root of 15625?

20. How many digits will be there in the square of 999?

21. Find the value of $\sqrt{31 + \sqrt{21 + \sqrt{15 + \sqrt{1}}}}$

22. Find the value of $\sqrt{54 - \sqrt{21 + \sqrt{18 - \sqrt{4}}}}$

23. Find the value of $3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23$

24. Find the value of x if, $(6)^2 + (7)^2 + (42)^2 = (x)^2$

25. Find the value of $2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20$

26. Find the value of x if, $(4)^2 + (5)^2 + (20)^2 = (x)^2$

27. Find the value of $(1 \times 2) + (2 \times 3) + (3 \times 4) + (4 \times 5)$

28. Find the value of $(31)^2 - (29)^2$.

29. Find the value of $\sqrt{99} \times \sqrt{44}$

30. What is the sum of first 14 odd natural numbers?

31. Find X and Y if $(X)^Y = 441$such that $X > Y$, where X and Y are positive integers.

32. If length of a rectangular park is 80 m and its breadth is 60 m. find the sum of length of its diagonals.

33. Evaluate: $(2 + \sqrt{3})^2 + (2 - \sqrt{3})^2$.

34. Find the least number that should be subtracted from 537 to get a perfect square.

35. If the area of a square is 20.25 sq. m, find its perimeter.

36. Find the least number by which 288 must be multiplied so that it becomes a perfect square.

37. Find the least number by which 147 must be divided so that it becomes a perfect square.

38. The area of a square field is $30\frac{1}{4}$sq. m. Find the length of the side of the square.

39. Find the length of a side of a square playground whose area is equal to the area of rectangular field of dimension 72m and 50m.

40. Find the value of $\frac{\sqrt{625}-\sqrt{441}}{\sqrt{625}+\sqrt{441}}$

41. Find: 9+11+13+15+17+19+21+23

42. How many perfect squares lie between 0 and 550?

43. Find the value of $\sqrt{\sqrt{\frac{1296}{2401}}}$

44. Find the value of $(44+3)^2-(44-3)^2$

45. Find the value of $(\sqrt{441}-\sqrt{196}+\sqrt{121}-\sqrt{64})$

46. Find the missing number: $175 \times \_\_ = (35)^2$

47. Find the Pythagorean triplet whose smallest number is 12.

48. Find x if, $5x=(49)^2-(44)^2$

49. Find x if, $x=\sqrt{0.01+0.03+0.07+0.11+0.14}$

50. Find x if, $x=(9+4\sqrt{5})(9-4\sqrt{5})$

ANSWERS

Question No.	Answer	Question No.	Answer
1.	21	26.	$x = 21$
2.	1024	27.	40
3.	$x = 13$	28.	120
4.	12	29.	66
5.	0.3	30.	196
6.	18	31.	X= 21, Y= 2
7.	1000	32.	200 m
8.	3003	33.	14
9.	15	34.	8
10.	9	35.	18 m
11.	10.3	36.	2
12.	$\frac{5}{11}$	37.	3
13.	5	38.	5.5 m
14.	4	39.	60 m
15.	168 m	40.	$\frac{2}{23}$
16.	124	41.	128
17.	625	42.	23
18.	1	43.	$\frac{6}{7}$
19.	3	44.	528
20.	6	45.	10
21.	6	46.	7
22.	7	47.	12,16,20 or 12,35,37
23.	143	48.	93
24.	$x = 43$	49.	0.6
25.	110	50	1

Chapter-7

Cube and Cube Roots

Points to Remember

- **When a given number is multiplied by itself three times, the new number obtained is called cube of the given number and given number is called cube root of the new number i.e. a number 'm' is the cube root of a number 'n' if $n = m^3$ or $m = \sqrt[3]{n}$. symbol $\sqrt[3]{\ }$ represents cube root. E.g. $2^3 = 8$ *or* $2 = \sqrt[3]{8}$**
- **Numbers 1729, 4104, 13832 etc. are called Hardy-Ramanujan numbers. They can be expressed as the sum of two cubes in two different ways.**

$$1729 = 1^3 + 12^3 \text{ or } 9^3 + 10^3$$

- **Cube of a number having 1, 4, 6 or 9 as one's digit has the same digit at one's place.**

  As $1^3 = 1$(1^3 has 1 at its unit place)

  $4^3 = 64$(4^3 has 4 at its unit place)

  $9^3 = 729$(9^3 has 9 at its unit place)
- **If a number has 3 at its one's place, then its cube has 7 at its one's place, also if a number has 7 at one's place then its cube has 3 at one's place.**

  As $3^3 = 27$(3^3 has 7 at its unit place)

  $7^3 = 343$(7^3 has 3 at its unit place)
- **If a number has 2 at one's place then its cube has 8 at one's place, also if a number has 8 at one's place then its cube has 2 at one's place.**

As $2^3 = 8$(2^3 has 8 at its unit place)

$8^3 = 512$(8^3 has 2 at its unit place)

- **For two consecutive natural numbers p and q (p>q).**

$$p^3 - q^3 = 3pq + 1$$

e.g

$$5^3 - 4^3 = 125 - 64 = 61 = 3(5 \times 4) + 1$$

- For any positive integer 'n', we have

$$\sqrt[3]{-n} = -\sqrt[3]{n}$$

- For any two integers a and b we have

  i. $\sqrt[3]{ab} = \sqrt[3]{a} \times \sqrt[3]{b}$

  ii. $\sqrt[3]{\frac{a}{b}} = \frac{\sqrt[3]{a}}{\sqrt[3]{b}}, b \neq 0$

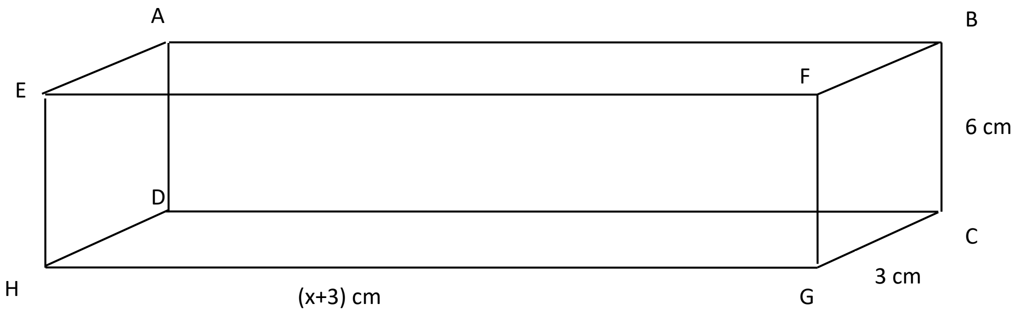
QUESTIONS

1. If $x = \sqrt[3]{\frac{10}{0.27}}$, find $x + \frac{2}{3}$.
2. Find the value of $\sqrt[3]{\frac{1024}{54}}$.
3. Simplify: $\sqrt[3]{4\frac{12}{125}}$.
4. Find the smallest natural number other than 1, which is a perfect square as well as perfect cube.
5. Find the maximum number of digits in the cube of 4-digit number.
6. Find the minimum number of digit in the cube of a three-digit number.
7. If $64b = b^4$ then find the value of $b^2 (b \neq 0)$.
8. Evaluate $(0.3)^3 - (0.2)^3$.
9. Write the unit's digit of $\sqrt[3]{216 \times 1728}$
10. If $(216)^x = 36$, then find x.
11. Evaluate $(\frac{3}{5})^3 - (\frac{2}{5})^3$
12. Simplify: $\sqrt[3]{(343 \times 64)}$
13. Simplify: $\sqrt[3]{(-50 \times 40 \times 4)}$
14. Simplify: $3^{31} + 3^{31} + 3^{31}$
15. Simplify: $7^{32} \times 7^{-34} \times 7^4$
16. $9^x + 9^x + 9^x = \frac{1}{243}$, then find x.
17. Evaluate $\sqrt[3]{(2 \times 2 \times 21 \times 7 \times 7 \times 6 \times 3)}$
18. Volume of a cube is 729 cm^3. Then find the area of its face.
19. Evaluate $\sqrt[3]{\left(\frac{0.01}{17.28}\right)}$

20. **Evaluate** $\{50^0 + (10^4)^{\frac{1}{4}}\}^3$

21. **Evaluate** $\{(24^2 + 7^2)^{\frac{1}{2}}\}^3$

22. **The figure shows a cuboid with volume 1800 cm^3. Find the value of x.**



23. **Find the smallest number that can be expressed in two different ways as sum of two different cubes. What is the special name given to such numbers?**

24. **Find the largest negative number which is a perfect cube.**

25. **If** $392 = 2 \times 2 \times 2 \times 7 \times 7$, **28=2**$\times$ 2×7, **and** $81 = 3 \times 3 \times 3 \times 3$

Find the least number by which $392 \times 28 \times 81$ **should be multiplied to get a perfect cube.**

26. **Area of one face of a cube is 121 cm^2. Find the volume of the cube.**

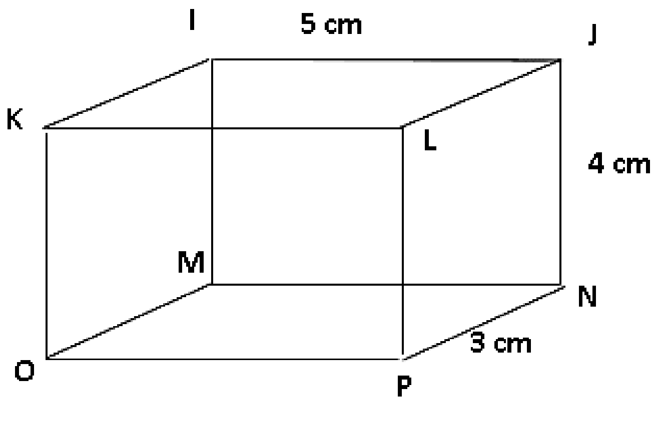
27. **Find the value of** $20^3 - 17^3$ **if** $20^2 + 17^2 + 20 \times 17$**=1029.**

28. **Find the value of** $13^3 + 17^3$ **if** $13^2 + 17^2 - 13 \times 17$**=237.**

29. **Find the unit digit of** $(5327)^3$

30. **Evaluate** $\sqrt[3]{\frac{40000}{512}} \div \sqrt[3]{\frac{5}{512}}$

31. **Find the number of unit cubes in the given figure.**



32. **How many cubes of edges 4 cm will be obtained on melting a solid of edge 12 cm?**

33. **Find the volume of a cube of edge 12cm.**

34. **Find the cube root of 46656.**

35. **The volume of a cube is 9261000 m^3. Find the edge of the cube.**

36. **Find the cube root of (-1728)×125.**

37. **Find the number of thousand in $24 \times 2^4 \times 5^4$.**

38. **Find the number of hundreds in $14 \times 2^4 \times 5^2$.**

39. **Two cubes have their volumes in the ratio 1:8. If the volume of smaller cube is 125 cubic cm. Find the side of another cube.**

40. **Simplify** $\sqrt[3]{5\frac{104}{125}}$

41. **Evaluate** $10^3 - 9^3$

42. **Evaluate** $\sqrt[3]{15624 + \sqrt[3]{0.8 + \sqrt[3]{0.008}}}$

43. **How many consecutive odd numbers will be needed to obtain the sum as 5^3.**

44. **Find x if** $7^{2x-1} = 343.$

45. **Evaluate :**$[(12^2 + 16^2)^{\frac{1}{2}}]^3$

ANSWERS

Question No.	Answer	Question No.	Answer
1.	4	23.	1729, Ramanujan Hardy Numbers
2.	$2\frac{2}{3}$	24.	-1
3.	$1\frac{3}{5}$	25.	18
4.	64	26.	1331 cubic cm
5.	12	27.	3087
6.	7	28.	7110
7.	16	29.	3
8.	0.019	30.	20
9.	2	31.	60
10.	$\frac{2}{3}$	32.	27
11.	$\frac{19}{125}$	33.	1728 cubic cm
12.	28	34.	36
13.	-20	35.	210m
14.	3^{32}	36.	-60
15.	49	37.	240 thousand
16.	-3	38.	56 hundred
17.	42	39.	10 cm
18.	81 square cm	40.	$1\frac{4}{5}$
19.	$\frac{1}{12}$	41.	271
20.	1331	42.	25
21.	15625	43.	5
22.	97 cm	44.	2
		45.	8000

Chapter-8

Comparing Quantities

Points to Remember

- Gain and loss are always calculated on the cost price (CP).
- A decimal can be converted into a percent by shifting the decimal two places to the right.
- If $S.P. > C.P.$ (in case of profit)
- $\boxed{Profit = S.P. - C.P.}$
- $\boxed{S.P. = C.P.\left(\frac{100 + profit\,\%}{100}\right)}$
- $\boxed{C.P. = S.P.\left(\frac{100}{100 + profit\,\%}\right)}$
- If $C.P. > S.P.$ (in case of loss)
- $\boxed{Loss = C.P. - S.P.}$
- $\boxed{S.P. = C.P.\left(\frac{100 - loss\,\%}{100}\right)}$
- $\boxed{C.P. = S.P.\left(\frac{100}{100 - loss\,\%}\right)}$
- $Discount = Marked\ Price - Selling\ Price$
- $\boxed{Discount\,\% = \frac{Discount}{\text{Marked Price}} \times 100}$
- If Principal = ₹ P, Rate of Interest = R % per annum, Time = T years

