

MENTAL MATHS

QUESTION BANK

CLASS 8

Prepared under the Guidance :
**REGIONAL DIRECTOR SOUTH,
DIRECTORATE OF EDUCATION
Govt. of NCT of Delhi**

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INDEX

<i>S. No.</i>	<i>Name</i>	<i>Page No.</i>
1.	Rational Numbers	1
2.	Linear Equations in One Variable	9
3.	Understanding Quadrilaterals	14
4.	Practical Geometry	24
5.	Data Handling	26
6.	Square and Square Roots	36
7.	Cube and Cube Roots	42
8.	Comparing Quantities	48
9.	Algebraic Expression and Identities	54
10.	Visualising Solid Shapes	59
11.	Mensuration	67
12.	Exponents and Powers	77
13.	Direct and Inverse Proportion	84
14.	Factorisation	91
15.	Introduction to Graphs	96
16.	Playing with Numbers	106

CHAPTER 1

RATIONAL NUMBERS

- ☐ Rational numbers are closed under the operations of addition, subtraction and multiplication.
- ☐ The rational number 0 is the additive identity for rational numbers.
- ☐ The rational number 1 is the multiplicative identity for rational number.
- ☐ The additive inverse of rational number $\frac{a}{b}$ is $\frac{-a}{b}$ and vice versa.
- ☐ The multiplicative inverse of the rational number $\frac{a}{b}$ is $\frac{b}{a}$ and vice versa.

QUESTIONS

1. Ramesh's camera was loaded with a new roll of film. The film can take 36 snaps. During the class picnic he took 20 pictures. What fraction of the roll can still be used to take snaps?
2. What fraction is 20 paise of ₹ 6.20?
3. Which is not a rational number?
(a) $\frac{22}{39}$ (b) $\frac{731}{0}$ (c) 288 (d) $8\frac{1}{3}$
4. Find $\frac{5}{12} + \frac{3}{8}$.
5. Find $\frac{-2}{15} + \frac{7}{30}$.
6. What is the additive inverse of $\frac{-4}{9}$?
7. Find x if
$$\frac{13}{11} \times \frac{22}{39} \times x = \frac{1}{9}.$$

8. Find $\frac{-5}{48} + \frac{-11}{24}$.
9. If a and b are rational numbers then which is not always true
- $a + b$ is a rational number
 - $a - b$ is a rational number
 - $a \times b$ is a rational number
 - $a \div b$ is a rational number.
10. Find $\frac{3}{4} \div \frac{-7}{48}$.
11. Complete the following :
- $$\frac{a}{b} + \square = 0$$
12. Find $3\frac{1}{7} + \frac{-5}{14}$.
13. Complete the following :
- $$\square + 0 = -\left(\frac{-5}{8}\right).$$
14. Find out the missing number :
- $$\frac{3}{7} \times \frac{x}{7} \times \frac{7}{45} = \frac{1}{21}.$$
15. What is the value of $\frac{3}{4} \times \frac{2}{5} + \frac{3}{4} \times \frac{3}{5}$?
16. What is the value of $\frac{1}{2} + \frac{1}{2} \div \frac{1}{2}$?
17. Find the multiplicative inverse of $4\frac{2}{3}$.
18. What is the value of $\frac{17}{9} \times \frac{-2}{3} + \frac{17}{9} \times \frac{8}{3} - \frac{34}{9}$?
19. The product of two rational numbers is $\frac{15}{11}$. If one rational number is $\frac{5}{9}$ then find the other.
20. What is the multiplicative inverse of $\frac{-11}{3} \times \frac{-4}{5}$?

21. What is the value of $\frac{3}{8} \times \left(\frac{-5}{7}\right) + \frac{3}{7} + \frac{3}{8} \times \frac{4}{7}$?

22. What is the value of $1 - \frac{1}{2} \times 2$?

23. Find the missing number 'y'

$$\frac{-3}{2} + \frac{7}{5} = y - \frac{3}{2}.$$

24. What is the multiplicative inverse of $-2\frac{2}{7}$?

25. Simplify $\left(\frac{15}{17} + \frac{21}{34}\right) + \frac{9}{34}$.

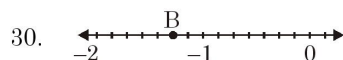
26. What number should be added to $\frac{15}{16}$ so that we get the rational number $\frac{77}{48}$?



Which number is A?

28. Simplify : $\frac{-8}{15} + \frac{4}{5} - 4 + \frac{23}{15} - \frac{9}{5}$.

29. How many ribbons of $\frac{11}{10}$ m can be cut from a ribbon of length $5\frac{1}{2}$ m?



Which number is B?

31. Which number lies between $\frac{1}{3}$ and $\frac{1}{2}$?

(a) $\frac{1}{4}$

(b) $\frac{23}{60}$

(c) $\frac{1}{5}$

(d) $\frac{1}{6}$.

32. Find the missing number x

$$\frac{5}{6} + \frac{8}{3} = \frac{8}{3} - x.$$

33. Complete the following :

$$\square + \left(\frac{-4}{9}\right) = \frac{-4}{9}.$$

34. Simplify : $12\frac{2}{3} \times 2\frac{1}{2} \times \frac{-5}{8} \times \frac{0}{3} \times \frac{8}{5}$.

35. Which number should be subtracted from $\frac{11}{12}$ so that we obtain $\frac{-3}{4}$?

36. Simplify : $\frac{1}{3} + \left(\frac{-3}{4}\right) + \frac{7}{8}$.

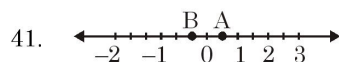
37. What is the reciprocal of $8 \times \frac{3}{2}$?

38. Identify the property of multiplication associated with the following statement.

$$\frac{1}{7} \times \frac{7}{1} = 1.$$

39. What is the value of $\left(\frac{2}{3} + \frac{3}{4}\right) + \frac{1}{4}$?

40. Simplify : $\left(\frac{-6}{7} \times \frac{4}{5}\right) \times \left(\frac{-5}{8}\right)$.



What is $A + B$?

42. What is the multiplicative inverse of $\left(\frac{-4}{7}\right) \times \left(\frac{-7}{4}\right)$?

43. Which rational number has no reciprocal?

44. Which of the following rational number lies between the rational numbers a and b ?

(a) $\frac{a+b}{2}$

(b) $a + b$

(c) $\frac{a+b}{3}$

(d) $\frac{1}{2}a + b$

45. Simplify : $\frac{3}{8} \times \frac{-11}{5} + \frac{3}{8} \times \frac{1}{5} - \frac{11}{4}$.

46. A designer needs $\frac{3}{5}$ th of a metre of cloth to make a fancy dress for children taking part in a dance performance. If 200 children are taking part, how much cloth will the designer need?

47. Fill up the blank boxes of the magic square such that the sum of the numbers taken vertically, horizontally and diagonally remains the same.

	$2\frac{1}{2}$	6
	$4\frac{1}{2}$	
3		

48. Find a rational number between $\frac{1}{2}$ and $\frac{1}{4}$ such that its denominator is 8.
49. Simplify : $\frac{7}{8} \times 1\frac{1}{7} = \square$
50. Simplify : $\frac{2}{9} \times \frac{7}{10} - 1 + \frac{2}{9} \times \frac{1}{5} + \frac{4}{5}$.

ANSWERS

- | | |
|-----------------------------------|----------------------|
| 1. $\frac{4}{9}$ | 2. $\frac{1}{31}$ |
| 3. (b) | 4. $\frac{19}{24}$ |
| 5. $\frac{1}{10}$ | 6. $\frac{4}{9}$ |
| 7. $\frac{1}{6}$ | 8. $\frac{-9}{16}$ |
| 9. (d) | 10. $\frac{-36}{7}$ |
| 11. $\frac{-a}{b}$ | 12. $\frac{39}{14}$ |
| 13. $\frac{5}{8}$ | 14. 5 |
| 15. $\frac{3}{4}$ | 16. $\frac{3}{2}$ |
| 17. $\frac{3}{14}$ | 18. 0 |
| 19. $\frac{27}{11}$ | 20. $+\frac{15}{44}$ |
| 21. $\frac{21}{56} = \frac{3}{8}$ | 22. 0 |
| 23. $\frac{7}{5}$ | 24. $\frac{-7}{16}$ |
| 25. $\frac{30}{17}$ | 26. $\frac{2}{3}$ |
| 27. $\frac{4}{5}$ | 28. -4 |

29. 5

30. $\frac{-9}{7}$

31. (b)

32. $\frac{-5}{6}$

33. 0

34. 0

35. $\frac{5}{3}$

36. $\frac{11}{24}$

37. $\frac{1}{12}$

38. Multiplicative inverse.

39. $\frac{5}{3}$

40. $\frac{3}{7}$

41. $\frac{1}{6}$

42. 1

43. 0

44. (a)

45. $\frac{-14}{4} = \frac{-7}{2}$

46. 120m

47.

5	$2\frac{1}{2}$	6
$5\frac{1}{2}$	$4\frac{1}{2}$	$3\frac{1}{2}$
3	$6\frac{1}{2}$	4

48. $\frac{3}{8}$

49. 1

50. 0

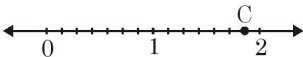
TEST YOUR KNOWLEDGE

1. $\frac{11}{6} + \frac{3}{-4} = \square$

2. $0.3 \times 3\frac{1}{3} = \square$

3. What is the multiplicative inverse of $-1\frac{1}{7}$?

4. Find x if $\frac{5}{8} \div x = \frac{25}{24}$.

5. The sum of two rational numbers is $\frac{9}{13}$. If one of them is $\frac{5}{26}$ then find the other rational number.
6.  which number is C ?
7. Which number lies between $\frac{1}{10}$ and $\frac{1}{100}$?
- (a) $\frac{2}{10}$ (b) $\frac{2}{100}$ (c) $\frac{10}{2}$ (d) $\frac{100}{2}$
8. What is the value of $3 \times \frac{1}{3} + \frac{1}{3} \div \frac{1}{3}$?
9. Simplify : $\left(\frac{-13}{12} + \frac{23}{24} \right) + \frac{11}{24}$.
10. Simplify : $11 \frac{1}{2} \times 2 \frac{1}{2} \times \frac{4}{5}$.

ANSWERS

1. $\frac{13}{12}$

3. $\frac{-7}{8}$

5. $\frac{1}{2}$

7. (b)

9. $\frac{1}{3}$

2. 1.

4. $\frac{3}{5}$

6. $\frac{13}{7}$

8. 2

10. 23.

CHAPTER 2

LINEAR EQUATIONS IN ONE VARIABLE

QUESTIONS

1. Form an equation : 5 added to twice a number is 135.
2. Sum of ages of 5 friends is n years. What is the sum of their ages after 3 years?
3. If sum of two numbers is 35 and one of them is 23. Form an equation for finding another number.
4. A man has ₹ x with him. He gave half to his wife, $\left(\frac{1}{3}\right)^{rd}$ to his son and rest of ₹ 1500 to his daughter. Form an equation in x .
5. If $2x + 9 = 47$. Find x .
6. Find the value of $\frac{x}{2} + \frac{x}{3} + \frac{x}{4}$.
7. If the length of a rectangle is 5 more than its breadth x . What is the perimeter of the rectangle?
8. Form an expression : when twice a number x is added to thrice its reciprocal.
9. How many variables are there in $x^2 + 4x + 1 = 0$?
10. Give a number which is always even in terms of variable x .
11. What type of number is $(2x + 1)$? [odd or even].
12. Form an equation for a multiple of 5 added to 19 is 54.
13. Sum of two consecutive odd numbers is 56, form an equation.
14. Some monkeys were playing in two groups. In one group there were 5 more than $\left(\frac{1}{3}\right)^{rd}$ of total monkeys and in other group $\left(\frac{1}{4}\right)^{th}$ of the total monkeys. Write in the form of an equation.

15. A train is moving at the speed of x km/hour. What distance will it cover in 15 hours if it stops for 1 hour at two stations?
16. 48 sweets are to be distributed among three friends A , B and C in such a way that B gets 5 sweets more than A and C gets 7 sweets more than A . Form an equation.
17. I guessed a number x then added 10 to it. Give the expression for double of it.
18. Find x if $2x + 5 = x + 25$.
19. Simplify the expression $\frac{x}{2} + \frac{x}{3} + \frac{x}{6}$.
20. Fill in the blanks : $\frac{x+5}{x+1} = 1 + \frac{\square}{x+1}$.
21. Complete it : $\frac{x+2}{x-2} = 1 + \frac{\square}{x-2}$.
22. If $x = n + 1$ then find the value of $(2x + 5)$
23. Find $3x - 2$ when $x = y + 1$.
24. If $x = \frac{n}{3} + 2$ then $3x - 1 = \underline{\hspace{2cm}}$.
25. Ratio of three angles of a triangle is $1 : 2 : 3$. Find the angles.
26. Perimeter of the top of a table in the conference hall is 32m. If the length of the table is 3 times its breadth, how long is the table?
27. Preeti has three more dolls than Renu. If there are 11 dolls in all, how many dolls does each have?
28. Find the value of P from the equation

$$x + 2 = \frac{1}{2}(P + 4) \text{ where } x = P - 4.$$
29. Ankit covered half of the distance by metro train, $\left(\frac{1}{3}\right)^{rd}$ of the distance by bus and rest of 6 km by car for moving from Dwarka to South Extension. Find the total distance covered?
30. Sum of two numbers is 30. If one number is twice the other, form an equation for finding the numbers.
31. $3(x + 4) = x + 38$ find x .
32. Ratio of three sides of a triangle are $1 : 3 : 5$ and perimeter of the triangle is 270m. Find the sides.
33. Find the value of x if $\frac{x}{5} + \frac{x}{3} + 7 = x$.