Simple Interest = $\boxed{SI = \frac{P \times R \times T}{100}}$

- Compound Interest, $\boxed{CI = P\left(1 + \frac{R}{100}\right)^T - P}$ and Amount, $\boxed{A = P\left(1 + \frac{R}{100}\right)^T}$

QUESTIONS

1. Find x, if $4, 6, 6, x$ are in proportion.
2. Convert 7:8 into percentage.
3. If $25\%\ of\ 200 = 10\%\ of\ x$, find x.
4. Out of ₹750, I saved 20%. Find my spending.
5. In a gathering $87\frac{1}{2}\%$ people are standing. Find the percentage of people not standing.
6. Express 12.5% as a ratio.
7. Find x, if $x\%\ of\ 24 = 144$.
8. If 25% of a number is 148, find the number.
9. Express 1.234% as a decimal.
10. 105 chocolates are distributed between Pooja and Anupama in the ratio 2:3. How many chocolates will Anupama get?
11. Salma bought a car for ₹50000 and sold it for ₹60000. Find her profit percent.
12. If $x\%\ of\ 150 + 25\%\ of\ x + 25 = 200$, find the value of x.
13. In an examination, a student has to score 40% marks to pass. He gets 65 marks and fails by 15 marks. Find the maximum number of marks.
14. 60% of 30 students are good in mathematics, how many are not good in it?
15. If $42\%\ of\ y = 84$ then find y.
16. Find $12\%\ of$ ₹ 1200.
17. A shopkeeper buys a toy for ₹2500 and sell it for ₹ 3000. Find his gain and gain %.
18. How much is 2% of 300 kilogram?
19. Find $(25\%\ of\ 600) - (20\%\ of\ 450)$.
20. Express 174% as a fraction.
21. Convert $(0.123 + 0.025)$ into percentage.
22. Sonam's present salary is ₹35000. She gets an increment of 10%, find her new salary.
23. Find $3.5\%\ of\ 500$.
24. If 75% of a number is added to 150, the result is the number itself. Find the number.
25. The cost of 6 pens is ₹ 72. Find the cost of 9 such pens.
26. Convert $\frac{14}{25}$ into percentage.

27. Ramesh got 450 marks out of 500. Find his percentage of marks.
28. Find the difference between a paisa and 1% of a rupee.
29. If $40\%\ of\ x + 180 = 564$ then find the value of x.
30. What is the resultant discount which is equal to (50%+20%) discount?
31. Pushpa bought a shirt for ₹ 250, a frock for ₹ 350 and a pair of jeans for ₹650. She paid

₹ 1000 for all. How much discount did she get?
32. Evaluate $90\%\ of$ ₹ 5000 + $80\%\ of$ ₹ 1000 − $25\%\ of$ ₹ 6000.
33. Find the difference between simple interest and compound interest for the sum of ₹ 2000 at the rate of 10% p. a. for 2 years.
34. Find the difference between simple interest and compound interest for the sum of ₹ 25700 at the rate of 10% p.a. for 1 year.
35. What percent is 75 minutes of 2 hours?
36. If an article was sold for ₹ 93, after a discount of ₹ 23.75. Find its marked price.
37. The price of a computer is ₹ 25000. The sales tax charged is 12%. Find the amount that you will have to pay to buy it.
38. The present value of a machine is ₹ 1000. Its value depreciates every year by 10%. What will be its value after 2 years?
39. Find the simple interest on ₹ 7000 for 3 years at the rate of 10% per annum.
40. By selling a chair for ₹ 880, Rohan loses 20%. Find the cost price of the chair.
41. Express $\frac{(0.105+0.195)}{0.15}$ as percent.
42. Find gain or loss in percentage if CP = ₹ 1600 and SP = ₹ 1840.
43. Amisha gets 70 marks in her exams which is 56% of the total marks. Find the maximum marks.
44. Find x, if $25\%\ of\ x + x\%\ of\ 45 + 90 = x$
45. An umbrella is sold at ₹ 375, with a loss of 25%. What is its cost price?
46. Find $x, if\ x : 16 :: 9 : x$
47. Find $15\%\ of\ 300 + 20\%\ of\ 400$
48. Convert 0.875% into fraction.
49. If 20% of 20% of x = 20, then find x.
50. If 40% of a number is added to the number itself, it becomes 560. Find the number.

ANSWERS

Question No.	Answer	Question No.	Answer
1	9	26	56%
2	87.5%	27	90%
3	500	28	0
4	₹ 600	29	960
5	12.5%	30	60%
6	1:8	31	₹ 250
7	600	32	₹ 3800
8	592	33	₹ 20
9	0.01234	34	0
10	63	35	62.5%
11	20%	36	₹ 116.75
12	100	37	₹ 28000
13	200	38	₹ 810
14	12	39	₹ 2100
15	200	40	₹ 1100
16	₹ 144	41	200%
17	Gain = ₹ 500 Gain% = 20%	42	Gain% = 15%
18	6 kg	43	125
19	60	44	300
20	$1\frac{37}{50}$	45	₹ 500
21	14.8%	46	12
22	₹ 38500	47	125
23	17.5	48	$\frac{7}{800}$
24	600	49	500
25	₹ 108	50	400

Chapter-9

Algebraic Expressions and Identities

Points to Remember

Standard Algebraic Identities

- $(a+b)^2 = a^2 + 2ab + b^2$
- $(a-b)^2 = a^2 - 2ab + b^2$
- $(a+b)^2 = (a-b)^2 + 4ab$
- $(a-b)^2 = (a+b)^2 - 4ab$
- $(a+b)(a-b) = a^2 - b^2$
- $(x+a)(x+b) = x^2 + (a+b)x + ab$
- $(x-a)(x+b) = x^2 + (-a+b)x - ab$
- $(x+a)(x-b) = x^2 + (a-b)x - ab$
- $(x-a)(x-b) = x^2 - (a+b)x + ab$
- $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$
- $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$
- $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$
- $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

QUESTIONS

1. **Simplify:** $(2x^2 - 3xy^2)^2$
2. **Simplify:** $(25x^2 - 16y^2) \div (5x + 4y)$
3. **Simplify:** $(3a+2b)(3a-2b) - 5b^2$
4. **Simplify:** $(4x-3y)^2 + 24xy$
5. **Simplify:** $\frac{9x^2+24xy+16y^2}{3x+4y}$
6. **Simplify:** $(x^2 + 5x + 6) \div (x + 2)$
7. **Simplify:** $(6.25p^2 - 2.25q^2) \div (2.5p + 1.5q)$
8. **Simplify:** $(7x+4y)^2 - 49x^2 - 16y^2$
9. **Simplify:** $(x^2 + 10x + 25) \div (x + 5)$

10. **Simplify:** $(a + b)(a^2 + b^2 - ab)$

11. **Simplify:** $(m^2 + mn + n^2)(m - n)$

12. **If $a = 3, b = 4$, then find the value of $(a + b)^2 + ab$**

13. **If $m = -5, n = 7, a = 3, b = 3$, then find the value of $(a - b)^3 + (m + n)^2$**

14. **If $p = 7, q = -5$ then find the value of $(q + p)^2 - qp$**

15. **If $x = 10, y = 17$ then find the value of $(x - y)^2 + (x + y)$**

16. **If $p = 1.5, q = 0.5$ then find the value of $(p + q)^2 - (2)^3$**

17. **If $a = 10, b = -5, c = 2$, then find the value of $(a + b + c)^3$**

18. **If $x = \frac{100}{\sqrt{25}+(1^0 \times 0)}$ then find the value of x^2**

19. **If $a = 101^2 - 100^2$ then find the value of $a - 1$**

20. **If $m = 100^2 - 98^2$ then find the value of $m + 4$**

21. **If $a = 100, b = 98$ then find the value of $(a - b)^2 + (a + b)$**

22. **Simplify:** $(\sqrt{25} - \sqrt{16})(\sqrt{16} - \sqrt{9}) + \sqrt{36} - \sqrt{16}$

23. **Simplify:** $(2a - b)^2 - (a + 2b)^2 + 3b^2 + ab$

24. **Simplify:** $(a + b)^2 + (a - b)^2 - ab$

25. **Simplify:** $(a - b)(a + b) + (a + b)(a - b) + a^2 - b^2$

26. **If $(5)^2 - (4.9)^2 = x$, find the value of $(0.01 \times x)$**

27. **If $(a + b)^2 = 5 + 2\sqrt{6}$, then find the value of a and b.**

28. **Simplify:** $(x + y)^2 - (x - y)^2 + x - y$

29. **What should be subtracted from $(a + b)^2$to make it $(a - b)^2$?**

30. **What should be added in $25x^2 + 16y^2$ to make it $(5x + 4y)^2$?**

31. **$121m^2 - 100n^2$should be divided by which expression to get $11m + 10n$?**

32. **Simplify:** $(2x + 3y)^2 + 24xy$

33. **Simplify:** $(3x - 4y)^2 - 16y^2$

34. **Simplify:** $(2.5m - 0.5n)^2 + 2.5mn + 3.5mn$

35. **What should be subtracted from $(x + y)^2$ to get $x^2 + y^2$?**

36. **The sides of a rectangle are $5x$ units and $7y$ units. Find the area and perimeter of the rectangle.**

37. **Find the value of 61×5.9**

38. **Find the value of 302×298**

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

40. Find the square root of $5 + 2\sqrt{6}$.

41. Find the square root of $14 - 6\sqrt{5}$.

42. If $(53)^2 = (48)^2 + 5x$, then find the value of x.

43. If $a = 0.8$ and $b = 0.5$, then find the value of $a^2 + b^2 + ab$.

44. If $x = 5$ and $b = 3.2$, then find the value of $x^2 + y^2 - xy$.

45. If x= $3 + 2\sqrt{2}$ and $y = 17 + 12\sqrt{2}$, then find the value of $\sqrt{y} - \sqrt{x}$.

ANSWERS

Question No.	Answer	Question No.	Answer
1.	$4x^4 + 9x^2y^4 - 12x^3y^2$	24.	$2a^2 + 2b^2 - ab$
2.	5x-4y	25.	$3a^2 - 3b^2$
3.	$9a^2 - 9b^2$	26.	$x = 0.0099$
4.	$16x^2 + 9y^2$	27.	$a = \sqrt{3}, \quad b = \sqrt{2}$ or $a = \sqrt{2}, \quad b = \sqrt{3}$
5.	$3x + 4y$	28.	$4xy + x - y$
6.	$x + 3$	29.	$4ab$
7.	$2.5p - 1.5q$	30.	$40xy$
8.	$56xy$	31.	$11m - 10n$
9.	$x + 5$	32.	$4x^2 + 9y^2 + 36xy$
10.	$a^3 + b^3$	33.	$9x^2 - 24xy$
11.	$m^3 - n^3$	34.	$6.25m^2 + 0.25n^2 + 3.5mn$
12.	61	35.	$2xy$
13.	4	36.	Area=$35xy$ sq.units, Perimeter=$(10x + 14y)$ units
14.	39	37.	359.9
15.	76	38.	89996
16.	-4	39.	12
17.	343	40.	$\sqrt{3} + \sqrt{2}$
18.	400	41.	$3 - \sqrt{5}$
19.	200	42.	$x = 101$
20.	400	43.	1.29
21.	202	44.	19.24
22.	3	45.	$2 + \sqrt{2}$
23.	$3a^2 - 7ab$		

Chapter-10

Visualising Solid Shapes

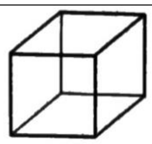
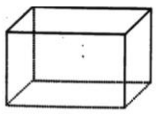
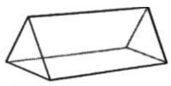
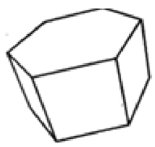
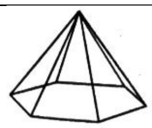
Points to Remember

- **Plane shapes or flat shapes having two measurements are called two dimensional shapes (2D). e.g: triangles, circles, squares, rectangles etc.**
- **Solid shapes having three measurements are called three dimensional (3D) shapes. for example: cube, cuboid, sphere, cone, cylinder, prism, pyramid etc.**
- **3D objects have different views from different positions.**
- **Distances on the map are proportional to the actual distance on the ground. This is called scaling.**
- **Maps involve a scale which is fixed for a particular map. For example: 1cm = 1 km.**
- **A polygon is a plane figure made of line segments, it is a 2D figure.). For example: triangle, square etc.**
- **A polyhedron (Plural-Polyhedra) is a solid (3D shape) with flat polygonal faces. Examples of Polyhedra are cube, cuboid, prism and pyramid.**
- **Sphere, cone and cylinder are not polyhedral as they don't have flat polygonal faces.**
- **A net for a 3-D figure is a sort of skeleton-outline in 2-D dimension which when folded, results in three dimensional figure.**
- **Prism: A polyhedron whose base and top are congruent polygons and other faces are parallelograms.**
- **Pyramid: a polyhedron whose base is a polygon and whose lateral faces are triangles with a common vertex.**
- **In general, the number of faces, vertices and edges of prisms and pyramids are given as Euler's formula for a polyhedron is: F+V-E=2**
  Where 'F' stands for number of faces,
  'V' stands for number of vertices,
  'E' stands for number of edges.

- **In general, the number of faces, vertices and edges of prisms and pyramids are given as**

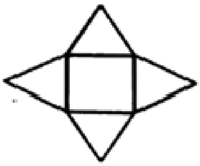
Polyhedron	**Faces**	**Vertices**	**Edges**
Prism	**n+2**	**2n**	**3n**
Pyramid	**n+1**	**n+1**	**2n**

Where 'n' is the number of sides of the base (Prism/Pyramid)

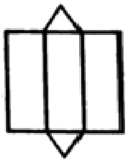
S.No:	**Shape**	**Name**	**Faces (F)**	**Vertices (V)**	**Edges (E)**
1		**Prism with a square base (Cube)**	**6**	**8**	**12**
2		**Prism with a rectangular base (Cuboid)**	**6**	**8**	**12**
3		**Prism with a triangular base**	**5**	**6**	**9**
4		**Prism with a hexagonal base**	**8**	**12**	**18**
5		**Pyramid with a hexagonal base**	**7**	**7**	**12**
6		**Pyramid with a square base**	**5**	**5**	**8**
7		**Pyramid with a triangular base (Tetrahedron)**	**4**	**4**	**6**

QUESTIONS

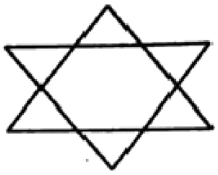
Identify the polyhedron whose nets are given below:



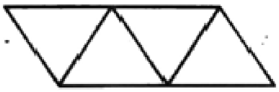
1. ____________



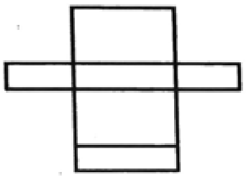
2. _______________



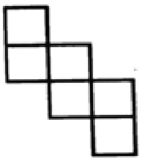
3. _______________



4. _______________



5. _________________

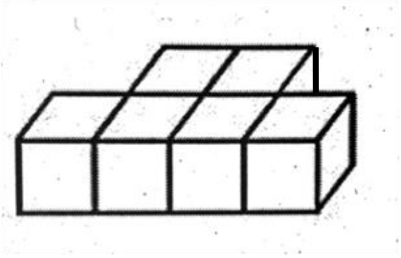


6. ___________________

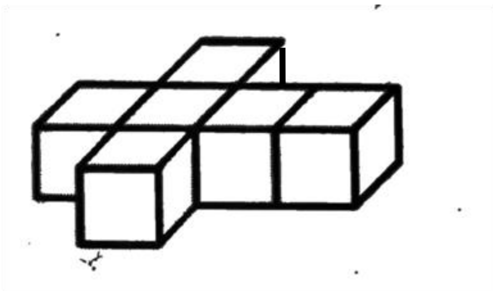
7. **Following are the combinations of a polyhedron. Find the missing part to make the combination true for a polyhedron.**
   i. **4 faces, 4 vertices, ______ edges.**
   ii. **_______ faces, 20 vertices, 30 edges.**
   iii. **20 faces, _______ vertices, 54 edges.**
   iv. **14 faces, 24 vertices, _______ edges.**
8. **What is the other name for a triangular pyramid having congruent equilateral triangles as faces?**
9. **What is the other name of a quadrilateral prism square base?**
10. **What is the special name of a polyhedron whose base is a polygon and whose lateral faces are triangles with a common vertex?**

Find the number of squares visible in the top view, the side view and the front view of the following solids:

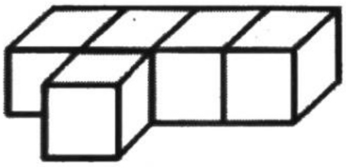
11.



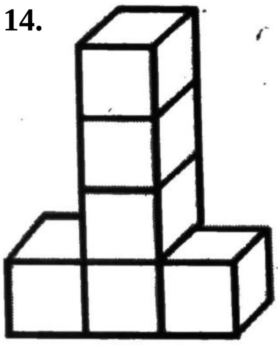
12.



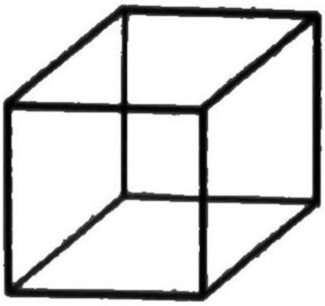
13.



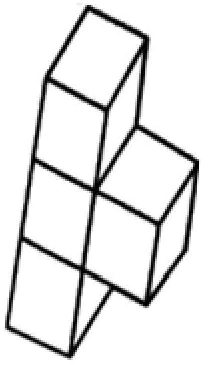
14.



15.



16.



17. Find the number of faces in a prism with a pentagonal base.

18. Find the number of edges in a pyramid with a pentagonal base.

19. **Find the number of vertices in a triangular prism.**

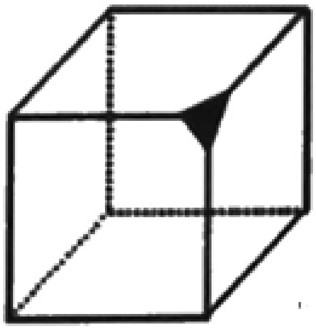
20. **Find the number of faces in a pyramid with pentagonal base.**

21. **Find the number of edges in a prism with a pentagonal base.**

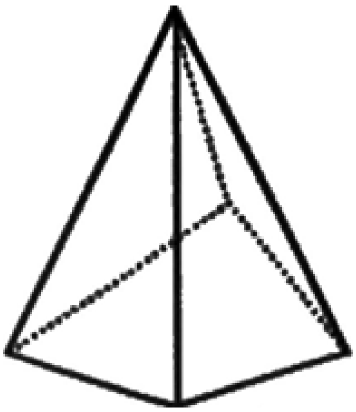
22. **Find the number of edges in a triangular pyramid.**

23. **Find the number of faces in a prism with a square base.**

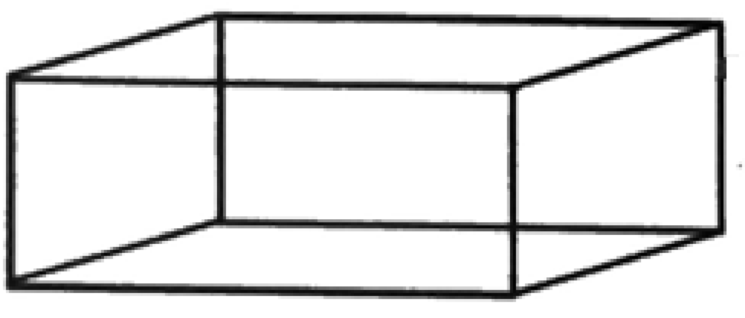
24. **Find the number of faces in the given figure.**



25. **Find the number of edges in the given figure.**



26. **Find the number of vertices in the given figure .**



27. **What do we call the polygons forming a polyhedron?**

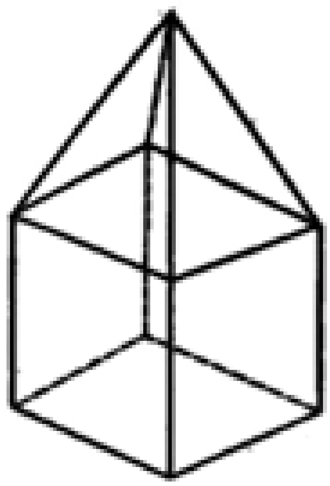
28. **Find the odd one out:**

Matchbox, Chalk box, Book, Coin, Sugar cubes, Dice

29. **Find the odd one out:**

Ball, Sun, Earth, Circle, Moon, football, Bangle

30. **Find the number of edges in the given figure .**



31. **Which 3-D shape is obtained on making a pile of 50 coins of the same size?**

32. **What is the minimum number of faces that a polyhedron can have?**

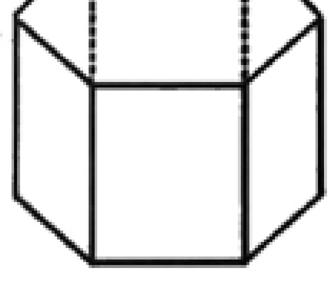
33. **A polyhedron has 6 edges and 4 faces. Find the number of its vertices.**

34. **A polyhedron has 7 vertices and 12 edges. Find the number of its faces.**

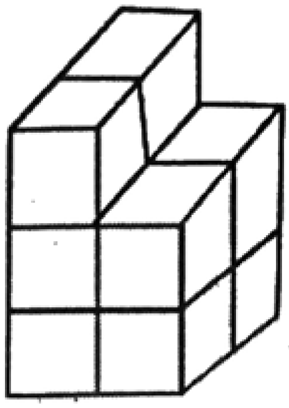
35. **Find the number of cuboids measuring 5 cm$\times$3 cm $\times$2 cm required to form a solid cube of edge 30 cm.**

36. **Find the number of unit cubes required to form a solid cuboid measuring 5 unit$\times$4 units $\times$3 units.**

37. **Find the number of edges in the given figure .**



38. **Find the number of cubes required to make the adjacent 3D shape in figure .**



39. **Find the number of edges in a triangular prism.**

40. **Find the number of faces in a pyramid with a triangle as its base.**

ANSWERS

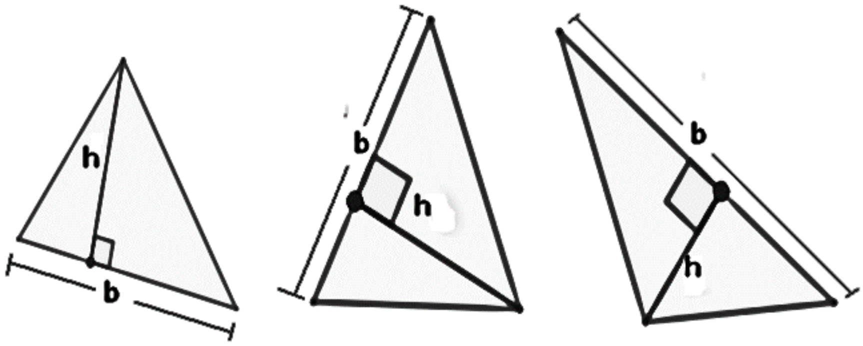
Question No.	Answer	Question No.	Answer
1.	Square pyramid	20.	6
2.	Triangular prism	21.	15
3.	Hexagonal Pyramid	22.	6
4.	Tetrahedron	23.	6
5.	Cuboid	24.	7
6.	Cube	25.	8
7.	i.6	26.	8
	ii.12	27.	Faces of polyhedron
	iii.36	28.	Coin
	iv.36	29.	Circle
8. .	Tetrahedron	30.	16
9.	Cuboid	31.	Right circular cylinder
10.	Pyramid	32.	4
11.	6, 2, 4	33.	4
12.	6, 3, 4	34.	7
13.	5, 2, 4	35	900
14.	3, 4, 6	36.	60
15.	1, 1, 1	37.	18
16.	2, 3, 4	38.	10
17.	7	39.	9
18.	10	40.	4
19.	6		

Chapter-11

Mensuration

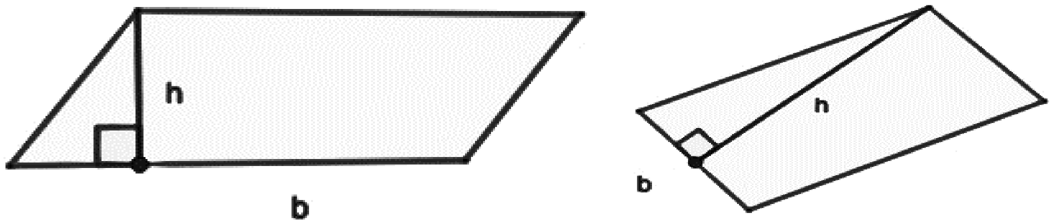
Points to Remember

- **TRIANGLE**:



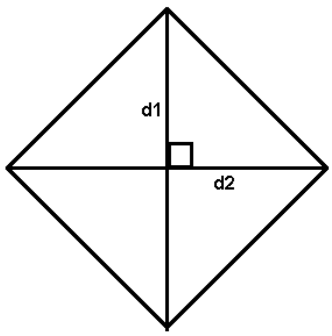
$$\boxed{Area\ of\ a\ Triangle = \frac{1}{2} \times b \times h}$$

- **PARALLELOGRAM**:



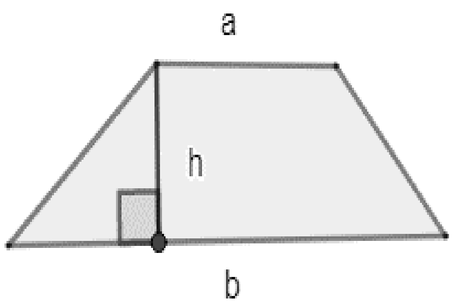
$$\boxed{Area\ of\ a\ Parallelogram = b \times h}$$