34. If father is twice as old as his son and also 29 years older than his son. What is the age of father?
35. Solve for x : $9x + 36 = 4x + 91$
36. Solve for x : $\frac{-2 + x}{3 + x} = 6$.
37. Simplify : $(x + 7)^2 - (x - 7)^2$
38. Two numbers are in the ratio 4:7. If the sum of numbers is 143, find the numbers.
39. Sides of a rectangle are in the ratio 14:3. If the perimeter of the rectangle is 170 cm, find the length and breadth.
40. Find three consecutive odd numbers whose sum is 147.

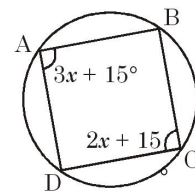
ANSWERS

- | | |
|--|---|
| 1. $2x + 5 = 135$ | 2. $(n + 15)$ years |
| 3. $23 + x = 35$ | 4. $\frac{x}{2} + \frac{x}{3} + 1500 = x$. |
| 5. 19. | 6. $\frac{13x}{12}$. |
| 7. $4x + 10$. | 8. $2x + \frac{3}{x}$. |
| 9. One | 10. $2x$ |
| 11. Odd | 12. $5x + 19 = 54$ |
| 13. $(2x - 1) + (2x + 1) = 56$ | 14. $\frac{x}{3} + 5 + \frac{x}{4} = x$. |
| 15. $14x$ km | 16. $3x + 12 = 48$. |
| 17. $2(x + 10)$ | 18. 20. |
| 19. x | 20. 4 |
| 21. 4 | 22. $2n + 7$. |
| 23. $3y + 1$. | 24. $n + 5$. |
| 25. 30° , 60° , 90° | 26. $12m$ |
| 27. 7, 4 | 28. 8 |
| 29. 36 km | 30. $2x + x = 30$. |
| 31. 13 | 32. 30m, 90m, 150m |
| 33. 15 | 34. 58 years. |

- | | |
|------------------|-----------------|
| 35. 11 | 36. -4 |
| 37. $28x$ | 38. 52, 91 |
| 39. 70 cm, 15 cm | 40. 47, 49, 51. |

TEST YOUR KNOWLEDGE

- If $m = x - 2$ then find x in the equation $3x + 2m = 6$.
- Find x if $ABCD$ is a cyclic quadrilateral.
- If $x = k$ then find the value of k if $(x + 1) + k - 2 = 0$.
- Find x if $\frac{3}{x} + 5 = 1$.
- The perimeter of the square is 44 cm. Find its side.
- Find k if $\frac{13}{39} = \frac{k}{k + 4}$.
- A mother is four times as old as her daughter. If the difference of their ages is 36 years. Find the age of the daughter.
- If $x = 2p - 1$ and $y = p + 7$ and $x + y = 6$ then find p .
- A person starts his job with a monthly salary of ₹ 5000 and earn a fixed increment after every year. If he gets ₹ 6000 after 5 years. Find his annual increment,
- If one is subtracted from a number it becomes $\frac{4}{5}$. Find the initial number.



ANSWERS

1. $x = 2$

2. $x = 30^\circ$

3. $k = \frac{1}{2}$.

4. $x = -\frac{3}{4}$.

5. 11 cm

6. $k = 2$.

7. 12 years

8. $p = 0$

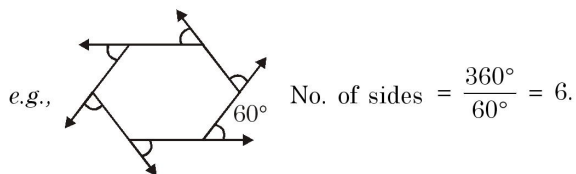
9. ₹ 250

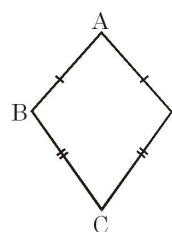
10. $\frac{9}{5}$.

CHAPTER 3

UNDERSTANDING QUADRILATERALS

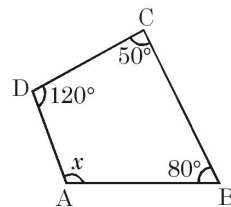
- Sum of all interior angles of a polygon = $(n - 2) \times 180^\circ$ where n is the no. of sides of polygon.
- The sum of the measures of all the exterior angles of any polygon is 360° .
- The number of sides of a polygon = $360^\circ / \text{measure of an exterior angle}$.



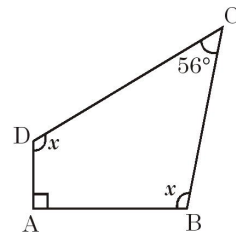
-  $ABCD$ is a kite then $\angle B = \angle D$.

QUESTIONS

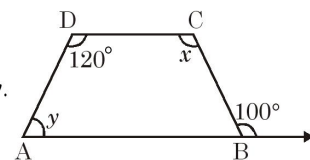
1. $ABCD$ is a quadrilateral. Find x .



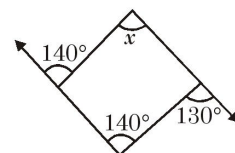
2. $ABCD$ is a quadrilateral. Find x .



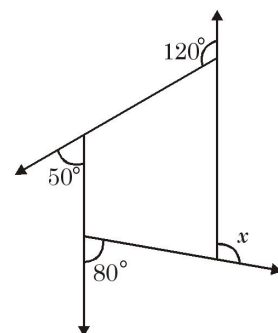
3. $ABCD$ is a quadrilateral in which $AB \parallel CD$. Find x and y .



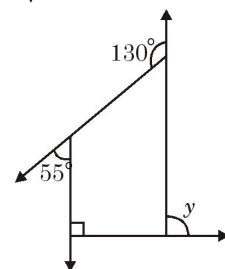
4. Find x .



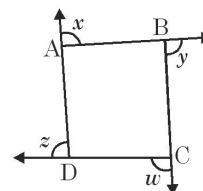
5. In the adjoining figure, Find x .



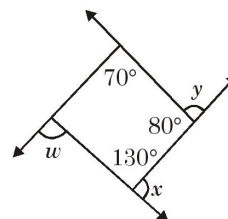
6. Find y .



7. What is $x + y + z + w$?

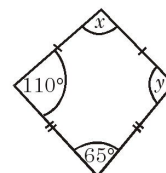


8. What is $x + y + w$?



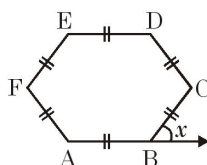
9. Name the polygon whose each exterior angle is 72° .

10. Find x and y .

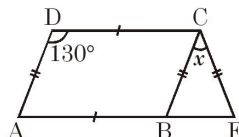


11. What is the measure of each exterior angle of a regular polygon of 10 sides?

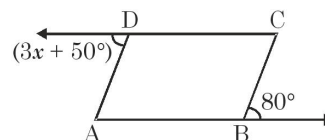
12. $ABCDEF$ is regular hexagon. What is the value of the exterior angle x ?



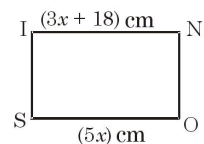
13. How many sides does a regular polygon has if each of its interior angle is 160° ?
14. If the total angle sum of a polygon is 1080° then how many sides does polygon has?
15. In Fig. what is the value of x if $ABCD$ is a parallelogram and $\triangle CBE$ is an isosceles triangle.



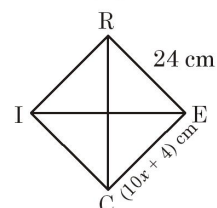
16. $ABCD$ is a parallelogram. What is the value of x ?



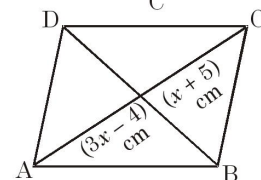
17. $SONI$ is a rectangle. What is the length of $\overline{IN}$?



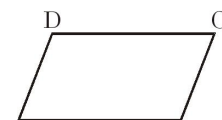
18. What is the value of the variable x in the rhombus $RICE$?



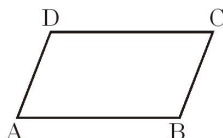
19. $ABCD$ is a parallelogram. What is the value of x ?



20. $ABCD$ is a parallelogram. If $AB = 5$ cm then $CD = ?$

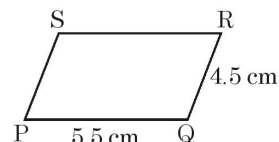


21. $ABCD$ is a parallelogram. The perimeter is 144 cm and $BC = 20$ cm then $AB = ?$

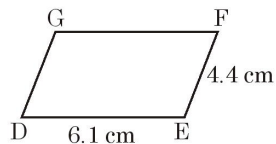


22. The ratio of two adjacent sides of a parallelogram is 5:4. Its perimeter is 18 cm then, what is the length of the adjacent sides?

23. In the given figure $PQRS$ is a $\parallel gm$, Find $PS + SR$.



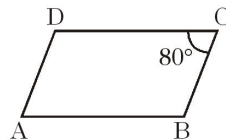
24. $DEFG$ is a parallelogram. Find the perimeter of the given figure.



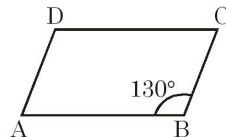
25. Complete the following :

The opposite sides of a parallelogram are _____.

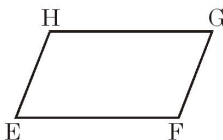
26. $ABCD$ is a parallelogram. If $\angle C = 80^\circ$ then what is $\angle B + \angle D$?



27. $ABCD$ is a parallelogram. If $\angle B = 130^\circ$, then what is $\angle C$?



28. In a parallelogram $\angle F : \angle G = 2 : 3$. What is the degree measure of $\angle F$ and $\angle G$?

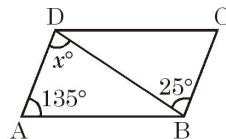


29. In a parallelogram $ABCD$, $\angle B = 2\angle C$. What is the degree measure of $\angle B$ and $\angle C$?

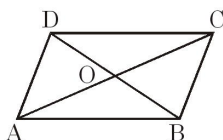
30. Complete the following :

The opposite angles of a parallelogram are _____.

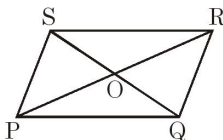
31. In the fig. $ABCD$ is a parallelogram Find x .



32. In a parallelogram $ABCD$ the point of intersection of both diagonals AC and BD is O . If $AC = 16$ cm and $BD = 12$ cm then what is OA and OD ?



33. $PQRS$ is a parallelogram and diagonals PR and SQ bisect at O . If $PO = 3.5$ cm and $OQ = 4.1$ cm. What is the length of diagonals?

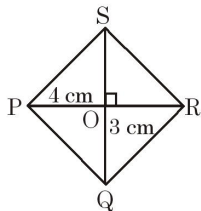


34. Complete the following :

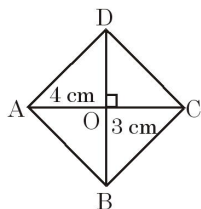
The diagonals of a parallelogram _____ each other.

35. $ABCD$ is a rhombus. If $AB = 4$ cm then what is the perimeter of $ABCD$?

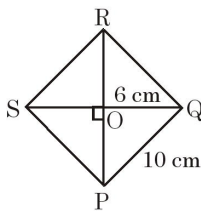
36. $PQRS$ is a rhombus. If $PO = 4$ cm and $OQ = 3$ cm then what is $PR + SQ$?



37. In the figure $ABCD$ is a rhombus in which $AO = 4$ cm and $OB = 3$ cm. What is the length of the side of the rhombus?

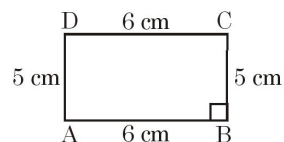


38. $PQRS$ is a rhombus with $PQ = 10$ cm. If $OQ = 6$ cm then what is the length of the diagonal PR ?

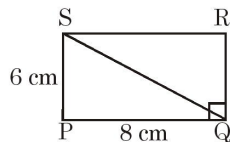


39. In a rhombus $RSTU$ if $\angle R = 120^\circ$, then what is the measure of $\angle S$?

40. Which figure is this?

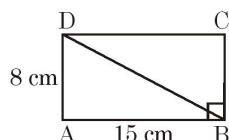


41. In rectangle $PQRS$, $PQ = 8$ cm and $PS = 6$ cm. What is the length of SQ ?

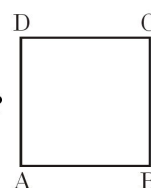


42. What is the length of the rectangle if its breadth is 10 cm and the diagonal is 26 cm?

43. $ABCD$ is a rectangle if $AB = 15$ cm and $AD = 8$ cm then find AC .