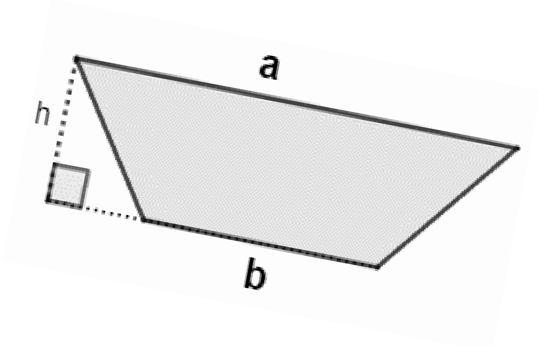
- **RHOMBUS**:



$$\boxed{Area\ of\ a\ Rhombus = \frac{1}{2} \times d_1 \times d_2}$$

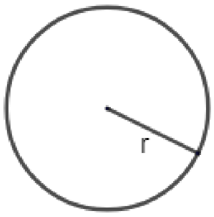
- **TRAPEZIUM**:





$$\boxed{\boldsymbol{Area\ of\ a\ Trapezium = \frac{1}{2} \times (a+b) \times h}}$$

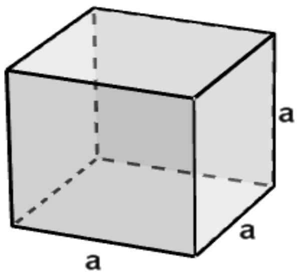
- **CIRCLE**:



$$\boxed{\boldsymbol{Area\ of\ a\ Circle = \pi r^2}}$$

$$\boxed{\boldsymbol{Perimeter\ or\ circumference\ of\ a\ Circle = 2\pi r}}$$

- **CUBE**:



$$\boxed{\boldsymbol{Volume\ of\ a\ cube = a^3}}$$

$$\boxed{\boldsymbol{Lateral\ surface\ area\ of\ a\ cube = 4a^2}}$$

$$\boxed{\boldsymbol{Total\ surface\ area\ of\ a\ cube = 6a^2}}$$

- **CUBOID**:

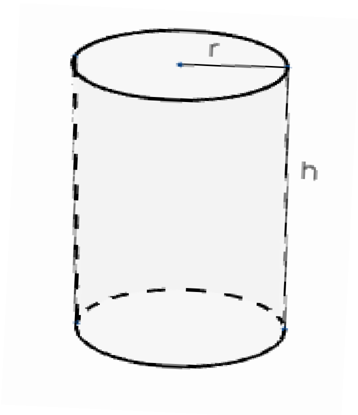
$$\boxed{\boldsymbol{Volume\ of\ a\ cuboid = l \times b \times h}}$$

$$\boxed{\boldsymbol{Lateral\ surface\ area\ of\ a\ cuboid = 2(l + b)h}}$$

$$\boxed{\boldsymbol{Total\ surface\ area\ of\ a\ cuboid = 2(lb + bh + hl)}}$$

$$\boxed{\boldsymbol{Length\ of\ the\ diagonal\ of\ the\ cuboid = \sqrt{l^2 + b^2 + h^2}}}$$

- **CYLINDER**:



$$\boxed{\boldsymbol{Volume\ of\ a\ cylinder = \pi r^2 h}}$$

$$\boxed{\boldsymbol{Lateral\ surface\ area\ of\ a\ cylinder = 2\pi rh}}$$

$$\boxed{\boldsymbol{Total\ surface\ area\ of\ a\ cylinder = 2\pi rh + 2\pi r^2 = 2\pi r(h + r)}}$$

- $\boldsymbol{1\ cm^3 = 1\ ml}$
- $\boldsymbol{1\ litre = 1000\ cm^3}$
- $\boldsymbol{1\ m^3 = 1000\ litre = 1\ kilo\ litre}$

QUESTIONS

Based on the given figures 1 and figure 2, answer the following questions from 1 to 4.

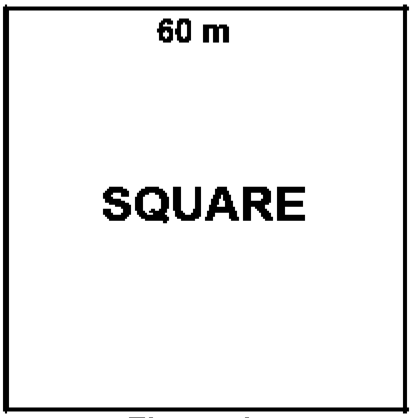


Figure-1

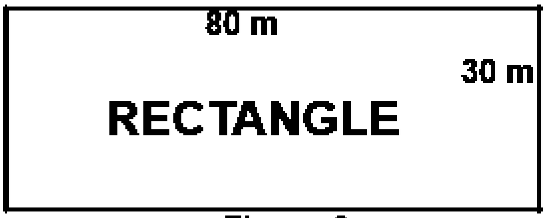
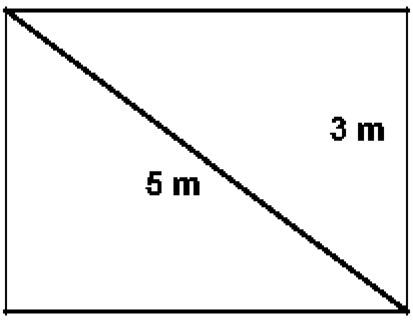


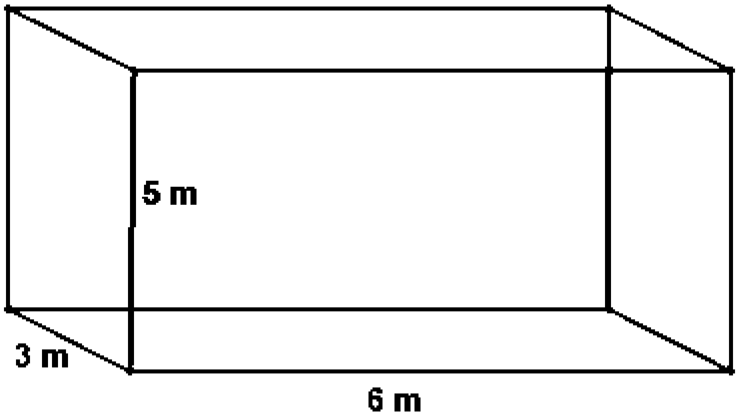
Figure-2

1. **Find the area and perimeter of the square.**
2. **Find the area and perimeter of the rectangle.**
3. **Which figure has less area and by how much?**
4. **Whose perimeter is greater and by how much?**
5. **Find the area of the rhombus whose diagonals are 16cm and 12cm.**
6. **Find the perimeter of the rhombus given in question 5.**
7. **If the radius of the circle is 14 cm, find the diameter of the circle.**
8. **Find the circumference of the circle whose diameter is 28 cm.**
9. **Find the area of the circle of radius 7 cm.**
10. **In the given figure, the breadth of the rectangle is 3 m and the length of diagonal is 5 m. Find the perimeter of the rectangle.**

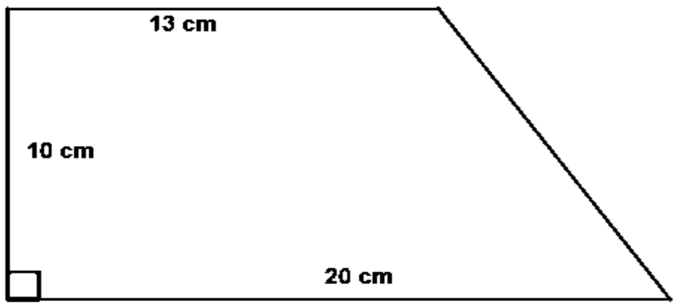


11. **Find the area of the rectangle given in question 10.**
12. **If the side of a cube is 4 cm. Find its lateral surface area.**
13. **Find the total surface area of a cube of side 6 cm.**

14. If the diameters of two circles are 14 cm and 7 cm, find the ratio of their areas.
15. The height of a cylinder is 14 cm and its radius is 7 cm. Find the total surface area of the cylinder.
16. Find the volume of the cylinder given in question 15.
17. Find the side of the cube whose total surface area is 9600 sq. m.
18. Find the volume of the cube given in question 17.
19. Find the total surface area of the cuboid as shown in the figure.

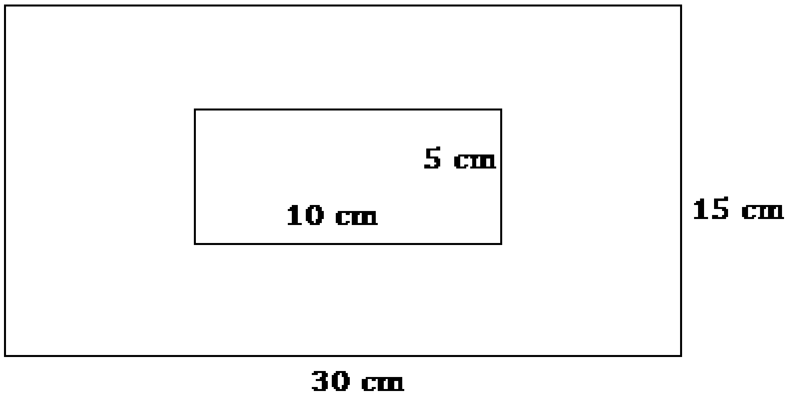


20. Find the volume of the cuboid given in question 19.
21. Find the height of the cuboid whose base area and volume are 800 square meter and 6400 cubic meter respectively.
22. A cuboid is of dimensions $50\ cm \times 40\ cm \times 30\ cm$. How many small cubes each having side of $10\ cm$ can be placed in the given cuboid?
23. A cuboidal tank is 8 m long, 6 m wide and 2 m deep. How many litres of water it can hold?
24. Volume of a cube is 3375 cubic cm. What is the length of the side of the cube?
25. Find the area of the given figure.

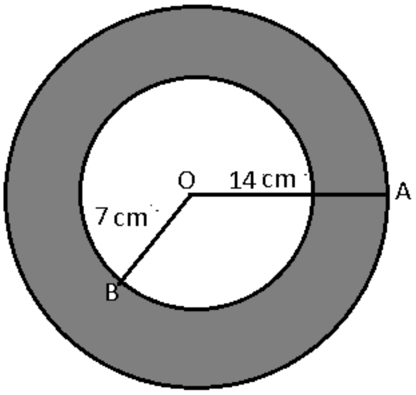


26. **The sides of a room are in the ratio 3: 2: 4. The volume of the room is 24000 cubic meter. Find the length of the longest side of the room.**

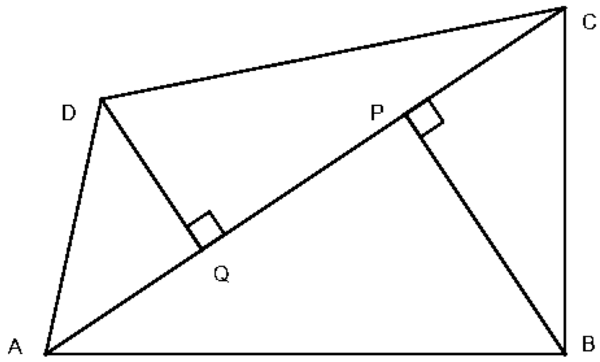
27. **Find the area of shaded portion**



28. **As shown in the given figure, two concentric circles having centre O, OA = 14 cm and OB = 7 cm. Find the area of the shaded portion.**



29. **As shown in the given figure, AC = 15 cm, DQ = 8 cm, BP = 10 cm. Find the area of the figure.**



30. If the radius of circle is doubled, then by how much percent its area will increase?

31. The area of four walls of a room is 48 sq.m. If perimeter of the floor is 16m, find the height of the room.

32. Find the area of a trapezium shaped field whose parallel sides are 132.7m and 67.3m respectively and distance between parallel sides is 23.75m.

33. The capacity of a cylindrical tank, whose base diameter is 4m is 44000 litres. Find its height.

34. If the radius of a cylindrical tank is reduced to half of original radius, then what will be the change in its height if the volume of the cylinder remains same?