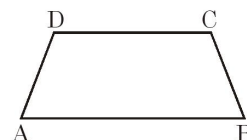


44. $ABCD$ is a square with sides 2.4 cm. What is the perimeter of the square?



45. The perimeter of a square is 196 cm. What is the side of the square?
 46. The side of the square is 16 cm. What is the length of the diagonal?

47. In trapezium $ABCD$, $AB \parallel CD$. What is the sum of $\angle B$ and $\angle C$?



48. Complete the following :

A quadrilateral can be constructed uniquely if 4 sides and one _____ is known.

49. How many triangles are made while constructing a quadrilateral with four sides and a diagonal?
 50. Complete the following :

While constructing a quadrilateral with three sides and two diagonals _____ triangles are made on the same base.

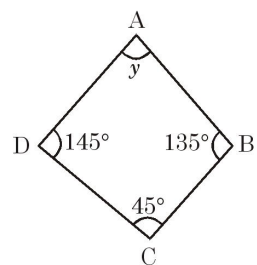
ANSWERS

- | | |
|-------------------------------------|--------------------------------------|
| 1. 110° | 2. 107° |
| 3. $x = 100^\circ$, $y = 60^\circ$ | 4. $x = 130^\circ$ |
| 5. 110° | 6. 85° |
| 7. 360° | 8. 250° |
| 9. Pentagon. | 10. $n = 75^\circ$, $y = 110^\circ$ |
| 11. 36° | 12. 60° |
| 13. 18 | 14. 8 sides |
| 15. 80° | 16. $x = 10^\circ$ |
| 17. 45 cm | 18. $x = 2$ cm |
| 19. $\frac{9}{2}$ cm. | 20. 5 cm |
-

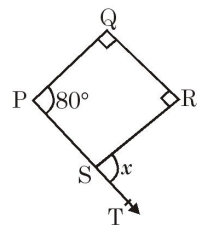
- | | |
|---------------------------|---------------------------|
| 21. 52 cm | 22. 5 cm, 4 cm |
| 23. 10 cm | 24. 21 cm |
| 25. equal. | 26. 200° |
| 27. 50° | 28. $72^\circ, 108^\circ$ |
| 29. $120^\circ, 60^\circ$ | 30. equal |
| 31. 25° | 32. 8 cm, 6 cm |
| 33. 7 cm, 8.2 cm | 34. bisect |
| 35. 16 cm | 36. 14 cm |
| 37. 5 cm | 38. 16 cm |
| 39. 60° | 40. rectangle |
| 41. 10 cm | 42. 24 cm |
| 43. 17 cm | 44. 9.6 cm |
| 45. 49 cm | 46. $16\sqrt{2}$ cm |
| 47. 180° | 48. diagonal or one angle |
| 49. Two | 50. Two. |

TEST YOUR KNOWLEDGE

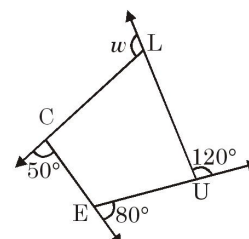
1. $ABCD$ is a quadrilateral. Find y .



2. $PQRS$ is a quadrilateral. Find x .

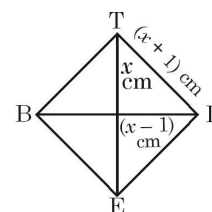


3. $CLUE$ is a quadrilateral, find w .

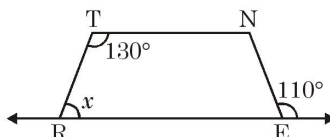


4. Name the polygon whose each exterior angle is 60°
5. What is the sum of all interior angles of a polygon having nine sides?
6. The perimeter of a parallelogram is 52 cm. If the length of one side is 16 cm, what is the length of its adjacent side?

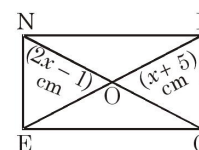
7. $BELT$ is a rhombus. Find the length of the side of the rhombus.



8. $RENT$ is a trapezium in which $TN \parallel RE$. What is the value of x ?



9. $NICE$ is a rectangle. What is the length of the diagonal EI ?



10. $ABCD$ is a square of side 5 cm. What is the length of its diagonal?

ANSWERS

- | | |
|-----------------|--------------------|
| 1. 35° | 2. $x = 80^\circ$ |
| 3. 110° | 4. Hexagon |
| 5. 1260° | 6. 10cm |
| 7. 5 cm | 8. 50° |
| 9. 22 cm | 10. $5\sqrt{2}$ cm |

CHAPTER 4

PRACTICAL GEOMETRY

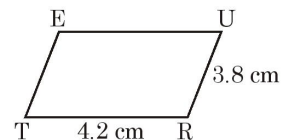
Points to Remember

- Five features can determine a quadrilateral uniquely.
 - ❖ A quadrilateral can be constructed uniquely if
 - Its four sides and one diagonal is given.
 - Its two adjacent sides and three angles are known.
 - Its three sides and two included angles are given.
 - Its other special properties are known (rectangle, square, rhombus, parallelogram).
 - Its three sides and two diagonals are given.

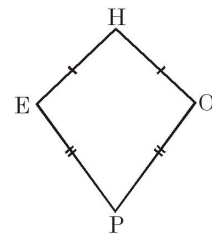
QUESTIONS

1. How many features can determine a quadrilateral uniquely?

2. In the given figure TRUE is a parallelogram find $TE + EU$.

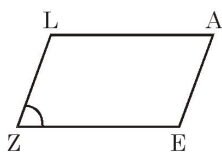


3. How many features can determine a parallelogram uniquely?

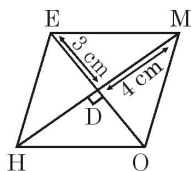


4. In the given figure which angles are equal?

5. In the given figure, $ZEAL$ is a parallelogram. If $\angle Z = 90^\circ$. Name the new shape so obtained.



6. How many features can determine a square?
 7. $HOME$ is a rhombus. If $DM = 4$ cm and $ED = 3$ cm, then what is $HM + OE$?



8. How many features can determine a rhombus?
 9. Which property is used to construct a parallelogram, if its one side and two diagonals are given?
 10. Which property is used to construct a rhombus, if its two diagonals are given?

ANSWERS

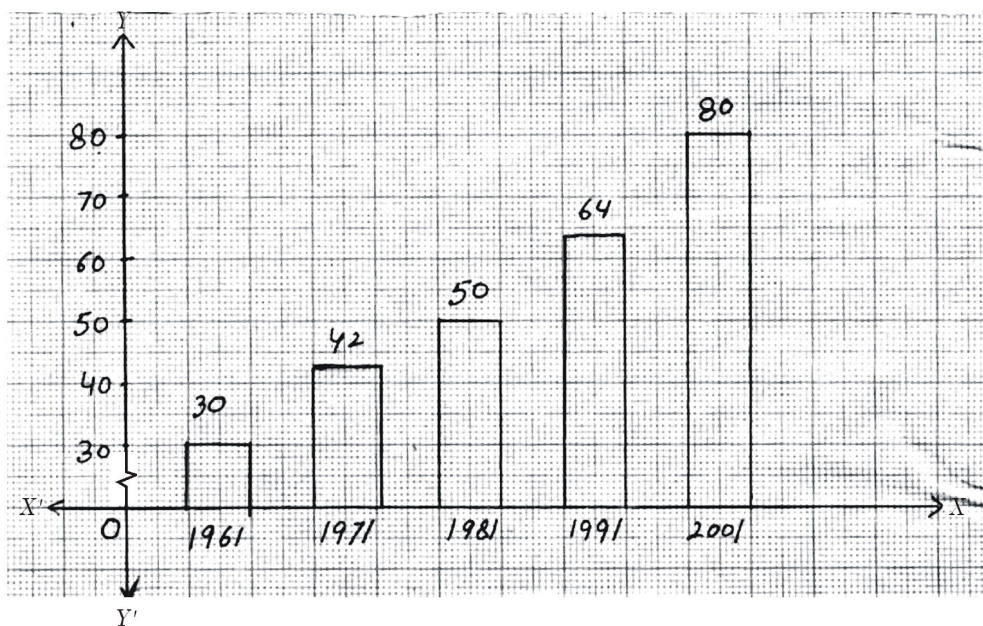
- | | |
|--|------------------------------|
| 1. 5 | 2. 8 cm |
| 3. 3 | 4. $\angle E$ and $\angle O$ |
| 5. Rectangle | 6. 1 |
| 7. 14 cm | 8. 2 |
| 9. Diagonals bisect each other. | |
| 10. Diagonals of a rhombus bisect each other at right angle. | |

CHAPTER 5

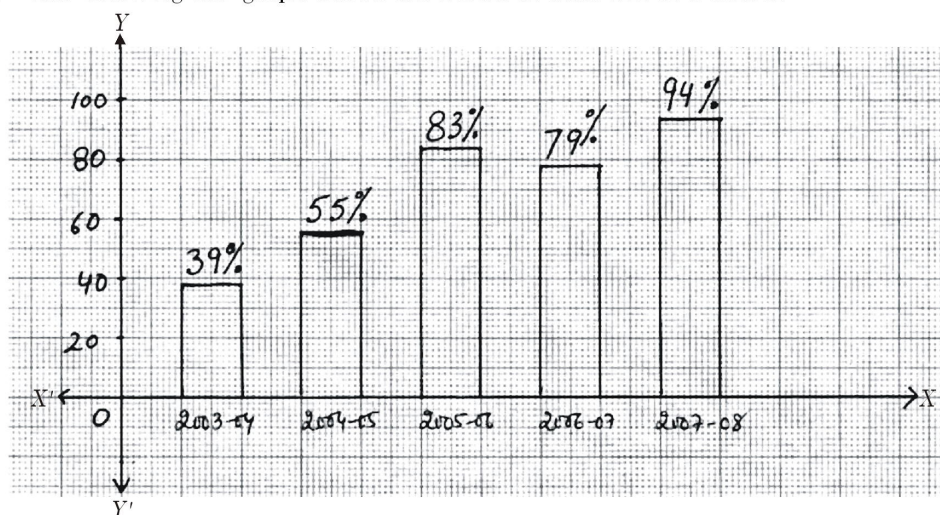
DATA HANDLING

QUESTIONS

1. The following bar graph shows the population of a country in various census (in crores). In which year there was maximum and minimum population?

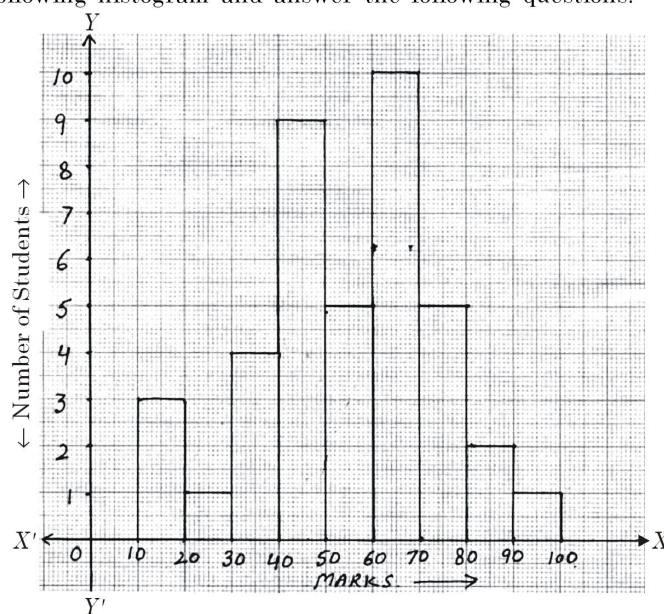


2. The following bar graph shows the result of class XII of a school.

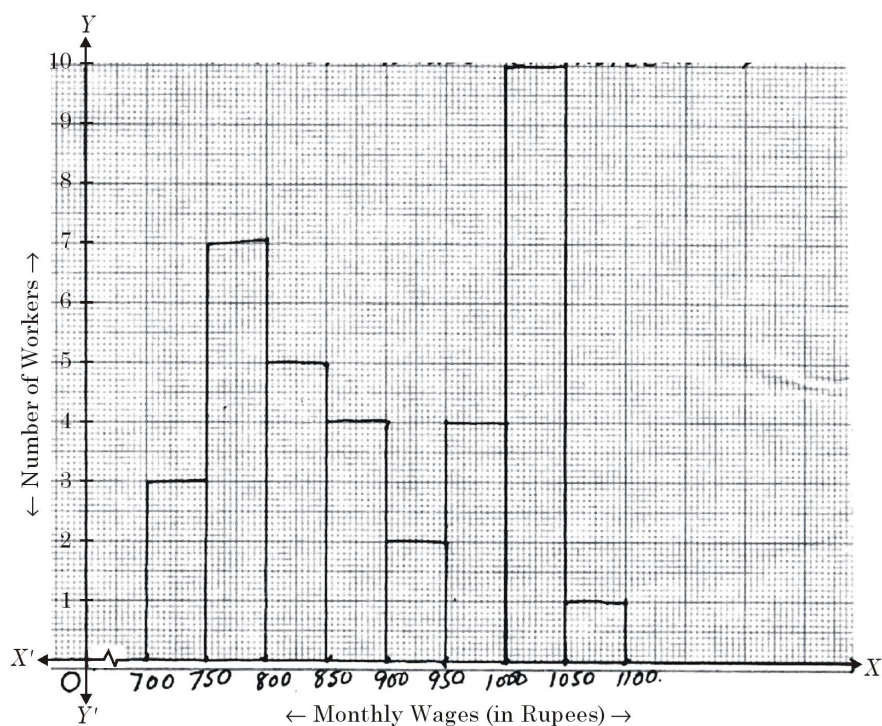


Answer the following questions :

- In which year the increase in the result was maximum? In which year the result of Class XII falls?
 - Can we say that the school's result is improving in all the years?
3. Read the following histogram and answer the following questions.

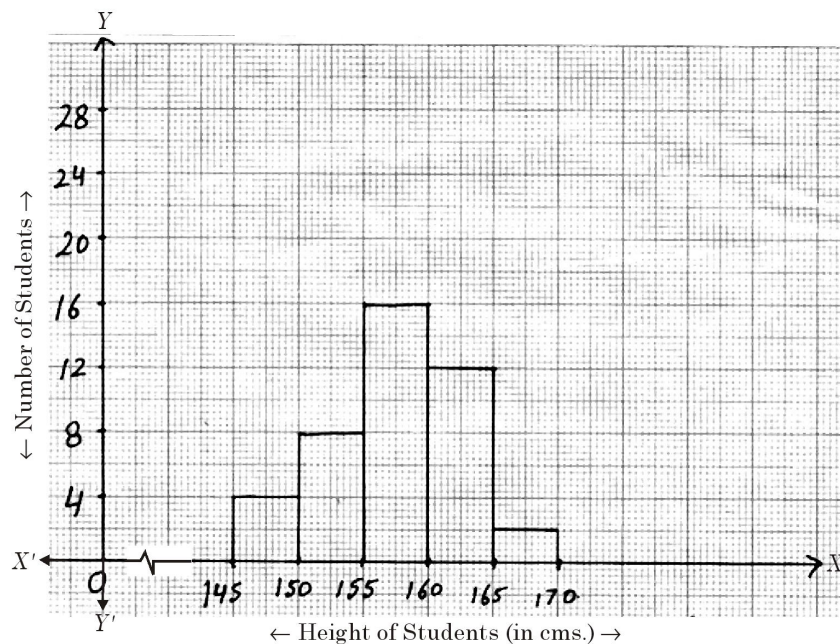


- (i) What is the number of students in the marks group of 50–60?
- (ii) In which group the number of students are maximum?
- (iii) In which two groups the number of students are the same?
4. The following histogram shows the weekly wages (in ₹) of workers in a factory.



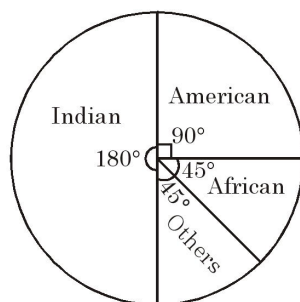
- (i) In which wage group are the largest number of workers being kept? What is their numbers?
- (ii) What is the amount which is received by the least number of workers?

5. The following histogram shows the height of 42 students in a class.

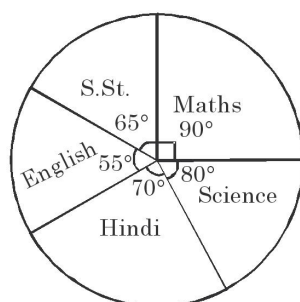


From the above histogram answer the following questions :

- How many students are having height less than 155 cm?
 - How many students have height equal to 160 cm or more?
 - How many students have height less than 170 cm?
6. Complete the following :
- The representation of statistical data by means of circle is known as _____.
7. The following pie chart depicts the percentage of students nationwide in a school. What is the percentage of Indian students?



8. The following pie chart depicts the marks scored in an examination by a student in different subjects.



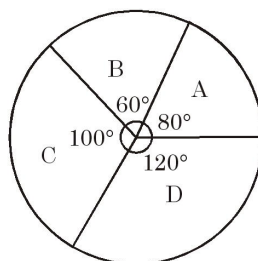
If the total marks obtained is 540. Which is greater?

(i) Sum of marks obtained in Maths and Science

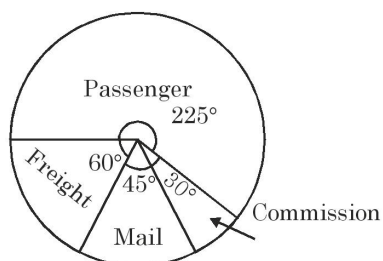
Or

(ii) Sum of marks obtained in S.St. and Hindi

9. The following pie chart represents the number of valid votes obtained by four candidates who contested an election for the post of chairman. The total number of valid votes polled was 720. What are the number of votes polled in favour of the winning candidate?

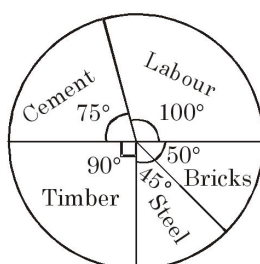


10. The following pie chart shows the sources of earning by a transport company.



What is the major source of earning of the transport company?

11. The following pie chart depicts the expenditure on different items at the time of construction of a flat.



- What is the difference of expenditure on timber and bricks if the total cost of construction is ₹ 81,000?
12. What is the total allocation of degrees in a pie chart?
13. Complete the following –
In pie chart we transform the data in terms of _____.
14. A coin is tossed twice. Find the probability of getting both tails.
15. Find the probability of getting an even number between 10 to 25.
16. A dice is thrown once. Find the probability of getting a prime number.
17. One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting a face card.
18. What is the maximum value of the probability for an event?
19. A bag contains 9 red, 7 white and 4 black balls. A ball is drawn at random. Find the probability that the ball drawn is not red.
20. In the word “EDUCATION” find the probability of getting a vowel.
21. Out of 400 bulbs in a box, 15 bulbs are defective. One bulb is taken at random from the box. Find the probability that the bulb is not defective.
22. A dice is thrown once. What is the probability of getting a multiple of 3?
23. A card is drawn from a pack of 52 cards. Find the probability of drawing a red face card.
24. A box contains 19 cards having numbers 1, 2, 3, 19. A card is drawn from the box. What is the probability that the number on the card is divisible by 5?
25. Three coins are tossed together. What are the total number of possible outcomes?
26. A letter of English alphabet is chosen at random. Find the probability that the letter chosen is a vowel.
27. A class has 40 students, 25 boys and 15 girls. A student of the class is selected at random as the monitor. Find the probability of selecting a girl student as the monitor.

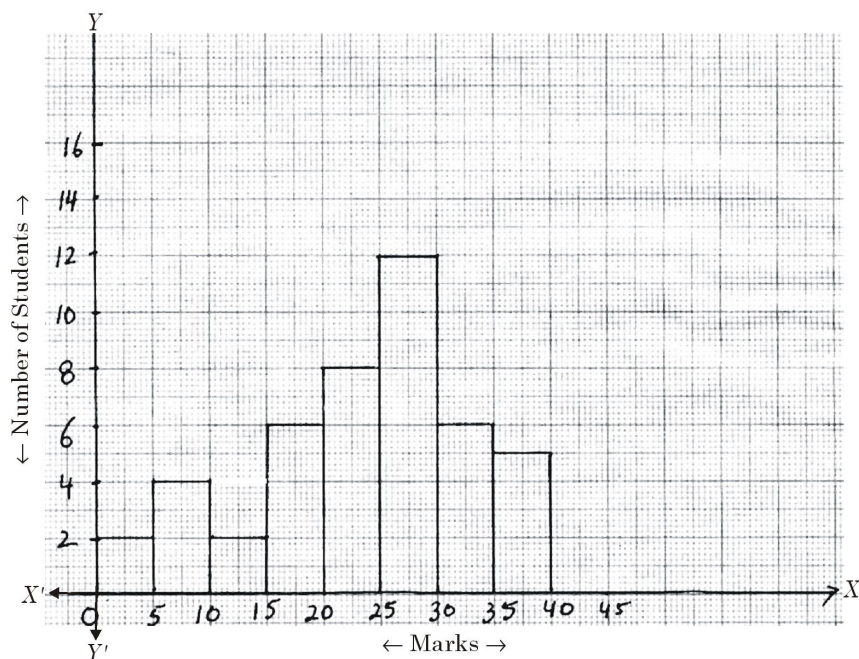
28. Two dice are thrown simultaneously. Find the probability of getting an even number as the sum.
29. In a family of two children. Find the probability of at least one girl child.
30. From 1 to 50, find the probability of getting a multiple of 6.

ANSWERS

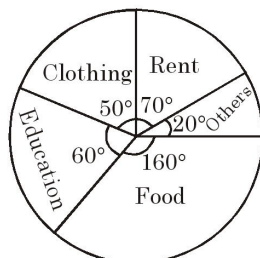
- | | |
|---|--|
| 1. Maximum = 2001, Minimum = 1961 | |
| 2. (i) In year 2005–06, In year 2006–07 | (ii) No. |
| 3. (i) 5 | (ii) 60 – 70 |
| | (iii) 50–60 and 70–80;
20–30 and 90–100 |
| 4. (i) 1000 – 1050, 10 | (ii) 1050–1100 |
| 5. (i) 12 | (ii) 14 |
| | (iii) 42 |
| 6. Pie Chart | |
| 7. 50% | 8. (i) |
| 9. 240 | 10. Passenger |
| 11. ₹ 9000 | 12. 360° |
| 13. Angles | 14. $\frac{1}{4}$ |
| 15. $\frac{1}{2}$ | 16. $\frac{1}{2}$ |
| 17. $\frac{3}{13}$ | 18. 1 |
| 19. $\frac{11}{20}$ | 20. $\frac{5}{9}$ |
| 21. $\frac{77}{80}$ | 22. $\frac{1}{3}$ |
| 23. $\frac{3}{26}$ | 24. $\frac{3}{19}$ |
| 25. 8 | 26. $\frac{5}{26}$ |
| 27. $\frac{3}{8}$ | 28. $\frac{1}{2}$ |
| 29. $\frac{3}{4}$ | 30. $\frac{4}{25}$ |

TEST YOUR KNOWLEDGE

For Q. No. 1 to Q. No. 4 refer the following histogram depicting the marks obtained by 45 students of a class in Maths test.



1. How many students obtained 20 or more marks but less than 35?
2. How many students got less than 15 marks?
3. If a first division is equal to 25 or more marks, how many students obtained this division?
4. In which class-interval of marks the no. of students were maximum?
5. A dice is thrown once. Find the probability of getting a number lying between 2 and 6.
6. Two unbiased coins are tossed simultaneously. Find the probability of getting no head.
7. A card is drawn from a well shuffled pack of 52 cards. Find the probability that the card drawn is a black king.



For Q. No. 8 to 10 refer the above pie chart which shows the monthly expenditure of a family. The family spends ₹ 3,600 per month on education.

8. What is the total monthly expenditure of the family?
9. How much they spend on food per month?
10. In comparison of education how much more money was spent by the family on rent?

ANSWERS

1. 26

3. 23

5. $\frac{1}{2}$

7. $\frac{1}{26}$

9. ₹ 9,600

2. 8

4. 25–30

6. $\frac{1}{4}$

8. ₹ 21,600

10. ₹ 600

CHAPTER 6

SQUARES AND SQUARE ROOTS

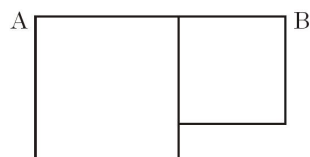
- A number multiplied by itself is called a square of that number.
- Ones digit of a square number can be one of 0, 1, 4, 5, 6, 9.
- A square number must have even number of zeros at the end *e.g.*, 400, 90000, 4000000 etc.
- Sum of first n odd numbers is n^2 *e.g.*, sum of first five odd numbers
i.e., $1 + 3 + 5 + 7 + 9 = 25 = 5^2 = n^2$
- Difference of squares of two consecutive numbers can be obtained by adding those two numbers
e.g., $59^2 - 58^2 = (59 + 58)(59 - 58) = (59 + 58) \times 1 = 117$
- A pythagorean triplet can be obtained by taking squares of odd numbers *i.e.*,
 $3^2 = 9 = 4 + 5$ Triplet (3, 4, 5)
 $5^2 = 25 = 12 + 13$ Triplet (5, 12, 13)
 $7^2 = 49 = 24 + 25$ Triplet (7, 24, 25) and so on.
- $35^2 = 3 \times 4 \quad \underline{25} = 1225$
For writing 35^2 or square of any number with ones digit five, two digits to right of the answer will be always 25 and left hand side digits can be obtained by multiplying the next natural number.
e.g., $75^2 = 7 \times 8 \quad \underline{25} = 5625$

QUESTIONS

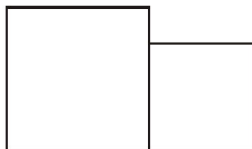
1. What is the square of 17?
2. Find the square of 24.
3. What is the product of two odd numbers?
4. Can we have a square number with unit digit 8?