35. The area of the circular base of a cylindrical tank is 220sq.cm. Find its volume if its height is 40cm.

ANSWERS

Question No.	Answer	Question No.	Answer
1	Area=3600 sq. meter Perimeter=240 meter	19	126 sq. m
2	Area=2400 sq. meter Perimeter=220 meter	20	90 cubic m
3	Rectangle, 1200 sq. meter	21	8 m
4	Square, 20 meter	22	60
5	96 square centimeter	23	96000 litres
6	40 centimeter	24	15 cm
7	28 centimeter	25	165 sq. cm
8	88 centimeter	26	40 m
9	154 sq. cm	27	400 sq. m
10	14 m	28	462 sq. cm
11	12 sq. m	29	135 sq. cm
12	64 sq. cm	30	300%
13	216 sq. cm	31	3m
14	4:1	32	2375 sq.m
15	924 sq. cm	33	3.5m
16	2156 cubic cm	34	4 times
17	40 m	35	8800 cubic cm
18	64000 cubic m		

Chapter-12

Exponents and Powers

Points to Remember

- **Exponent is used to express very large and very small numbers in standard form.**
- **<u>Laws of exponents:</u>**

If 'a' and 'b' are non zero integers, 'm' and 'n' are the power of 'a' and 'b' respectively

- $a^m \times a^n = a^{m+n}$
- $a^m \div a^n = a^{m-n}$
- $(a^m)^n = a^{mn}$
- $a^m \times b^m = (ab)^m$
- $a^0 = 1, a \neq 0 \; [a^0 = a^{x-x} = \frac{a^x}{a^x} = 1]$
- $\frac{a^m}{b^m} = \left(\frac{a}{b}\right)^m$
- $(-1)^{even\ no.} = 1$
- $(-1)^{odd\ no.} = -1$
- $\sqrt[n]{a} = a^{\frac{1}{n}}$
- **We can use power of 10 to express very large number and very small number in standard form.**
- **Example:-**
  - i. **Speed of light = 30,00,00,000 m/sec or 3.0×10^8 m/sec.**
  - ii. **The average diameter of red blood cell is 0.000007 mm or 7.0×10^{-6} mm**

QUESTIONS

1. **Simplify:**

a. $(4)^3$ **b.** $(3)^4$ **c.** $(5)^4$ **d.** $(7)^3$

2. **Simplify:**

a. $(2)^{-3}$ **b.** $(1)^{-10}$ **c.** $(6)^{-2}$ **d.** $(8)^{-3}$

3. **Simplify and write the answer in positive exponential form**
   a. $(4)^3 \div (4)^2$
   b. $(2^{-3} \times 2^{-2}) \div 2^2$
   c. $(2^{-4} \times 4^1) \div (2)^2$
   d. $(3^1 + 4^{-1} + 5^{-1} + 6^{-1})^0$
4. **Simplify:**
   a. $2^3 \times 5^2 \times 3^2$
   b. $2^2 \times 5^2 \times 7^2$
   c. $(\frac{1}{2})^2 \times (\frac{1}{4})^2 \times (\frac{1}{3})^{-2}$
   d. $(\frac{1}{3})^2 \times (\frac{1}{9})^2 \times 18^2$
5. **Simplify:** $(-5)^{-3} \times (-7)^2$
6. **Simplify:** $[(-6)^2 \times (-5)^3] \div (2)^3$
7. **Find the value of a if ,** $(7)^a = (49)^5$
8. **Write $(125)^{-3}$ in the exponential form as base 5.**
9. **Simplify:** $[(-\frac{2}{3})^2]^3$
10. **Find the value of m if ,** $\left(\frac{5}{7}\right)^m = \frac{125}{343}$
11. **Find the value of $\frac{a}{b}$ if ,** $\left(\frac{2}{5}\right)^3 \times \left(\frac{4}{25}\right)^{-2} = \frac{a}{b}$
12. **Simplify:** $(3)^{-5} \times (5)^{-4} \times 125 \times (3)^2$
13. **Simplify:** $(x^{-1} + y^{-1}) \div (x + y)$
14. **Simplify:** $(2^{-2} \times 3^{-2}) \div 6^{-2}$
15. **Simplify:** $(4^{-1} + 29^0) \div (2)^{-2}$
16. **Find the value of $(2p \times 3^p)$, if $p = 2$.**
17. **If $(a)^{-8} = \frac{1}{(a)^{2x}}$, then find the value of x.**
18. **Simplify:** $3^5 \times 3^{-2} \times 3^4 \times 3^{-10}$

19. **If $5^m \times 125^m = (25)^2$,then find the value of m.**

20. **If $7^n \div 7^{2n} = \frac{1}{7}$, then find the value of n.**

21. **If $(x^3 \times x^{-2})^2 = 121$,then find the value of x.**

22. **Write 0.0081 in the standard form.**

23. **Write 1/10000000 in the standard form.**

24. **Write 4050000 in the standard form.**

25. **If $(5)^{2x} = 625$, then find the value of x.**

26. **Find the value of x if $27^2 \times 27^3 = (3)^x$.**

27. **Find the value of $(a^3 \times b^2) \div ab$ if $a = 2\ and\ b = 3$.**

28. **Simplify:** $(\sqrt{5})^5 \div (\sqrt{5})^3$

29. **Write 9.432×10^{-4}in general form.**

30. **Write 0.00032×10^5in general form.**

31. **If $x = (\frac{3}{2})^3 \times (\frac{2}{3})^4$, them find the value of x^2.**

32. **Simplify:** $(\sqrt{1})^3 + 2^3 + 3^2 + 0^2$.

33. **Find the value of $(\frac{1}{27})^{-2/3}$.**

34. **Find the value of $(125)^{-2/3}$.**

35. **Simplify:** $\sqrt{8} \times (2)^{\frac{1}{2}}$

36. **If $9^x = \frac{1}{27}$, then find the value of x.**

37. **Simplify:** $(32)^{\frac{1}{2}} \times (72)^{\frac{1}{2}}$.

38. **Find the value of $[6^3 + 8^3 + 10^3]^{\frac{1}{3}}$.**

39. **Simplify:** $(x)^{a^2-b^2}.(x)^{b^2-c^2}.(x)^{c^2-a^2}$.

40. **Simplify:** $\frac{(x)^{a+b}.(x)^{b+c}.(x)^{c+a}}{(x)^a.(x)^b.(x)^c}$

41. **Find the value of $2 - \sqrt{3}$ if $\sqrt{3} = 1.732$**

42. **Find the value of $[(1)^1 + (2)^2 + (3)^3]^{\frac{1}{5}}$**

43. **Simplify:** $\sqrt[4]{\sqrt[3]{\sqrt{x}}}$

44. **Simplify:** $\sqrt[4]{\sqrt[3]{x^{36}}}$

45. **If $(\frac{\sqrt{5}}{3})^m = 1 - (\frac{2}{3})^2$, then find the value of m.**

ANSWERS

Question No.	Answer	Question No.	Answer
1.	a. 64 b. 81 c. 625 d. 343	19. 20. 21. 22.	$m = 1$ $n = 1$ $x = 11$ 8.1×10^{-3}
2.	a. $\frac{1}{8}$ b. 1 c. $\frac{1}{36}$ d. $\frac{1}{512}$	23. 24. 25. 26. 27.	1×10^{-7} 4.05×10^{6} $x = 2$ $x = 15$ 12
3.	a. 4 b. $\frac{1}{2^7}$ c. $\frac{1}{2^4}$ d. 1	28. 29. 30. 31.	5 0.0009432 32 $\frac{4}{9}$
4.	a. 1800 b. 4900 c. $\frac{9}{64}$ d. $\frac{4}{9}$	32. 33. 34. 35.	18 9 $\frac{1}{25}$ 4
5.	$-\frac{49}{125}$	36.	$-\frac{3}{2}$
6.	$-\frac{1125}{2}$	37.	48
7.	$a = 10$	38.	12
8.	$(5)^{-9}$	39.	1
9.	$\frac{64}{729}$	40.	$(x)^{a+b+c}$
10.	$m = 3$	41.	0.268
11.	$\frac{5}{2}$	42.	2
12.	$\frac{1}{135}$	43.	$(x)^{\frac{1}{24}}$
13.	$\frac{1}{xy}$	44.	x^3
14.	1	45.	$m = 2$
15.	5		
16.	36		
17.	$x = 4$		
18.	$\frac{1}{27}$		

Chapter-13

Direct and Inverse Proportions

Points to Remember

- **In direct proportion, two quantities x and y increase or decrease together, the ratio of their corresponding values remains constant.**

i.e. $\frac{x_1}{y_1} = \frac{x_2}{y_2} = k$

Or $\frac{x_1}{x_2} = \frac{y_1}{y_2} = k$**, where** k **is a positive number.**

e.g. Ramesh covers a distance of 4km in 2 hours and with same speed he can cover 8 km in 4 hours or we can say when time is increased, distance also increases so it is a case of direct proportion.

- **In inverse proportion, increase in a quantity x, causes a proportional decrease in quantity y and vice versa, the product of their corresponding values remains constant.**

i.e. $x_1 y_1 = x_2 y_2 = k$

Or $\frac{x_1}{x_2} = \frac{y_2}{y_1} = k$**, where** k **is a positive number.**

e.g. Four men complete a construction work in 10 days and 5 men complete the same work in 8 days. When we increase the number of workers, the number of days to complete same work decreases so it is a case of inverse proportion.

QUESTIONS

1. **'x' and 'y' are directly proportional to each other. If** $x_1 = 20, y_1 = 8, x_2 = 5$ **then find** y_2.
2. **A person can build a wall in 10 days. What fraction of the wall will be completed in 2 days?**
3. **A lady covers a distance of 75 m in 60 steps. What distance will she cover in 320 steps?**
4. **It takes 2 hours for 6 pipes to fill a tank. How much time will be needed to fill 10 such tanks if 12 pipes are used?**
5. **A train is moving at 150 kilometer/hour. How far will it go in 20 minutes?**
6. **The scale of a map is 1:200000. What is the actual distance of 5 cm on the map?**

7. **Four pipes can fill a tank in 1 hour 20 minutes. How long will it take to fill the tank if 8 pipes are used?**
8. **If 15 tailors can stitch a dress in 24 days, how long will 9 tailors take to stitch the same dress?**
9. **Bus is travelling at an average speed of 55 km/ hour. How much distance would it cover in 12 minutes?**
10. **20 women can whitewash a building in 26 days. In how many days can 52 women whitewash the same building?**
11. **72 chocolates are packed in 8 boxes of same size. How many boxes are required for 360 chocolates?**
12. **6 men can construct a wall in 5 days. If 10 men are employed, find the number of days in which the similar wall can be constructed?**
13. **A carpenter prepares 36 tables in 8 days. In how many days would he prepare 27 such tables?**
14. **If 560 notebooks cost ₹ 3920, find the cost of 6 dozen notebooks.**
15. **10 women can do a job in 20 days. In how many days can 20 women do the same job?**
16. **What will happen to the area of a square if the length of each side is doubled?**
17. **A scooter travels 44 kilometer on 4 litres of petrol. How far will it go in 13 litres of petrol?**
18. **In a fort, there is food for 240 soldiers that is enough for 10 days. If 40 soldiers left the fort, then for how many days the food will last?**
19. **Nine bags of fertilizers weigh 639 kilograms. What is the weight of 4 bags?**
20. **Ravi takes 40 minutes to reach the school with a speed of 4 km/hr. If he walks with a speed of 5 km/hr., how much time will he now take to reach the school?**
21. **If the cost of 20 m cloth is ₹ 420, how much cloth can be bought for ₹ 105?**
22. **Out of 45 students, 9 are absent. What is the ratio of present students to absent ones?**
23. **The weekly consumption of potatoes in a hostel with 640 students is 160 kilogram. Find the consumption if the number of students become 800.**
24. **If the cost of two dozen pens is ₹ 60, what will be the cost of 60 pens?**
25. **6 taps can fill a water tank in 90 minutes. How many taps can fill the same water tank in 30 minutes?**

26. **If Aman reads 12 pages daily, he can complete a book in 15 days. How many days will it take to complete the book, if he reads 30 pages daily?**

27. **A stock of food grains is enough for 600 students for 10 weeks. How long will the same stock last for 240 students?**
28. **If the length of a rectangle is halved, what change should be made in its breadth so that its area remains the same?**
29. **12 workers can construct a room in 7 hours. How many workers will be needed in all for constructing the same sized room in 2 hours?**
30. **Aman and Abhinav can complete a project in 24 days. Aman alone can do the same task in 36 days. How much time will Abhinav take alone to complete the same project?**
31. **In a library, 189 copies of a certain book require a shelf length of 3.78 meter. How many copies of the same book would occupy shelf length of 0.42 meter?**
32. **Mohan is paid ₹ 2720 on working for eight days. If his total wages during a month is ₹ 6800, for how many days did he work?**
33. **A train running at the speed of 108 kilometer/ hr passes a signal post in 10 seconds. Find the length of the train in meters.**
34. **If 30 stamps occupy an area of 75 cm^2, how much area of paper is required for putting 330 stamps assuming that no area is wasted in between two stamps?**
35. **Geet, Meet and Reet can do a work in 15, 6 and 10 days respectively. All the three together can finish four times of that work in how many days?**
36. **If $2x = 3y = 4z$, then find $x:y:z$.**
37. **If 75 goats can graze a field in 13 days, how many goats will graze the same field in 25 days?**
38. **Kavita can type a given assignment in 1 hour 30 minutes at a speed of 50 words per minute. Her friend Kareem can type the same assignment in 60 minutes. What would be Kareem's typing speed?**
39. **If 40 square metres of a carpet cost ₹ 241.60, find the cost of 50 square metres of carpet.**
40. **Reena, Meena and Teena can complete a job in 10, 12 and 15 days respectively. In how many days will they complete the work together?**

41. **A journey by car takes 45 minutes at 40 kilometer/ hour. How fast must a car go to undertake the same journey in 25 minutes?**
42. **If 30 women can repair a road in 48 days, how long will 18 women take to repair the same road?**
43. **Rekha can drive to Gwalior in eight hours at 60 kilometer per hour. How long will Ravi take to drive to Gwalior if his speed is 40 kilometer per hour?**
44. **The speed of a train 125 m long is 45 kilometer/hr. How much time will it take to pass a platform 1375m long?**
45. **6 monkeys take 6 minutes to eat 6 bananas. How many minutes would 10 monkeys will take to eat 10 bananas if their speed of eating is equal?**
46. **How long will an athlete take to run around a rectangular park measuring $50m \times 40m$,if she runs at a speed of 3 m/sec?**
47. **Two bus drivers start from same place in opposite directions. One goes towards north at 36 kilometer/ hour and other goes towards south at a speed of 40 kilometer/ hour. What time did they to be 190 kilometer apart?**
48. **Satyam has enough money to buy 60 oranges at ₹ 5 per orange. How many oranges can he buy if the price is increased by rupees 1 per orange?**
49. **The cost of 32 packets of Vim each weighing 900 gram is ₹56. What will be the cost of 27 packets if each packet weighs 1 kilogram?**
50. **Abha cycles to her school at an average speed of 15 kilometer per hour. It takes 20 minutes to reach the school in time. At what speed should she cycle if she has to reach 5 minutes earlier?**