5. Which are the digits that a square number can have at its units place?
6. How many 2's are there in the prime factors of 800?
7. How many 5's are there in the prime factors of 13000?
8. How many digits will be there in the square root of 12321?
9. How much is $45^2 - 44^2$?
10. Find the value of $(39 + 21)^2$.
11. What is the missing digit in $(37)^2 = 136 - ?$
12. Find the value of $121^2 - 120^2$.
13. Simplify and give the answer : $\sqrt{63 \times 28}$.
14. How many natural nos lie between 56^2 and 57^2 ?
15. What is the square of $\frac{19}{20}$?
16. Find the square of 3.1.
17. How much is $(0.1)^2$?
18. Find the value of $\sqrt{0.0081}$.
19. Give the perfect square number between 36 and 64.
20. How many perfect square numbers lie between 81 and 225?
21. Follow the pattern and answer.
 Pattern $1 = 1^2$
 $1 + 3 = 2^2$
 $1 + 3 + 5 = 3^2$ Find $1 + 3 + 5 + 7 + 9$,
22. What is the sum of first ten odd numbers?
23. What is the sum of the first 21 odd numbers?
24. Find the sum $5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21$
 [Hint : Write as $(1 + 3 + 5 + 7 + \dots + 21) - (1 + 3) = 11^2 - 2^2 = 117]$
25. Find $7 + 9 + 11 + 13 + 15 + 17$.
 [Hint : make pairs $(7 + 17) + (9 + 15) + (11 + 13) = 24 \times 3 = 72]$
26. What should be added to 45^2 to get 46^2 ?
27. How much is $87^2 - 86^2$?
28. Find the value of $85^2 - 80^2$?
29. What should be subtracted from 37^2 to get 35^2 ?
 [Hint : $37^2 - 35^2 = 72 \times 2$. Therefore number is 144].

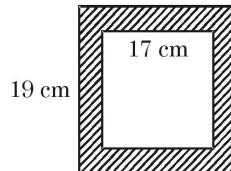
30. What should be subtracted from 121^2 to get 120^2 ?
31. Fill in the blanks : $116^2 + \underline{\hspace{1cm}} = 117^2$
32. Which two consecutive numbers on adding gives a square number 81 ?
33. $(\sqrt{4900} + 10)^2 = \underline{\hspace{2cm}}$.
34. $(a + b)^2 - (a - b)^2 = \underline{\hspace{2cm}}$.
35. If $21^x = 441$ then $x = \underline{\hspace{1cm}}$.
36. Find the smallest number which when multiplied by 180 makes it a perfect square.
37. If the area of a square is 38.44 sq. cm, then find the side of the square.
38. In the adjoining figure, find the length AB if areas of two squares are 81 sq. cm. and 25 sq. cm. respectively?



39. Find the least number which when added to 599 to make it a perfect square.
40. How much is $\sqrt{\frac{441}{1369}}$?
41. Find $\left(\frac{-2}{5}\right)^2 - \left(\frac{1}{5}\right)^2 = \underline{\hspace{2cm}}$.
42. In a cinema hall 729 people are seated in such a way that the number of people in a row is equal to number of rows. Then how many rows of people are there in the hall?
43. Simplify $\sqrt{1024} - \sqrt{900}$.
44. The length of a rectangular park is 80m and breadth is 60m. Find the length of its diagonal.
45. Give one Pythagorean triplet in which one of the number is 12.
46. Two squares of sides 11 cm. and 9 cm are joined together to form a toy. What is the area of the Fig. so formed?

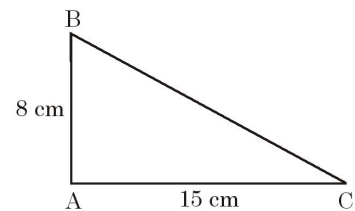


47. In the figure side of bigger square is 19 cm and smaller square is 17cm. What is the area of the shaded portion?



48. A rectangular paper of length 45cm and breadth 5 cm is cut to form a square with the same area. What is the side of the square?
49. Find the missing number. $175 \times \underline{\hspace{1cm}} = 35^2$.

50. In the figure find the length of BC .



ANSWERS

- | | |
|-----------------------|-------------|
| 1. 289 | 2. 576 |
| 3. Odd number | 4. No. |
| 5. (0, 1, 4, 5, 6, 9) | 6. Five 2's |
| 7. Three 5's | 8. 3 |
| 9. 89 | 10. 3600 |
| 11. 9 | 12. 241 |
| 13. 42 | 14. 112 |
| 15. $\frac{361}{400}$ | 16. 9.61 |
| 17. 0.01 | 18. 0.09 |
| 19. 49 | 20. 5 |
| 21. 5^2 | 22. 100 |
| 23. $(21)^2 = 441$ | 24. 117 |
| 25. 72 | 26. 91 |
| 27. 173 | 28. 825 |
| 29. 144 | 30. 241 |
| 31. 233 | 32. 40, 41 |
-

- | | |
|--------------------|---------------------|
| 33. 49 | 34. $4ab$ |
| 35. 2 | 36. 5 |
| 37. 6.2 cm | 38. 14 cm |
| 39. 26 | 40. $\frac{21}{37}$ |
| 41. $\frac{3}{25}$ | 42. 27 |
| 43. 2 | 44. 100 m |
| 45. (5, 12, 13) | 46. 202 sq. cm. |
| 47. 72 sq. cm. | 48. 15 cm |
| 49. 7 | 50. 17 cm |

TEST YOUR KNOWLEDGE

1. What is square root of 441?
2. The square of $\frac{10}{11}$ is ____.
3. $(0.7)^2 =$ ____.
4. $(45)^2 =$ ____.
5. What is the least four digits number which is a perfect square?
6. $99^2 - 98^2 =$ ____.
7. Find the greatest two digits number which is a perfect square.
8. Find the square root of $\frac{256}{625}$.
9. What is $\sqrt{12.25}$?
10. Give a pythagorean triplet whose one number is 13.

ANSWERS

- | | |
|---------|----------------------|
| 1. 21 | 2. $\frac{100}{121}$ |
| 3. 0.49 | 4. 2025 |
| 5. 1024 | 6. 197 |
| 7. 81 | 8. $\frac{16}{25}$ |
| 9. 3.5 | 10. (5, 12, 13) |

CHAPTER 7

CUBES AND CUBE ROOTS

- A cube root of a number “ n ” is that number whose cube is n .
- For two consecutive natural numbers a and b .

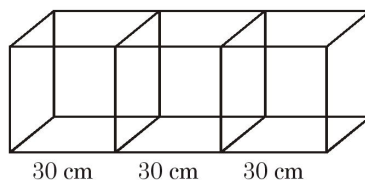
$$a^3 - b^3 = 1 + 3 \times a \times b$$

e.g., $9^3 - 8^3 = 1 + 3 \times 9 \times 8 = 217$.

QUESTIONS

1. Find the cube of $\left(-\frac{2}{3}\right)$.
2. How much is $\left(\frac{3}{5}\right)^3 - \left(\frac{1}{5}\right)^3$?
3. Simplify and give the answer : $(0.5)^3 + (0.2)^3$.
4. Find the volume of a cube of side 6 cm.
5. How many unit cubes can be formed by melting a copper cube of side 5cm?
6. Simplify $1 + \left(\frac{3}{5}\right)^3 = \underline{\hspace{2cm}}$.
7. If a number is written as $3 \times 3 \times 5 \times 3 \times 5 \times 7 \times 7$. Find the smallest number by which this is to be multiplied to form a perfect cube.
8. Find $\sqrt[3]{5 \times 7 \times 7 \times 5 \times 7 \times 5} = \underline{\hspace{2cm}}$.
9. $(0.3)^3 = \underline{\hspace{2cm}}$.
10. Find the value of $\sqrt[3]{0.064}$.
11. $\sqrt[3]{-216} - \sqrt[3]{125} = \underline{\hspace{2cm}}$.
12. Cubes of positive numbers are always $\underline{\hspace{2cm}}$.
13. Cube roots of positive numbers are always $\underline{\hspace{2cm}}$.

14. $(\sqrt[3]{x})^3 = \underline{\hspace{2cm}}$.
15. If volume of a cube is 216 cm^3 , What is the length of the side of cube?
16. Three cubes of sides 3cm, 4cm and 5 cm respectively are melted to form a new cube. What is the side of new cube?
17. What is the value of $(-0.2)^3$?
18. Find the value of $\sqrt[3]{343} - \sqrt[3]{-216}$.
19. Simplify : $\sqrt[3]{\frac{125}{1331}} - \sqrt[3]{\frac{64}{1331}}$.
20. $\left(\frac{2}{5}\right)^3 \times \left(-\frac{5}{2}\right)^3 = \underline{\hspace{2cm}}$.
21. Find the cube root of -1728 .
22. How much is $\sqrt[3]{-0.729}$?
23. Find the smallest number by which $(2 \times 2 \times 3 \times 3 \times 3)$ is to be multiplied so that resultant number is a perfect cube.
24. Three solid wooden cubes of different colours with sides, 30 cm each are placed as shown in the figure. How much cubic cm of wood is required to make it?



25. What is the next number in the series 64, 125, 216, ____?
26. Find the value of $\sqrt[3]{125 \times 343}$.
27. How many thousands will be there is $29 \times 2^3 \times 5^3$?
28. Find the next number is the series $\sqrt[3]{(8)}, \sqrt[3]{(27)}, \sqrt[3]{(64)}, \underline{\hspace{2cm}}$.
29. Find the value of $\left(\sqrt[3]{\frac{2}{5}}\right)^3 + \left(\sqrt[3]{\frac{3}{5}}\right)^3$.
30. Simplify : $\frac{\sqrt[3]{216} \times \sqrt[3]{512}}{\sqrt[3]{8} \times \sqrt[3]{27}}$.
31. Simplify : $\sqrt[3]{216} \times \sqrt[3]{1728}$.
32. Find $\sqrt[3]{x}$ if $x = 1.331$

33. What is the cube root of 0.001728?
34. $(\sqrt[3]{729})^3 = \underline{\hspace{2cm}}$ complete it.
35. Simplify : $(\sqrt[3]{(1.1)^3} \times \sqrt[3]{1.331})$.
36. A cubical box has a volume of 512000 cubic cm. What is the length of the side of box?
37. Find the value of $\sqrt[3]{0.729} \times \sqrt[3]{1.331}$.
38. Evaluate $\sqrt[3]{100} \times \sqrt[3]{270}$.
39. Complete it $\sqrt[3]{825} > \underline{\hspace{1cm}}$. (whole number).
40. Simplify and give the answer in whole number $\sqrt[3]{55} \times \sqrt[3]{25} \times \sqrt[3]{121}$.
41. Find $\sqrt[3]{169} \times \sqrt[3]{25} \times \sqrt[3]{65}$.
42. What is $\sqrt[3]{400} \times \sqrt[3]{49} \times \sqrt[3]{140}$?
43. Simplify : $15^3 - 14^3$.
44. How many hundreds are there in $31 \times 2^2 \times 5^3$?
45. Simplify and give the answer $\frac{\sqrt[3]{216} \times \sqrt[3]{729}}{3 \times 9}$.
46. Which least number should be multiplied by $2 \times 2 \times 7 \times 7 \times 5 \times 7 \times 5 \times 5$ to get a perfect cube?
47. By which least number 250×512 should be divided to make it a perfect cube.
48. What is $11^3 - 10^3$?
49. Find $1^3 + 2^3 + 3^3$.
50. What is x if $3^x = 243$?

ANSWERS

- | | |
|----------------------|------------------------|
| 1. $-\frac{8}{27}$. | 2. $\frac{26}{125}$. |
| 3. 0.133 | 4. 216 cm^3 |
| 5. 125 | 6. $\frac{152}{125}$. |
| 7. 35 | 8. 35 |
| 9. 0.027 | 10. 0.4 |
| 11. -11 | 12. Positive |
-

- | | |
|----------------------|--------------------------|
| 13. Positive | 14. x |
| 15. 6cm | 16. 6cm |
| 17. -0.008 | 18. 13 |
| 19. $\frac{1}{11}$. | 20. -1 |
| 21. -12 | 22. -0.9 |
| 23. 2 | 24. 81000 cm^3 |
| 25. 343 | 26. 35 |
| 27. 29 | 28. $\sqrt[3]{125} = 5$ |
| 29. 1 | 30. 8 |
| 31. 72 | 32. 1.1 |
| 33. 0.12 | 34. 729 |
| 35. 1.21 | 36. 80cm |
| 37. 0.99 | 38. 30 |
| 39. 9 | 40. 55 |
| 41. 65 | 42. 140 |
| 43. 631 | 44. 155 |
| 45. 2 | 46. 2 |
| 47. 2 | 48. 331 |
| 49. 36 | 50. 5 |

TEST YOUR KNOWLEDGE

- What is cube of $\frac{8}{11}$?
- What is cube root of 1728?
- Complete it $\sqrt[3]{\frac{\boxed{?}}{3375}} = \frac{7}{15}$.
- What is $10^3 - 9^3$?
- By which least no 1024 should be divided to make it a perfect cube?
- What is cube of 0.2?

7. If square of a number having digit 9 at unit's place then what will be the digit at unit's place in the cube of that numbers?
8. What is the smallest number by which 9000 can be multiplied so that it becomes a perfect cube ?
9. What is the volume of a cube if the area of one face is 36 cm^2 ?
10. Find $\sqrt[3]{\frac{0.001}{1.331}}$.

ANSWERS

1. $\frac{512}{1331}$.

3. 343

5. 2

7. 7 or 3.

9. 216 cm³

2. 12

4. 271

6. 0.008

8. 3

10. $\frac{1}{11}$.

CHAPTER 8

COMPARING QUANTITIES

QUESTIONS

1. Find the ratio of 5 paise to ₹ 25.
2. Find the ratio of speed of a car and truck travelling 150 km in 3 hours and 120 km in 4 hours respectively.
3. Convert the ratio 1:4 into percent.
4. Radhika earned ₹ 16,000 in a month. She saves 20% of her income. How much does she spend?
5. Find the ratio of 5m to 10 mm.
6. On Monday, if $\frac{1}{2}$ of number of students of class VIII are in a computer room, $\frac{1}{4}$ are in art room and rest 12 students are in playground. What is the total number of students in a class?
7. The cost of 6 pens is ₹ 72. What would be the cost of 10 such pens?
8. If in a class of 40 students, 70% of students are girls then what is the number of boys in the class?
9. Divide 95 chocolates among Rahul and Rekha in the ratio of 2:3. How many chocolate each will get?
10. Last year price of mangoes was ₹ 30 per kg. This year the price of mangoes has increased by 30%. What is the price now?
11. Mrs. Sunita has got 20% increase in her salary. If her salary was ₹ 18000. What will be her new salary?
12. The price of a computer is ₹ 48,000. The sales tax charged was 4%, what is the amount to be payed by Mr. Gupta?
13. Vijay has bought a motor bike for ₹ 32,400 including 8% VAT. What is the price of motorbike before VAT?

14. The list price of washing machine is ₹ 26,000. A discount of 10% was given by the shopkeeper to attract the customers. How much money does one has to pay?
15. In off-season a company announced 25% discount on A.C. to clear their stock. If Mr. Gupta has paid ₹ 22,500 for the A.C. What was the original price for A.C?
16. Find 50% of ₹ 728.
17. 25% of $x = 250$. Find x .
18. $x\%$ of 360 = 72. Find x
19. Express 25% as a fraction,
20. Express $\frac{4}{25}$ as a percentage.
21. Find 30% of 600.
22. Express $\frac{42}{50}$ as a percentage.
23. A fruit seller bought a basket containing 2050 oranges out of which 41 oranges were rotten. What percentage of oranges were rotten?
24. In a school there were 810 students 90% of them went to a picnic. How many students went to the picnic?
25. Express 0.295 as a percentage.
26. Ankita bought a book for ₹ 450 and after two months she sold it for ₹ 360 to her friend. Find the loss percentage.
27. By selling a car for ₹ 44,000 a man made a profit of 10%. At what price did he buy the car?
28. A whole sale dealer observed that cost of 45 pants of equal to selling price of 30 pants. What is his profit percent?
29. C.P. of 360 books = S.P. of 270 books. Find profit %.
30. Ramesh scored 445 marks out of 500. What percent of marks he scored?
31. Find $(25\% \text{ of } 600) - (20\% \text{ of } 450)$
32. Seema purchased a shirt for ₹ 250 a frock for ₹ 350 and a jeans for ₹ 650. She paid ₹ 1000 for all the three items. What percentage discount she got?
33. Anil bought a quilt for ₹ 1200 and sold it at a profit of 15%. At what price did he sell the quilt?
34. By selling a chair for ₹ 880.00, Rohit loses 20%, For what price Rohit bought the chair?
35. Selling price of 25 paintings is equal to cost price of 35 paintings. Find the profit percentage.

36. Profit percent = $\frac{\text{Total Profit}}{\square} \times 100$.
37. Complete it S.P. = $\frac{100 + \text{Profit}\%}{\square} \times C.P.$
38. Find the missing number : $C.P. = \frac{100}{\square - \text{Loss}\%} \times S.P.$
39. Which is more : A discount of (50% + 20%) or discount (70%)?
40. Complete it. (50% + 40%) = _____% discount
41. At what price does Poonam sell her T.V. set which she bought for ₹ 5000 so as to make a profit of 20%?
42. Which is more : (90% of 800) or (70% of 1100)?
43. Find the amount Preeti has to pay to the bank after 2 years at 4% per annum on ₹ 625, if the Interest is compounded annually.
44. Ragani borrow a sum of ₹ 8000 from Seema at 5% per annum for 3 years. How much money she has to return to Seema?
45. Find the difference between simple interest and compound interest on ₹ 1000 for 2 years at 10% per annum.
46. Find the money Raj borrowed from his friend if he paid ₹ 72900 to him after 2 years at 8% per annum compounded annually.
47. Seema purchased a washing machine for ₹ 10,000 at credit at 10% for 2 years. What amount she has to pay after 2 years if the interest is compounded annually?
48. Compound interest on a certain sum for 2 years at $12\frac{1}{2}\%$ per annum is ₹ 170. Find the sum.
49. At what rate of interest (Compound) per annum will ₹ 625 amount to 784 in 2 years?
50. At what rate percent (compound) per annum will ₹ 12500 amount to ₹ 21600 in 3 years?

ANSWERS

- | | |
|------------|-------------|
| 1. 1 : 500 | 2. 5 : 3 |
| 3. 25% | 4. ₹ 12,800 |
| 5. 500 : 1 | 6. 48 |
| 7. ₹ 120 | 8. 12 Boys |
-

- | | |
|-----------------------|-------------------|
| 9. 38 and 57 | 10. ₹ 39 |
| 11. ₹ 21,600 | 12. ₹ 49,920 |
| 13. ₹ 30,000 | 14. ₹ 23,400 |
| 15. ₹ 30,000 | 16. ₹ 364 |
| 17. 1000 | 18. $x = 20$ |
| 19. $\frac{1}{4}$. | 20. 16% |
| 21. 180 | 22. 84% |
| 23. 2% | 24. 729 |
| 25. 29.5% | 26. 20% |
| 27. ₹ 40,000 | 28. 50% |
| 29. $\frac{100}{3}$ % | 30. 89% |
| 31. 60 | 32. 20% |
| 33. ₹ 1380 | 34. ₹ 1100 |
| 35. 40% | 36. C.P. |
| 37. 100 | 38. 100 |
| 39. 70% | 40. 70% |
| 41. ₹ 6,000 | 42. (70% of 1100) |
| 43. ₹ 676 | 44. ₹ 9261 |
| 45. ₹ 10 | 46. ₹ 62500 |
| 47. ₹ 12,100 | 48. 640 |
| 49. 12% | 50. 20% |

TEST YOUR KNOWLEDGE

- Two numbers are in the ratio 3 : 4 and their sum is 84. Find the numbers.
- Find the ratio of 15 min. to 1 hour.
- The cost price of a table is ₹ 1500 and gain is 12%, what is its selling price ?
- Find the discount percent when marked price is ₹ 900 and selling price is ₹ 873.
- What is 8% of 450?
- 25% children of a class of 48 like to have milk in the morning. How many children does not like to have milk in the morning?

7. The cost price of 10 pencils is equal to the selling price of 8 pencils. What is the profit percentage?
8. At what rate percent compounded annually ₹ 1000 amount to ₹ 1331 in 3 years?
9. What will be difference between compound interest and simple interest on ₹ 2000 at 10% for 2 years?
10. In how much time will a sum of money double itself, if invested at 5% simple interest per annum?

ANSWERS

- | | |
|-----------|---------------|
| 1. 36, 48 | 2. 1 : 4 |
| 3. ₹ 1680 | 4. 3% |
| 5. 36 | 6. 36 |
| 7. 25% | 8. 10% |
| 9. ₹ 20 | 10. 20 years. |

CHAPTER 9

ALGEBRAIC EXPRESSIONS AND IDENTITIES

Points to Remember

- Expressions are formed from variables and Constants.
- Expressions that contain exactly one, two and three terms are called monomials, binomials and trinomials respectively.
- Like terms are formed from the same variables and the power of these variables are the same too. Coefficients of like terms need not be the same.
- An identity is an equality which is true for all values of the variables in the equality.
- The following are the standard identities :

$$(a + b)^2 = a^2 + 2ab + b^2 \quad \dots(i)$$

$$(a - b)^2 = a^2 - 2ab + b^2 \quad \dots(ii)$$

$$(a + b)(a - b) = a^2 - b^2 \quad \dots(iii)$$

$$(x + a)(x + b) = x^2 + (a + b)x + ab \quad \dots(iv)$$

QUESTIONS

1. Find the product of $9xy^2$ and $4x^3y$.
2. Add : $7xy + 5yz - 3zx$, $-5yz + 3zx$, $-6xy + yz + zx$.
3. Simplify : $(5x^2p)^3$
4. Find the value of $(5x + 7y)$ if $x = 3$ and $y = 2$.
5. Subtract : $9a - 6ab + 3b + 5$ from $12a - 9ab + 5b - 3$.
6. If $x = 3$ and $y = 5$ find $x^2 + y^2$.
7. Add $ab - bc$, $bc - ca$, $ca - ab$.
8. Identify the numerical co-efficients of first and second terms in the algebraic expression $3xyz^2 - 2zy$.
9. If $a = 7$ and $b = 3$ find $a^2 - b^2$.

10. What should be subtracted from $(x + y)^2$ to get $(x^2 + y^2)$?
11. If $x = 5$ and $y = 3$ find the value of $(x + y)^2 - (x^2 + y^2)$.
12. Multiply and give the answer in simplified form $(z - 6)(z - 5)$.
13. What should be added to $a^2 + b^2$ to get $(a - b)^2$?
14. Find the volume of a rectangular box with length, breadth and height respectively $2ax$ units, $3cy$ units and $5gz$ units.
15. Find the area of a rectangle with length and breadth respectively $5mn$ units and $3ns$ units.
16. Find the value of $47^2 - 43^2$.
17. Find the product of $(3n - 5p)(3n + 5p)$
18. How much is $(\sqrt{19} + \sqrt{17})(\sqrt{19} - \sqrt{17})$?
19. Find $\left(\frac{4}{3}m + \frac{3}{4}n\right)\left(\frac{4}{3}m - \frac{3}{4}n\right)$.
20. Find the value of $\left(\frac{2}{3}m - \frac{3}{2}n\right)^2 + 2mn$.
21. Find $(A + B)(A - B)(A^2 + B^2)(A^4 + B^4)$
22. Find the value of $(29 \times 31) - (30^2 - 1)$.
[Hint : $(a + b)(a - b) = a^2 - b^2$]
23. Simplify : $3x(4x - 5) + 3$, if $x = \frac{1}{2}$.
24. Simplify : $(ab + bc)^2 - 2ab^2c$.
25. Find the square of $(2mn + 3n)$
26. Find $(1 - x^2)$ if $x = 0.1$.
27. Find the product of $(a + b + c)(a + b - c)$
28. If $2x - 3y = 5$ and $xy = 4$. Find $4x^2 + 9y^2$.
29. If $2x + 3y = 8$ and $xy = 2$. Find $4x^2 + 9y^2$.
30. Find the product of $3\frac{1}{5} \times 2\frac{4}{5}$.
31. Find the product of $(4m + 3)(4m + 1)$
32. Simplify : $(2x + 5)^2 - (2x - 5)^2$.
33. Find the value of : $(a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a)$.
34. Find $(3pq + 4q)^2 - (3pq - 4q)^2$.
35. Find the product of $(t + s^2)(t^2 - s)$.

36. Simplify : $(x + y) (x^2 - xy + y^2)$
37. Multiply : $(a + 1) (a + 2)$
38. If $a = 3$, $b = 4$ and $x = 5$, Find the value of $(x + a) (x + b)$,
39. Simplify : $\frac{4x^2 - 9y^2}{2x + 3y}$.
40. Simplify : $\frac{6.25 m^2 - 2.25 n^2}{2.5 m - 1.5 n}$.
41. Simplify : $\frac{9x^2 + 16y^2 + 24xy}{3x + 4y}$.
42. Simplify : $\frac{4m^2 + 9n^2 - 12mn}{2m - 3n}$.
43. Find the value of $(9p - 5q)^2 + 180pq$
44. Find the value of $(3m + 5n)^2 - 60mn$.
45. Find the product of $(xyz - 3) (xyz - 2)$.
46. Find the value of $(4.9)^2$.
47. Simplify : $(p^2 + 5) (p - 5) + 25$.
48. Simplify : $(m^2 + 9) (m^2 - 9) + 81$.
49. Multiply : $(2.5m - 0.5n) (2.5m + 0.5n)$.
50. Subtract : $3pq (p - q)$ from $4pq (p - q)$.