ANSWERS

Question No.	Answer	Question No.	Answer
1.	$y_2 = 2$	27.	25 weeks
2.	$1/5$	28.	Breadth should be doubled
3.	400m	29.	42 workers
4.	10 hrs	30.	72 days
5.	50 kilometer	31.	21 copies
6.	10 kilometer	32.	20 days
7.	40 min	33.	300 m
8.	40 days	34.	825 cm^2
9.	11 kilometer	35.	12 days
10.	10 days	36.	6:4:3
11.	40 boxes	37.	39 goats
12.	3 days	38.	75 words/ min
13.	6 days	39.	₹ 302
14.	₹ 504	40.	4 days
15.	10 days	41.	72 kilometer/ hour
16.	Area will become its 4 times	42.	80 days
17.	143 kilometer	43.	12 hours
18.	12 days	44.	2 minutes
19.	284 kilogram	45.	6 minutes
20.	32 minutes	46.	60 seconds/ 1 min
21.	5 meter	47.	$2\frac{1}{2} hrs\ or\ 2\ hr\ 30\ min$
22.	4:1	48.	50 oranges
23.	200 kilogram	49.	₹52.50
24.	₹150	50.	20 kilometer/hr
25.	18 taps		
26.	6 days		

Chapter-14

Factorisation

Points to Remember

- **When we factorize an algebraic expression, we write it as a product of its factors. These factors are either numbers or algebraic variables or algebraic expressions.**
- **We use following methods of factorisation:**
- **Method of common factors**
- **Regrouping method**
- **Factorisation using following identities:**
- $\boxed{a^2 + 2ab + b^2 = (a+b)^2}$
- $\boxed{a^2 - 2ab + b^2 = (a-b)^2}$
- $\boxed{a^2 - b^2 = (a-b)(a+b)}$
- $\boxed{x^2 + (a+b)x + ab = (x+a)(x+b)}$
- **An irreducible factor is a factor which cannot be expressed further as a product of factors (i.e. prime factor for numbers) eg.** $x+2, a+b, x-y$ **etc.**
- **The general relation for division is:**

$$\boxed{Dividend = Divisor \times Quotient + Remainder}$$

- **If Remainder = 0, then divisor is a factor of dividend. Eg.** $\frac{x^2+4x+4}{x+2} = \frac{(x+2)^2}{x+2} = x+2$
- **The degree of a polynomial is the highest power of its variables.e.g. the degree of the polynomial** $x^3 + 2x^2 - 6x + 5$ **is 3**

QUESTIONS:

1. **What is the degree of algebraic expression** $y^3 + 2y + 8$?
2. **If** $a + \frac{1}{a} = \sqrt{3}$**, what is the value of** $a^2 + \frac{1}{a^2}$ **?**
3. **What is the quotient, when we divide** $17xy$ **by** xy ?
4. **If** $4ab$ **is one of the factor of** $(4a^2b + 4ab^2)$**, what is the other factor ?**
5. **What is the HCF of** $25x^2y^2,\ 65x^4y^3, 95x^{10}y^4$ **?**
6. **What is the degree of the quotient of** $\frac{(48x^4 - 12y^4)}{60}$ **?**

7. What is the common factor of $uv + 9u$ and $2(v+3)$?
8. Factorise: $k^6 - 12k^3$
9. Simplify: $\frac{77xyz}{7x}$
10. What should be added to $16x^2 + 9$ to make it $(4\,x - 3)^2$?
11. Which identity will be used to factorise $a^2 + 20b + 100$?
12. Find the value of $(105 \times 105 - 5 \times 5)$
13. What will be the product of $(3x + 2)(3x - 2)$?
14. What will be the quotient on dividing $x^2 - x - 30$ by $(x - 6)$?
15. What will be the common factor of $(u+v)(a + b)$and $w(a+b)$?
16. What should be added to the left hand side to rectify the equation

$$4x + 2 = 4(x+2)$$

17. What is the remainder when divisor is a factor of the dividend?
18. Factorising $100x^4 - 81y^4$ gives $10x^2 - 9y^2$ as one factor, what is the other factor?
19. Simplify: $\frac{x^4-16}{(x^2+4)(x-2)}$
20. Find the value of $(105)^2$
21. Evaluate: 99×101
22. Factorise: $x(y-z) + y(y - z)$
23. If $a = 6, b = 5$, find $a^2 - b^2$
24. What will be the coefficient of u^2 in the quotient of algebraic expression $\frac{3u^3+5u^2+7}{u+2}$
25. What will be the quotient of algebraic expression $\frac{4x^2y+8x^2y^2-16xy^2}{4xy}$?
26. What will be the coefficient of a^4 in the product of $\left(\frac{1}{4}a^2 + b^2\right)\left(a^2 - \frac{3}{2}b^2\right)$?
27. The area of a playground is $(14p^2 - 35p)$ square units and one of its side's measures $7p$ units. What is the measure of the other side?
28. If $(49x^2 + 14x + 35)$ kilograms of sugar is stored in 7 bags in equal quantities, how many kilograms of sugar is there in each bag?
29. What will be the constant term in the product of $(z+3)(z-7)$?
30. Find $a^2 - b^2$ if $a = -3$ and $b = 3$
31. Find $(11 \times 11 - 9 \times 9)$

32. Find k if $k(a^2 - b^2) = a^4 - b^4$

33. Find q if $q(a^2 + b^2) = a^4 - b^4$

34. What are the prime factors of 45 ?

35. Simplify: $6^2 - 2 \times 6 \times 5 + 5^2$

36. What will be the two numbers P and Q such that $P - Q = 2$ and $PQ = 15$?

37. Evaluate: $(2.5)^2 - (1.5)^2$

38. If $2a + 3b = 12$ and $2a - 3b = 20$, find a.

39. Simplify: $\frac{(x+y)^2-(x-y)^2}{xy}$

40. Find $Dividend$ when $Divisor = x + 3$, $Quotient = x + 1$ and $Remainder = 0$

41. Find $Quotient$ if $Dividend = y^2$, $Divisor = y - 5$ and $Remainder = 25$

42. If $x - \frac{1}{x} = 7$, find $x^2 + \frac{1}{x^2}$?

43. If $z + \frac{1}{z} = 11$, find $z^2 + \frac{1}{z^2}$?

44. Express $x^2 + 7x + 12$ as product of two expressions.

45. Simplify: $\frac{(x^2+y^2)}{(x^4-y^4)}$

46. Evaluate: $\frac{9.5\times(3+1.5)}{1+3.5}$

47. Evaluate: $(7.4)^2 - (2.6)^2$

48. What will be the value of $y^3 + y^2 - y + 1$ if $y = 1$?

49. What will be the value of $z^3 - z^2 + z + 2$ if $z = -1$?

50. Evaluate: $\frac{7.2\times2.8}{10-2.8}$

ANSWERS

Question No.	Answer	Question No.	Answer
1	3	26	$\frac{1}{4}$
2	1	27	$(2p-5)\ units$
3	17	28	$(7x^2+2x+5)\ kilograms$
4	$a+b$	29	-21
5	$5x^2y^2$	30	0
6	4	31	40
7	$v+3$	32	a^2+b^2
8	$k^3(k^3-12)$	33	a^2-b^2
9	$11yz$	34	$3, 5$
10	$-24x$	35	1
11	$(a+b)^2=a^2+2ab+b^2$	36	$P=5, Q=3$
12	11000	37	4
13	$9x^2-4$	38	$a=8$
14	$x+5$	39	4
15	$a+b$	40	x^2+4x+3
16	6	41	$y+5$
17	0	42	51
18	$10x^2+9y^2$	43	119
19	$x+2$	44	$(x+3)(x+4)$
20	11025	45	$\frac{1}{x^2-y^2}\ or\ \frac{1}{(x+y)(x-y)}$
21	9999	46	9.5
22	$(x+y)(y-z)$	47	48
23	11	48	2
24	3	49	-1
25	$x+2xy-4y$	50	2.8

Chapter-15

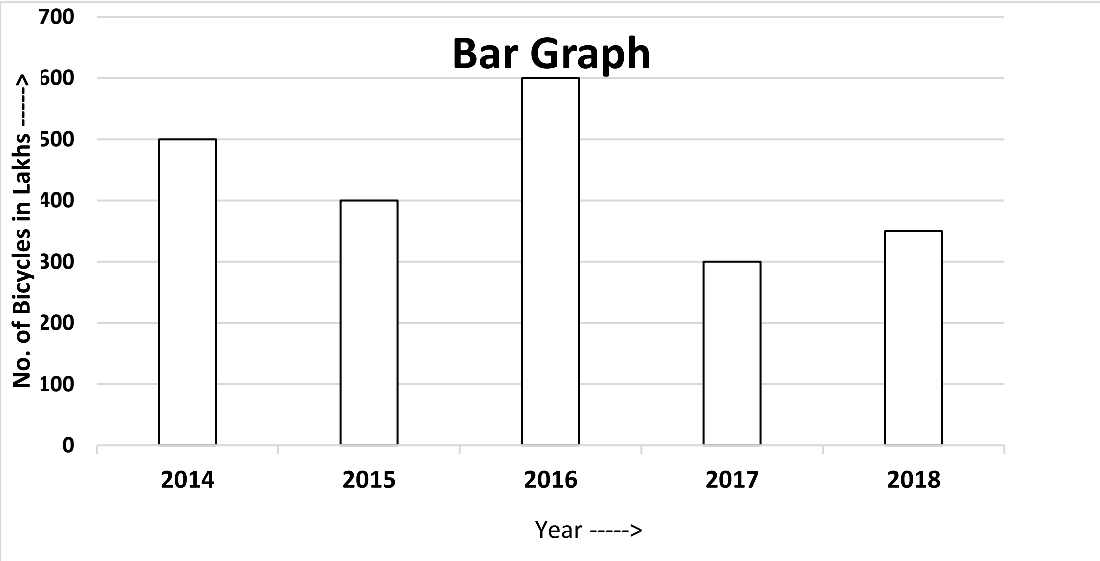
Introduction to Graphs

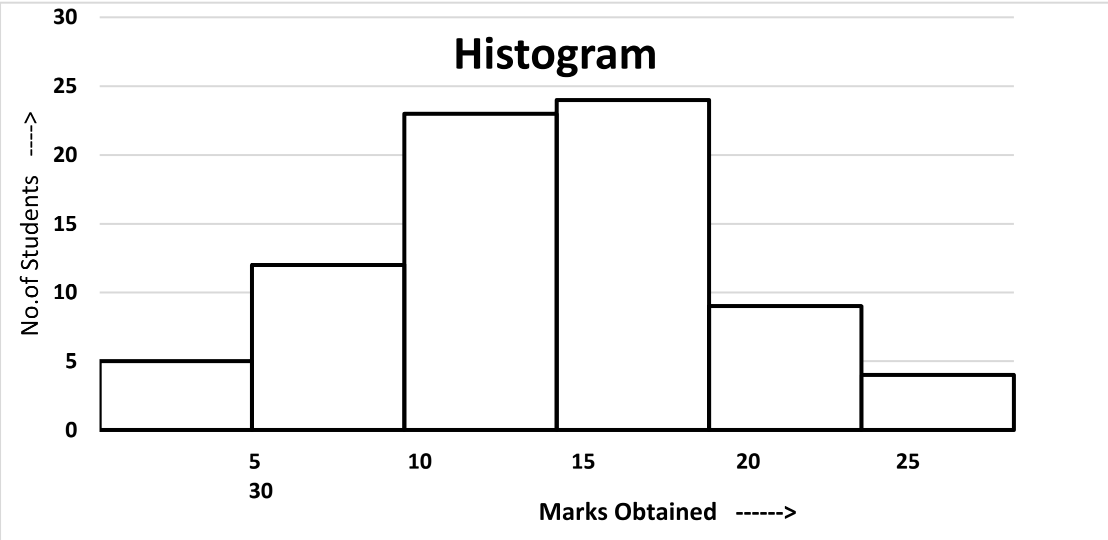
Points to Remember

Following are the different types of graphs:

- **Bar Graph :**

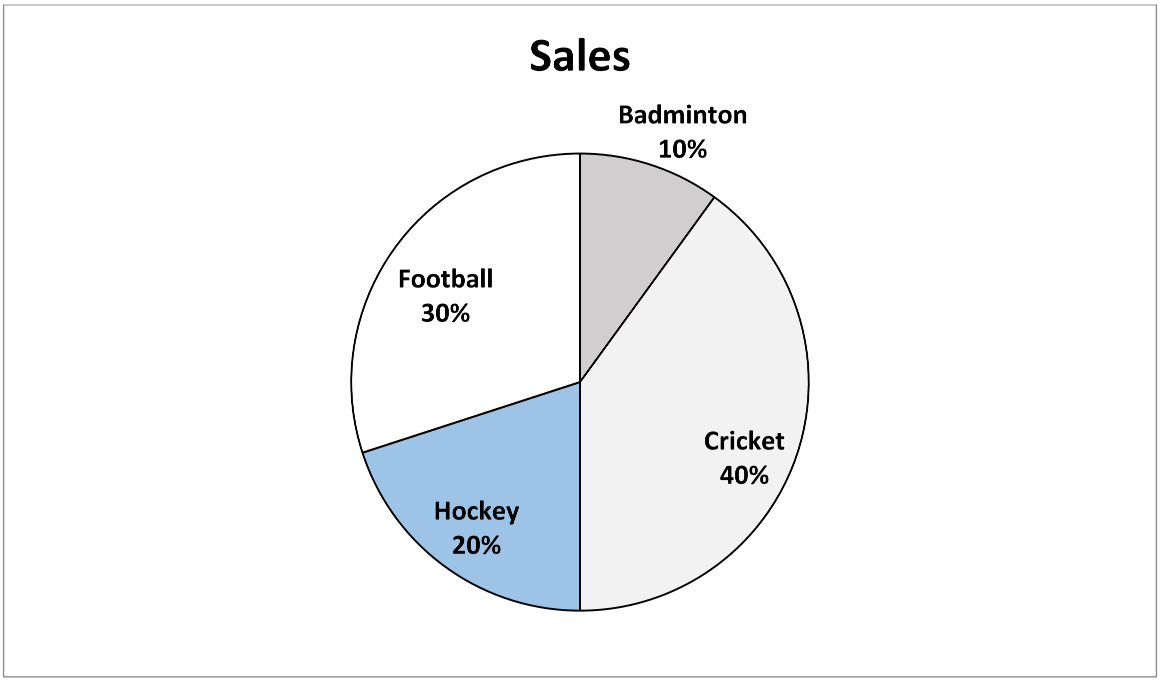
Bar graph is used to show comparison among categories.