ANSWERS

- | | |
|---|---|
| 1. $36x^4y^3$ | 2. $xy + yz + zx$ |
| 3. $125x^6p^3$ | 4. 29 |
| 5. $3a - 3ab + 2b - 8$ | 6. 34 |
| 7. 0 | 8. $(3, -2)$ |
| 9. 40 | 10. $+ 2xy$ |
| 11. 30 | 12. $z^2 - 11z + 30$ |
| 13. $-2ab$ | 14. 30 $acgxyz$ cubic units |
| 15. $15mn^2$ s square units | 16. 360 |
| 17. $9n^2 - 25p^2$ | 18. 2 |
| 19. $\frac{16}{9} m^2 - \frac{9}{16} n^2$. | 20. $\frac{4}{9} m^2 + \frac{9}{4} n^2$. |
| 21. $A^8 - B^8$. | 22. 0 |

- | | |
|-------------------------------|------------------------|
| 23. $-\frac{3}{2}$. | 24. $a^2b^2 + b^2c^2$ |
| 25. $4m^2n^2 + 12mn^2 + 9n^2$ | 26. 0.99 |
| 27. $a^2 + b^2 + 2ab - c^2$ | 28. 73 |
| 29. 40 | 30. $\frac{224}{25}$. |
| 31. $16m^2 + 16m + 3$ | 32. $40x$ |
| 33. 0 | 34. $48pq^2$ |
| 35. $t^3 + t^2s^2 - st - s^3$ | 36. $x^3 + y^3$ |
| 37. $a^2 + 3a + 2$ | 38. 72 |
| 39. $2x - 3y$ | 40. $2.5m + 1.5n$ |
| 41. $3x + 4y$ | 42. $2m - 3n$ |
| 43. $(9p + 5q)^2$ | 44. $(3m - 5n)^2$ |
| 45. $x^2y^2z^2 - 5xyz + 6$ | 46. 24.01 |
| 47. $p^3 - 5p^2 + 5p$ | 48. m^4 |
| 49. $6.25m^2 - 0.25n^2$ | 50. $p^2q - pq^2$ |

TEST YOUR KNOWLEDGE

- Identify the numerical co-efficient of the first term and second term in the algebraic expression $2a^2by - 3ay$.
- Find the value of x if $3x - 9b = 3b$.
- Simplify : $(3m^2np)^2$
- Simplify : $(3m + 2n)^2 - (9m^2 + 4n^2)$.
- Find the product of $(x + y)(x - y)(x^2 + y^2)$.
- Find the square of $(3xy + 4yz)$.
- How much is $(\sqrt{13} + \sqrt{11})(\sqrt{13} - \sqrt{11})$?
- Find the volume of a rectangular box with length, breadth and height respectively $3ab$ units, $4bc$ units, $5ca$ units.
- Find the product of $(3m + 2)(3m + 3)$.
- Simplify : $(x^2 + 4)(x^2 - 4) + 16$.

ANSWERS

1. $(2, -3)$

2. $4b$

3. $9m^4n^2p^2$

4. $12mn$

5. $x^4 - y^4$

6. $9x^2y^2 + 24xy^2z + 16y^2z^2$

7. 2

8. $60a^2b^2c^2$ cubic units

9. $9m^2 + 15m + 6$

10. x^4

CHAPTER 10

VISUALISING SOLID SHAPES

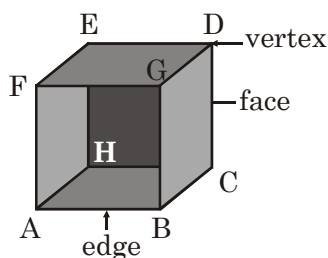
Points to Remember

- ❑ Plane shapes having two measurements like length and breadth are called two dimensional shapes (2-D).
- ❑ Solid shapes having three measurements like length, breadth and height or depth are called three dimensional shapes (3-D).
- ❑ In polyhedron relationship between no. of faces (F), vertices (V) and edges (E) is

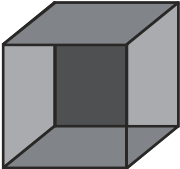
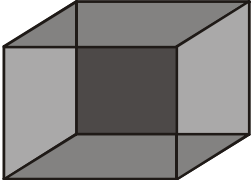
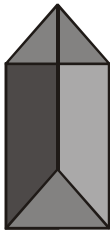
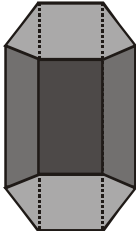
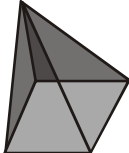
$$F + V - E = 2$$

It is also called Euler's Formula.

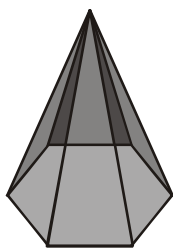
- ❑ **Prism** : A polyhedron whose base and top are congruent polygon and whose other faces are parallelogram.
- ❑ **Pyramid** : A polyhedron whose base is a polygon and whose lateral faces are triangles with a common vertex.
- ❑ Faces : $ABCH$, $BCDG$, $EFGD$, $EFAH$, $DEHC$, $ABGF$
 Edges : AB , BC , CH , AH , FG , GD , DE , EF , AF , HE , BG , CD
 Vertices : A , B , C , D , E , F , G , H



**THE NUMBER OF FACES, EDGES AND VERTICES FOR THE FOLLOWING
POLYHEDRONS**

<i>S. No.</i>	<i>Figure</i>	<i>Type of Polyhedron</i>	<i>No. of Faces F</i>	<i>No. of Vertices V</i>	<i>No. of Edges E</i>
1.		Prism with square base	6	8	12
2.		Prism with rectangular base	6	8	12
3.		Prism with triangular base	5	6	9
4.		Prism with Hexagonal base	8	12	18
5.		Pyramid with square base	5	5	8
6.		Pyramid with triangular base	4	4	6

7.



Pyramid with Hexagonal base

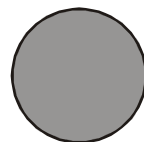
7

7

12

QUESTIONS

1. Name the shape and also tell the type of the given figure.



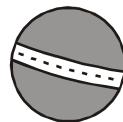
2. Name the shape and also tell the type of the given figure.



3. Name the shape and also tell the type of the given figure.



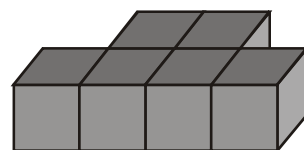
4. Name the shape and also tell the type of the given figure.



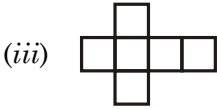
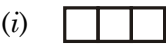
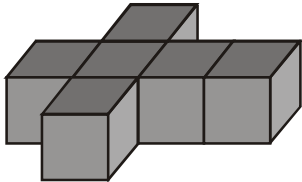
5. Name the shape and also tell the type of the given figure.



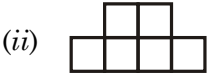
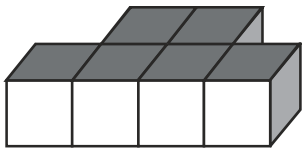
6. Find the odd one out : book, cylinder, square, cone.
7. Find the odd one out : coin, birthday cap, match box, triangle.
8. Find the odd one out : triangle, sphere, rectangle, circle.
9. Find the odd one out : bangle, circle, square, triangle.
10. Find the odd one out : Football, Table, Chalk, Floor.
11. How many no. of squares are visible in the top view of the given figure?



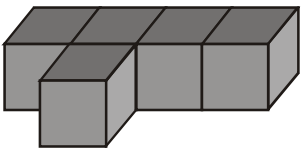
12. In the given solid identify the top, front and side view.



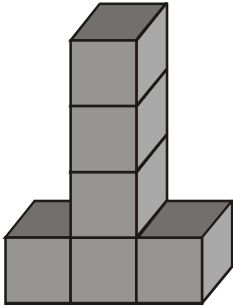
13. In the given solid identify the top, front and side view.



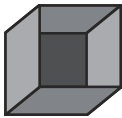
14. How many squares are visible in the side view of the given solid figure?



15. How many squares are visible in the front view of the given solid figure?



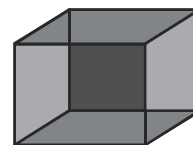
16. Find the no. of faces in the given figure.



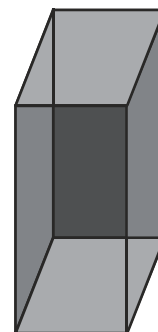
17. Find the no. of vertices in the given figure.



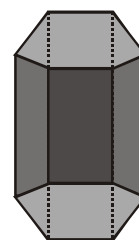
18. Find the no. of edges in the given figure.



19. Find the no. of faces in the given figure.



20. Find the no. of faces in the given figure.



21. Find the no. of faces in a Prism with square base.
22. Find the no. of faces in a Prism with hexagonal base.
23. Find the no. of faces in a Prism with triangle base.
24. Find the no. of edges in a triangular Prism.
25. Find the no. of edges in a Prism with hexagonal base.
26. Find the no. of edges in a Prism with square base.
27. Find the no. of vertices in a Prism with square base.
28. Find the no. of vertices in a Prism with hexagonal base.
29. Find the no. of vertices in a triangular Prism.
30. Find the no. of faces in a Pyramid with square base.
31. Find the no. of faces in a Pyramid with hexagonal base.
32. Find the no. of faces in a Pyramid with triangular base.
33. Find the no. of edges in a triangular Pyramid.
34. Find the no. of edges in a Pyramid with hexagonal base.

35. Find the no. of edges in a Pyramid with square base.
36. Find the no. of vertices in a Pyramid with square base.
37. Find the no. of vertices in a Pyramid with hexagonal base.
38. Find the no. of vertices in a Pyramid with triangular base.
39. Find the no. of edges in a Pyramid with pentagon base.
40. Find the no. of edges in a Prism with pentagon base.
41. Find the no. of vertices in a Pyramid with pentagon base.
42. Find the no. of vertices in a Prism with pentagon base.
43. Find the no. of faces in a Pyramid with pentagon base.
44. Find the no. of faces in a Prism with pentagon base.
45. In a polyhedron there are 8 vertices and 12 edges, find its no. of faces.
46. In a polyhedron there are 8 edges and 5 faces, find its no. of vertices.
47. In a polyhedron there are 5 faces and 6 vertices, find its no. of edges.
48. A polyhedron has 8 faces, 12 vertices, find its no. of edges.
49. A polyhedron has 6 edges and 4 faces, find its no. of vertices.
50. A polyhedron has 7 vertices and 12 edges, find its no. of faces.

ANSWERS

- | | |
|--------------------|-----------------|
| 1. Circle, 2-D | 2. Cone, 3-D |
| 3. Triangle, 2-D | 4. Sphere, 3-D |
| 5. Cuboid, 3-D | 6. Square |
| 7. Triangle | 8. Sphere |
| 9. Bangle | 10. Floor |
| 11. 6 | |
| 12. (i) Side view | (ii) Front view |
| 13. (i) Front view | (ii) Top view |
| 14. 2 | |
| 15. 6 | 16. 6 |
| 17. 8 | 18. 12 |
| 19. 6 | 20. 8 |
| 21. 6 | 22. 8 |

- | | |
|--------|--------|
| 23. 5 | 24. 9 |
| 25. 18 | 26. 12 |
| 27. 8 | 28. 12 |
| 29. 6 | 30. 5 |
| 31. 7 | 32. 4 |
| 33. 6 | 34. 12 |
| 35. 8 | 36. 5 |
| 37. 7 | 38. 4 |
| 39. 10 | 40. 15 |
| 41. 6 | 42. 10 |
| 43. 6 | 44. 7 |
| 45. 6 | 46. 5 |
| 47. 9 | 48. 18 |
| 49. 4 | 50. 7 |

TEST YOUR KNOWLEDGE

1. Find the sum of dots visible in this dice.
2. What is the shape of a bangle?
3. Shape of unsharpened pencil is prism or pyramid.
4. Can a polyhedron have 10 faces, 20 edges and 15 vertices?
5. A polyhedron has 7 faces and 10 vertices. Find its no. of edges.
6. Name the polygon formed in the front side of the figure.
7. Find 3-D figures from the following ball, cylinder, triangle.
8. Find the no. of faces in a cube.
9. What is the shape of top view of this cup?
10. Find the no. of edges in a match box.



ANSWERS

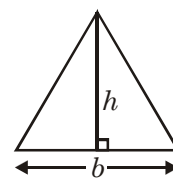
- | | |
|-------------------|-------------|
| 1. 6 | 2. Cylinder |
| 3. Prism | 4. No. |
| 5. 15 | 6. Pentagon |
| 7. Ball, cylinder | 8. 6 |
| 9. Circle | 10. 12. |

CHAPTER 11

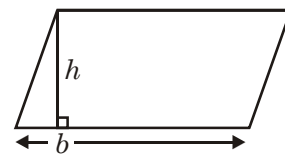
MENSURATION

Points to Remember

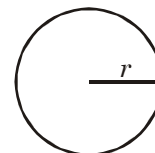
□ Area of triangle = $\frac{1}{2} \times b \times h$



□ Area of parallelogram = $b \times h$

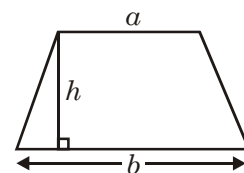


□ Area of circle = πr^2

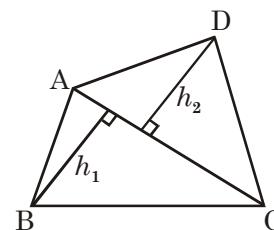


□ Perimeter or circumference of circle = $2\pi r$

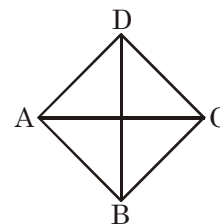
□ Area of trapezium = $\frac{1}{2} \times h (a + b)$



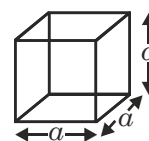
□ Area of quadrilateral = $\frac{1}{2} \times AC (h_1 + h_2)$



- Area of Rhombus = $\frac{1}{2} \times$ Product of diagonals.