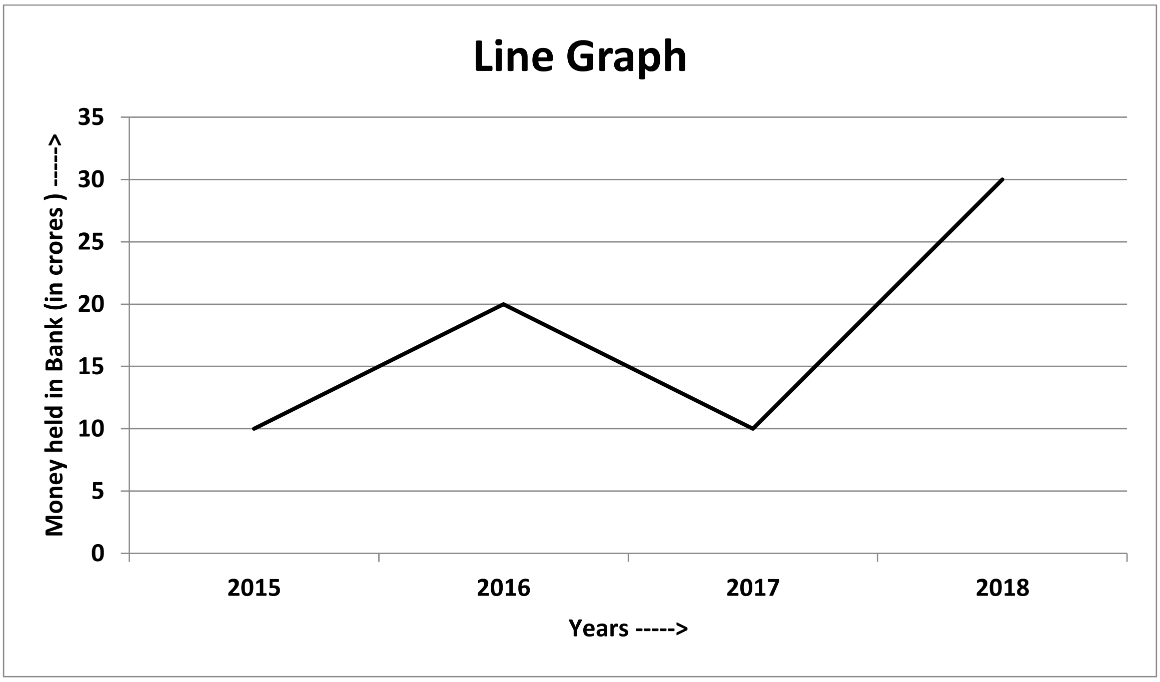
- **Pie Chart**

  Pie chart is used to compare parts of a whole.



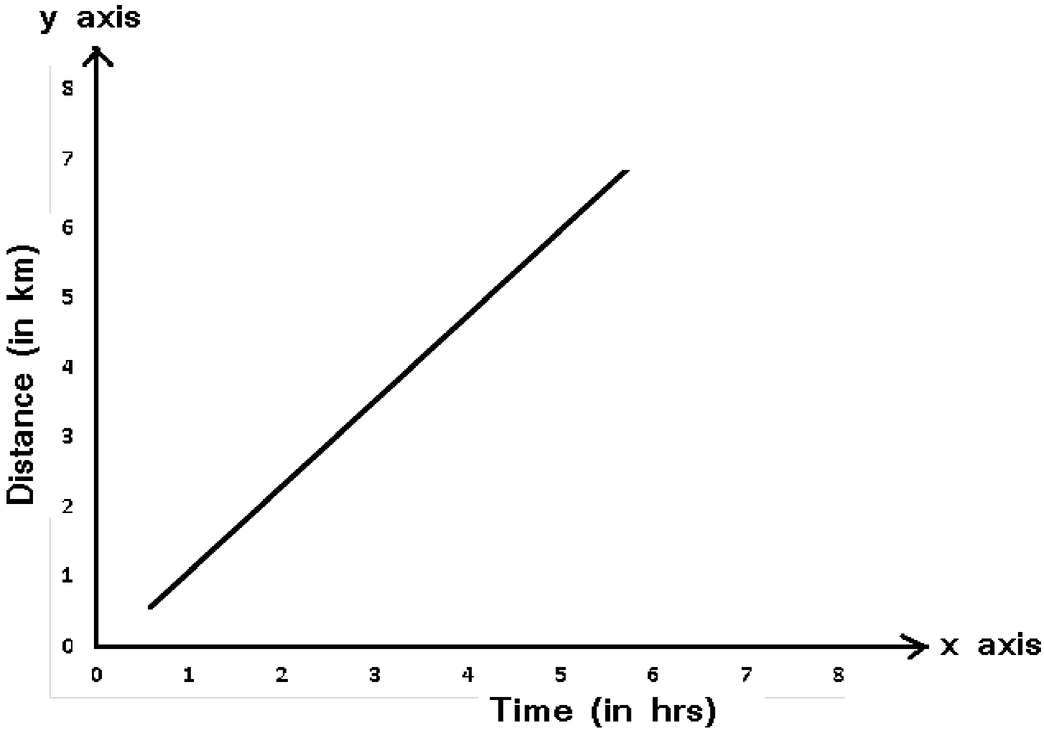
- **Line Graph:**

  A line graph displays the data that changes continuously over a period of time.

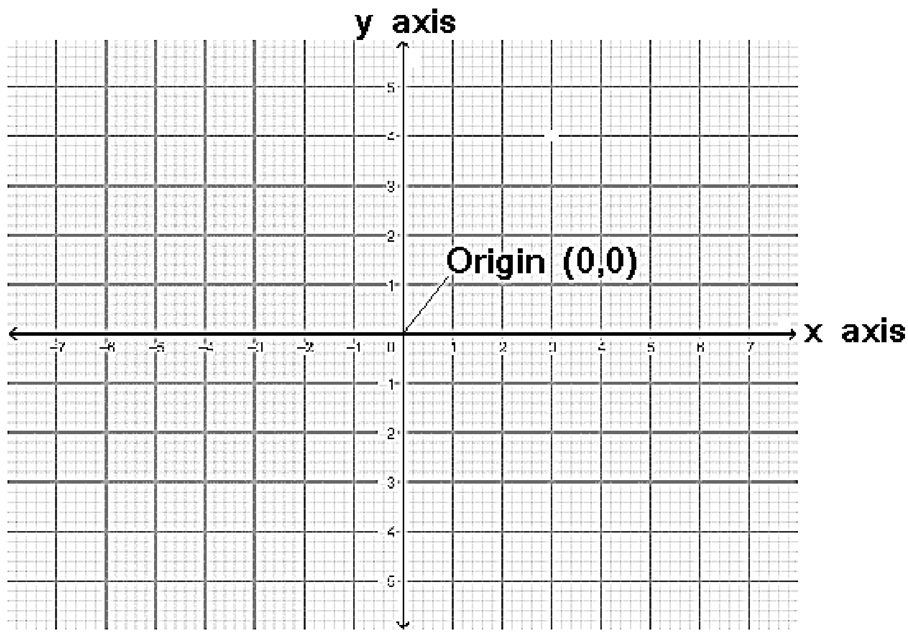


- **Linear Graph :**

  A line graph which is a whole unbroken line is called a linear graph.



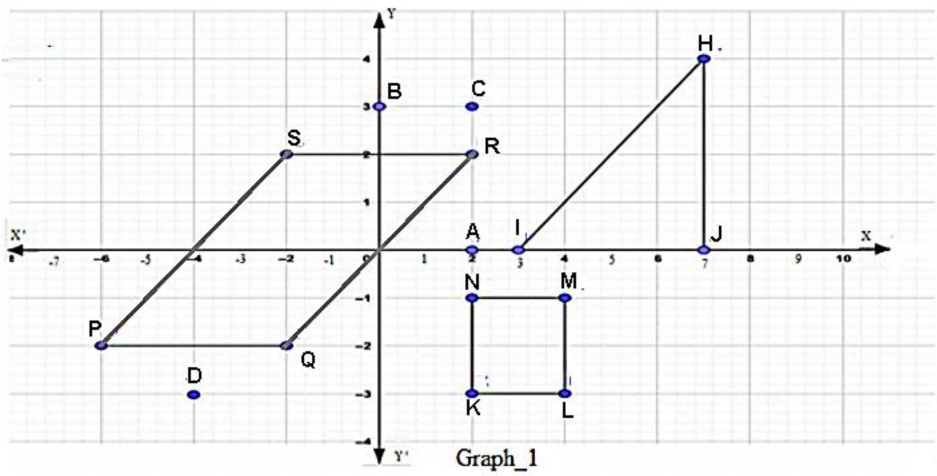
- **The 17th century mathematician Rene Descartes provided a system of locating a point with the help of two measurements, horizontal(x- coordinate) and vertical (y- coordinate). This system is known as Cartesian system of coordinates.**



QUESTIONS

1. Where does the point (8, 0) lie?
2. Where does the point (0, 9) lie?
3. What is abscissa of the point (3, 4)?
4. What is the ordinate of the point (6, 7)?
5. What are the coordinates of the origin?
6. What is the perpendicular distance of the point (7, 8) from x-axis?
7. What is the perpendicular distance of the point (4, 5) from y-axis?
8. What is the shortest distance of the point (6, 8) from origin?
9. What is the shortest distance of the point (7, 0) from origin?
10. What is the shortest distance of the point (0, 8) from origin?
11. What is the shortest distance between the points (14, 3) and (9, 3)?
12. What is the distance of the point (3, 4) from origin?
13. Find the distance between two points P(4, 0) and Q(9, 0).
14. Find the distance between two points A(0, 3) and B(0, -9).
15. What are the coordinates of the points for which x=0 and y=x+2?
16. What are the coordinates of the points for which y=0 and y=x+2?
17. To which axis will the line joining the points having x-coordinate constant will be parallel?
18. To which axis will the line joining the points having y-coordinate constant will be parallel?
19. Name the point where two axes intersect?

For Question no. 20 to 31, see the Graph_1



Graph_1

20. What are the coordinates of points A and B?

21. Which type of the quadrilateral KLMN is?

22. What are the coordinates of K, L, M and N?

23. What type of quadrilateral PQRS is?

24. What are the coordinates of the vertices of quadrilateral PQRS?

25. What is the area of quadrilateral KLMN?

26. What type of $\triangle$HIJ is?

27. What is the length of side IJ of $\triangle$HIJ?

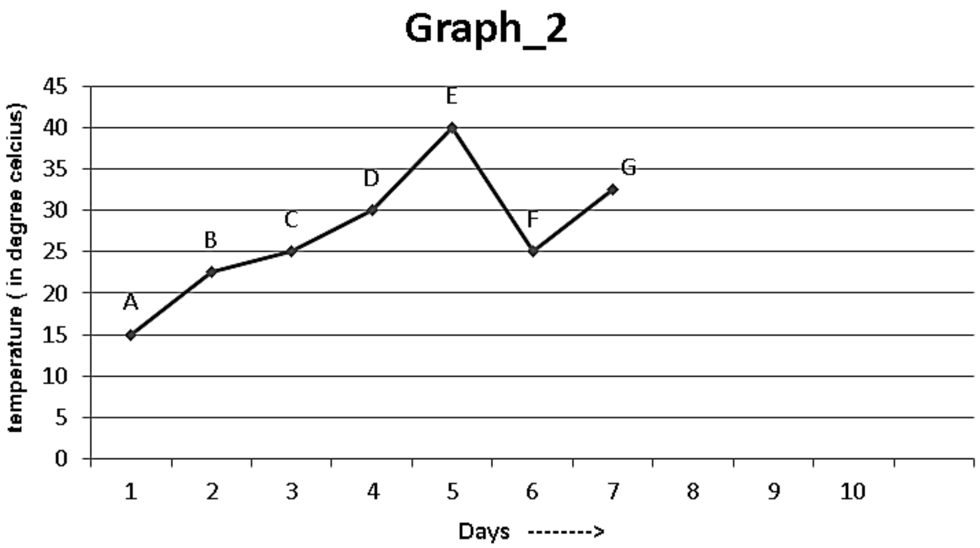
28. What is the area of $\triangle$HIJ?

29. What are the coordinates of point C and D?

30. What is the length of the shorter side of the quadrilateral PQRS?

31. What is the distance between the points C and N?

For question 32 to 40, see the Graph_2



32. For what period of time does the graph show the temperature?

33. The temperature in the beginning of the week was rising or falling?

34. What is the average temperature of fourth and fifth days?

35. What is the difference between the highest and lowest temperature?

36. After which day temperature fell down drastically?

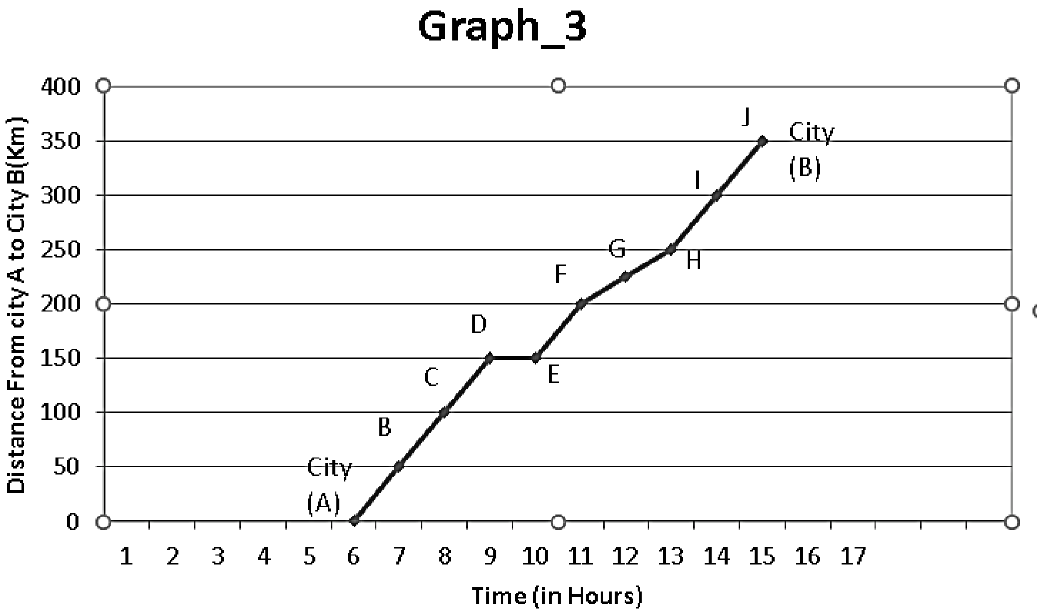
37. Between which days was the change in temperature minimum?

38. Between which days was the change in temperature maximum?

39. What is the temperature on second day?

40. On which days temperature is 25^o Celsius?

For question 41 to 48, see the Graph_3



41. What is represented on x-axis?

42. What is shown on y-axis?

43. From where and when the journey begins?

44. What is the distance covered in first hour?

45. How much distance is covered in first 4 hours?

46. At what time the distance of 200km was covered?

47. At what time the driver take a break?

48. When the journey ends and car reached city B?

49. On joining points x(0, 0), y(3, 0) and z(0, 3),which figure will you get?

50. On joining points A(3, 3), B(4, 4), C(5, 5) and D(6, 6),which figure will you get?

ANSWERS

Question No.	Answer	Question No.	Answer
1.	On X-axis	26.	Isosceles right angled triangle
2.	On Y-axis	27.	4 units
3.	3	28.	8 sq. units
4.	7	29.	C(2, 3) D(-4,-3)
5.	(0, 0)	30.	4 units
6.	8 units	31.	4 units
7.	4 units	32.	One week
8.	10 units	33.	Rising
9.	7 units	34.	35°C
10.	8 units	35.	25°C
11.	5 units	36.	After 5^{th} day
12.	5 units	37.	Between 2^{nd} and 3^{rd} day
13.	5 units	38.	Between 5^{th} and 6^{th} day
14.	12 units	39.	22.5°C
15.	(0, 2)	40.	3^{rd} and 6^{th} day
16.	(-2, 0)	41.	Time (in hours)
17.	y-axis	42.	Distance (in Km)
18.	x-axis	43.	From city A at 6 am.
19.	origin	44.	50 Km
20.	A(2, 0), B(0, 3)	45.	150 Km
21.	Square	46.	In 5 hours, at 11 am.
22.	K(2, -3), L(4, -3), M(4, -1), N(2, -1)	47.	9 am to 10 am
23.	Parallelogram	48.	At 3 pm
24.	P(-6, -2), Q(-2, -2), R(2, 2), S(-2, 2)	49.	Isosceles right angled triangle
25.	4 sq. units	50.	Straight line

Chapter-16

Playing with Numbers

Points to Remember

- A two digit number having ‘a’ as its ten’s digit and ‘b’ as unit’s digit is written as
- 10a+b in general form e.g. $52 = 5\times10 + 2$
- ab in the usual form
- Divisibility rules:
- If the One’s digit of a number is 0,2,4,6, or 8, the number is divisible by 2.
- If sum of digits of a number is divisible by 3 then the number is divisible by 3.
- If the number formed by Ten’s and One’s digit is divisible by 4, the entire number is divisible by 4.
- If the One’s digit of a number is 0 or 5, the number is divisible by 5.
- If the number is divisible by 2 and 3 both then the number is divisible by 6.
- If the number formed by hundred’s, ten’s and one’s digit is divisible by 8, then the number is divisible by 8.
- If sum of digits of a number is divisible by 9 then the number is divisible by 9.
- If the One’s digit of a number is 0, the number is divisible by 10.
- If the difference between the sum of digits of a number at its odd places and the even places is either ‘0’ or divisible by ‘11’, the number is divisible by 11.
  e.g: consider a number 635270

Number	Divisible or Divisibility	Divisibility Rule
2	Yes	Digit at unit place is zero
3	No	Sum of the digits is 23 which is not divisible by 3
4	No	Number formed by last two digits is 70 which is not divisible by 4
5	Yes	Digit at units place is zero
6	No	Number is not divisible by 2 and 3 both

Number	Divisible or not	Divisibility Rule
8	No	Number formed by last four digits is 270 which is not divisible by 8
9	No	Sum of digits is 23 which is not divisible by 9
10	Yes	Digit at units place is zero
11	No	Sum of the digits at odd places is 5 and sum of digits at even places is 18, their difference is 13 which is not a multiple of 11

QUESTIONS:

1. **Find the least possible missing digit of the number 13_64, if it is divisible by 3.**
2. **Find the remainder when number 4191 is divided by 5.**
3. **Find the missing digit of the number 453_892, so that the number is divisible by 11.**
4. **Find the greatest two digit number which when divided 11 gives remainder 2.**
5. **If 7_1 is a multiple of 9, find the missing digit.**
6. **If 14_ is a multiple of 6, find the least possible missing digit.**
7. **Find the quotient when the sum of 81 and 18 is divided by 9.**
8. **Find the quotient when the difference of 184 and 55 is divided by 3.**
9. **If 58_ is a multiple of 11, find the missing digit.**
10. **Find the smallest 3 digit number which is divisible by both 2 and 3.**
11. **Find the greatest 4 digit number which is divisible by both 5 and 10.**
12. **Find the smallest 3 digit number which is divisible by 5.**
13. **What is the greatest 3 digit number which is divisible by 2?**
14. **What is the greatest 4 digit number which is divisible by 9?**
15. **Find the smallest 5 digit number divisible by 3.**
16. **What least number should be added to 2184 so that it becomes divisible by 10?**
17. **Which least number should be subtracted from 43787, so that it becomes divisible by 5?**

18. **What least number should be added to 27841, so that the number is divisible by 3?**
19. **What least number should be subtracted from 4673, so that the number is divisible by 9?**
20. **Find the 3-digit greatest number which leaves a remainder 7 when divided by 9.**
21. **What least number should be added to 74862, so that the number is divisible by 3 and 4 both?**
22. **By which least number 600 be multiplied to get a perfect square number?**
23. **Find the least number which when divided by 3, 9 and 12 leaves a remainder 2 in each case.**
24. **Find the smallest number by which 80 must be multiplied to make it a perfect cube.**
25. **If 63_ is divisible by 15, find the least possible missing digit.**
26. **How many halves are there in $28\frac{1}{2}$?**
27. **Find the least possible missing digit if 81972_6 is divisible by 8.**
28. **Find the number of times a 5 m long rope needs to be cut for dividing it into 20 pieces.**
29. **You are participating in a race. You overtake the third runner, at what position are you?**
30. **Subtract the smallest 2-digit negative integer from the largest 2-digit negative integer.**
31. **Find the remainder when 10084237825 is divided by 4.**
32. **If 62_5 is a multiple of 3, find the least possible missing digit.**
33. **Find the value of x so that 14x32 is a multiple of 11.**
34. **Find the values of y so that 32y4 is a multiple of 4.**
35. **Find the value of x so that 73x56 is divisible by 6.**
36. **For what values of z, the number z536 is divisible by 11?**
37. **Find the smallest number with 4 different digits which is divisible by 11.**
38. **For 5AAA82, which least possible missing digit will make it divisible by 9?**
39. **What should be added to 189573 to make it divisible by both 2 and 3?**
40. **Find the smallest value of x, so that 92x5 is divisible by 5.**
41. **For what value of x the number 92x5x6 is divisible by 9?**
42. **If on dividing *N* by 5 we get a remainder 2, what might be the greatest one's digit of N?**

43. **If 8237AA is a number divisible by 3 and 'A' is a digit, what are the possible values of 'A'?**

44. **What smallest number should be added to 789153 so that it becomes divisible by both 4 and 3?**

For the following questions, find X, Y and/or Z according to the question:

45.
$$\begin{array}{r} XY \\ +1X \\ \hline Y7 \\ \hline \end{array}$$

46.
$$\begin{array}{r} ZY6 \\ \times\ Z \\ \hline 182Z \\ \hline \end{array}$$

47.
$$\begin{array}{r} 12X \\ +6XY \\ \hline X09 \\ \hline \end{array}$$

48.
$$\begin{array}{r} 58X \\ +3Y1 \\ \hline Z09 \\ \hline \end{array}$$

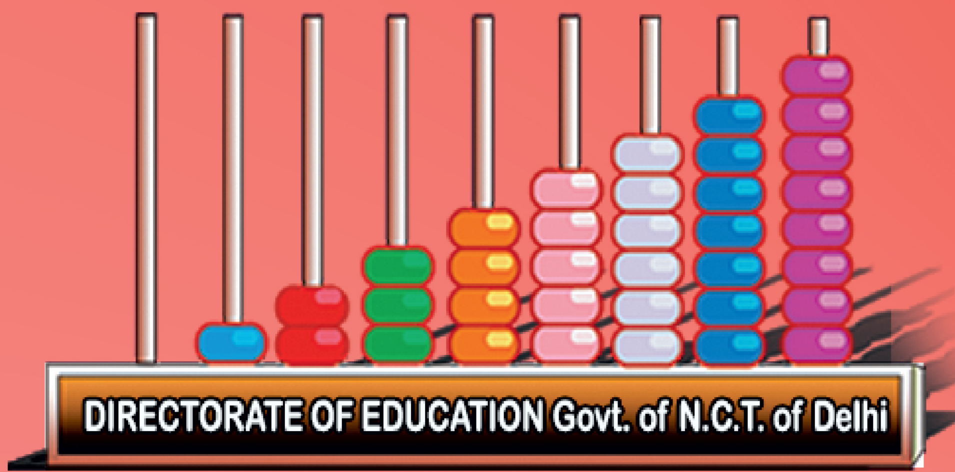
49.
$$\begin{array}{r} 2Y \\ \times\ Y \\ \hline 12Y \\ \hline \end{array}$$

50.
$$\begin{array}{r} 53X \\ +2Y5 \\ \hline Z07 \\ \hline \end{array}$$

ANSWERS

Question No.	Answer	Question No.	Answer
1.	1	26.	57
2.	1	27.	1
3.	3	28.	19 times
4.	90	29.	Third Position
5.	1	30.	89
6.	4	31.	1
7.	11	32.	2
8.	43	33.	4
9.	3	34.	Y=0,2,4,6,8
10.	102	35.	X=0,3,6,9
11.	9990	36.	Z=8
12.	100	37.	1023
13.	998	38.	A=1
14.	9999	39.	3
15.	10002	40.	0
16.	6	41.	7
17.	2	42.	7
18.	2	43.	A=2,5,8
19.	2	44.	3
20.	997	45.	X=3, Y=4
21.	6	46.	Z=4, Y=5
22.	6	47.	X=8, Y=1
23.	38	48.	X=8, Y=2, Z=9
24.	100	49.	Y=5
25.	0	50.	X=2, Y=7, Z=8

मैंटल मैथ्स
MENTAL MATHS



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