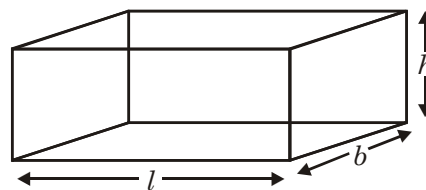


- Cube



- (i) Volume of cube = a^3
- (ii) Lateral surface area of cube = $4a^2$
- (iii) Total surface area of cube = $6a^2$

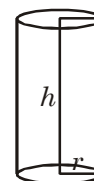
- Cuboid



- (i) Volume of cuboid = lbh
- (ii) Total surface area of cuboid = $2(lb + bh + hl)$
- (iii) Lateral surface area of cuboid = area of four walls

$$= 2h(l + b)$$
- (iv) Length of its diagonal = $\sqrt{l^2 + b^2 + h^2}$

- Cylinder



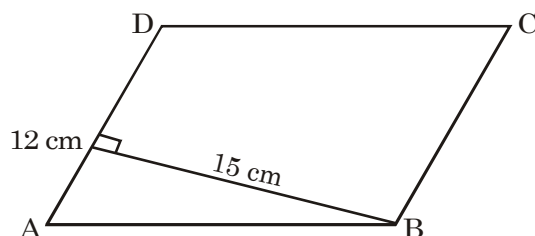
- (i) Volume of cylinder = $\pi r^2 h$
- (ii) Curved surface area of cylinder = $2\pi r h$
- (iii) Total surface area of cylinder

$$= 2\pi r h + 2\pi r^2$$

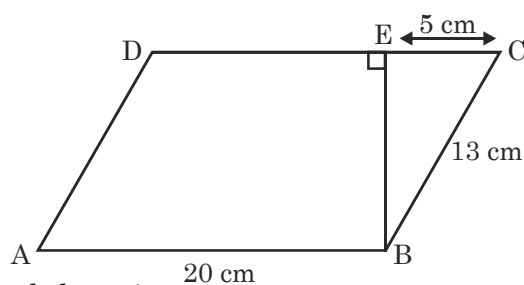
$$= 2\pi r(h + r)$$

QUESTIONS

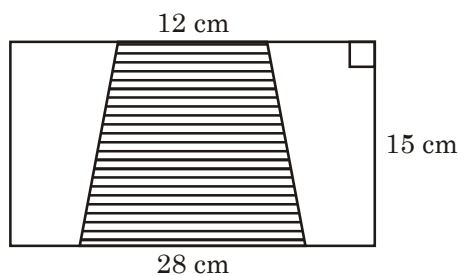
1. In the adjoining figure, find the area of the parallelogram.



2. In the figure find the area of the parallelogram.

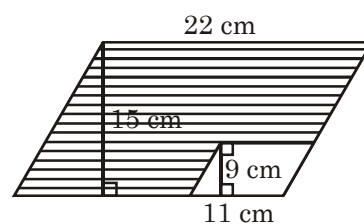


3. In the adjoining figure find the area of the shaded portion.

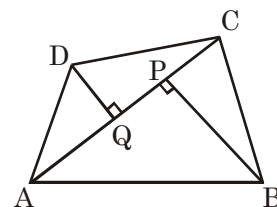


4. Find the area of rhombus whose two diagonals are 18 cm and 11 cm.

5. Find the area of the shaded portion.

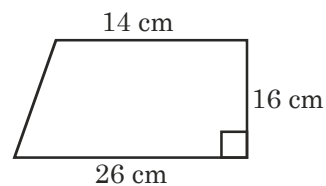


6. Find the area of the quadrilateral $ABCD$ in the given figure.

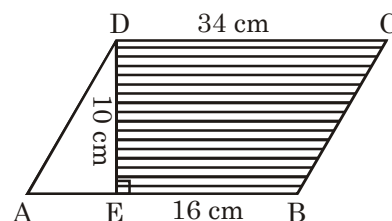


When $AC = 15$ cm, $BP = 10$ cm, $DQ = 6$ cm

7. In the figure, find the area of the given trapezium.

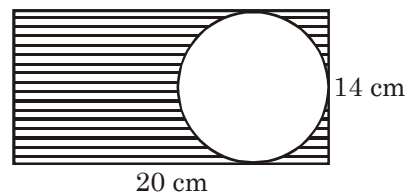


8. Find the area of shaded portion when $DE \perp AB$.

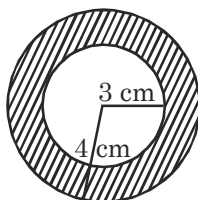


9. Find the circumference of the circle whose radius is 7 cm.
10. A racing track is a circle of radius 28 cm. How many metres Kiran has to run if she takes two (2) rounds of the track?

11. Find the area of the shaded portion.

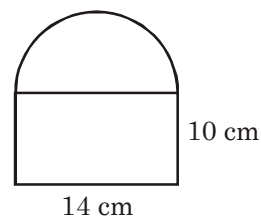


12. Diameters of two circles are 15 cm and 25 cm respectively. What is the ratio of their circumferences?
13. Find the ratio of the areas of two circles whose radii is 7 cm and 14 cm.
14. Find the diameter of the circle whose circumference is 220 metres.
15. A wire is in the shape of a square of side 44 m. If it is refolded into a circular ring, find the radius of the ring.
16. Diameter of a wheel of a car is 70 cm. How much distance will it cover in 10 revolutions?
17. What is the area of triangle whose base is 36 cm and height is 7 cm?
18. What is the area of shaded ring if radii of two circles are 4 cm and 3 cm?

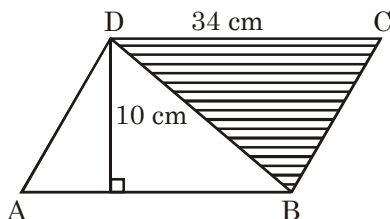


19. Find the diameter of a circle whose circumference is 66 cm.

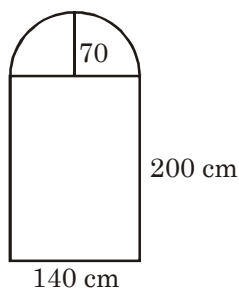
20. Find the area of the figure if the upper portion is a semi circle.



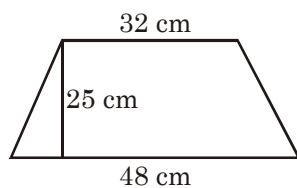
21. Find the area of the shaded triangle in the figure, where $ABCD$ is a parallelogram.



22. What is the radius of a circle of area 154 cm^2 ?
23. A room has two circular windows for exhaust fans. What is the area of these windows if the radius of each 7 cm.
24. The windows of a room are of the shape as in the figure. How much net is required to cover 2 such windows?

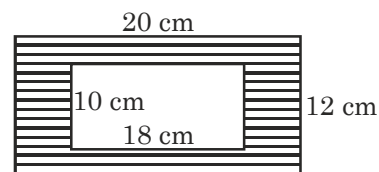


25. Radha wants to make a dress which is of the shape of trapezium. How much cloth is required to make the dress shown in the fig.

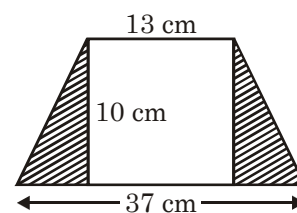


26. How much soil is required to fill a triangular flower bed, whose base is 35 m and height is 8m?

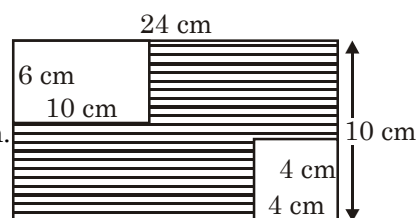
27. Find the area of shaded portion.



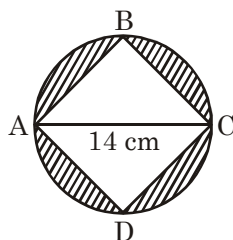
28. Find the area of shaded portion.



29. From the adjoining figure find the area of shaded portion.

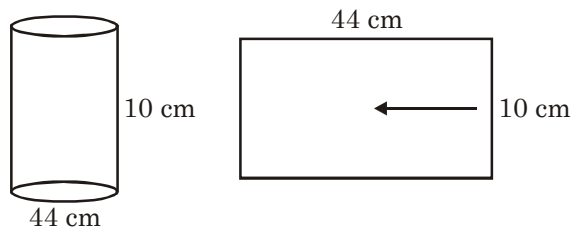


30. Find the area of the shaded portion if diameter of circle is 14 cm and $ABCD$ is a square.



31. What is the volume of a cubical tank of water of side 1.2m?
32. How many cm^3 of juice can be poured in a cuboidal can whose dimensions are $15 \text{ cm} \times 10 \text{ cm} \times 25 \text{ cm}$?
33. What is the area of curved surface of right circular cylinder with height 14 cm and radius of base 5 cm?
34. Volume of a cube is 1331 cm^3 . What is the length of each side?
35. Lateral surface area of a cube is 100m^2 . What is the length of its edge?
36. Total surface area of a cubical box is 294cm^2 . Find the length of its edge.
37. 216 cubes of same size are joined together to form a new cube. What is the ratio of the sides of small and bigger cube?
38. 125 cubes each of edge 2 cm are joined to form a new cube. What is the length of each edge of cube so formed?
39. Three cubes of iron with sides 3 cm, 4 cm and 5 cm are melted to form a new cube. What is the side of the new cube?

40. A rectangular piece of paper 44 cm long and 10 cm broad is rolled along the length to form a cylinder. What is the radius of the base?



41. Two cylinder have same base radius r . If their heights are 5 cm and 15 cm. What is the ratio of their volumes?
42. If base radius of a cylinder is doubled then the volume of new cylinder = _____ times the volume of given cylinder.
43. If the volume of a right circular cylinder, 3 cm high is 462 cm^3 . What is the radius of the base of cylinder?
44. What is the total surface area of a cube of side 1.2m?
45. A wire in the shape of a square, is 264 cm long is reshaped as a circle. What is the radius of the circle so formed?
46. What is the length of the largest rod that can be place in a cuboid of dimentions $3\text{m} \times 4\text{m} \times 5\text{m}$.
47. If the edges of a room are in the ratio 3:2:1 and its total surface area is 198 m^2 . What is the length of the room?
48. A small cube of side 4 cm is placed in a cube of side 5cm. Find the volume of the air in between the two cubes.
49. Volumes of two cylinders of same height are in the ratio 1:16. What is the ratio of their radii.
50. The sides of a room are in the ratio 5:3:2. If the volume of the room is 3750 cubic meters. Find the length of the room.

ANSWERS

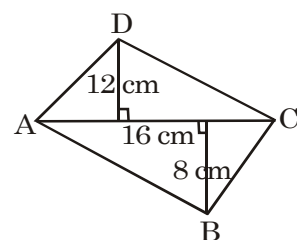
- | | |
|------------------------|-----------------------|
| 1. 180 cm^2 | 2. 240 cm^2 |
| 3. 300 cm^2 | 4. 99 cm^2 |
| 5. 231 cm^2 | 6. 120 cm^2 |
| 7. 320 cm^2 | 8. 250 cm^2 |
| 9. 44 cm | 10. 3.52 m |
| 11. 126 cm^2 | 12. 3:5 |
-

- | | |
|-------------------------|---------------------------|
| 13. 1:4 | 14. 70 m |
| 15. 28 m | 16. 22 m |
| 17. 126 cm^2 | 18. 22 cm^2 |
| 19. 21 cm | 20. 217 cm^2 |
| 21. 170 cm^2 | 22. 7 cm |
| 23. 308 cm^2 | 24. 71400 cm^2 |
| 25. 1000 cm^2 | 26. 140 m^2 |
| 27. 60 cm^2 | 28. 120 cm^2 |
| 29. 164 cm^2 | 30. 56 cm^2 |
| 31. 1.728 m^3 | 32. 3750 cm^3 |
| 33. 440 cm^2 | 34. 11 cm |
| 35. 5 m | 36. 7 cm |
| 37. 1:6 | 38. 10 cm |
| 39. 6 cm | 40. 7 cm |
| 41. 1:3 | 42. 4 |
| 43. 7 cm | 44. 8.64 m^2 |
| 45. 42 cm | 46. $5\sqrt{2} \text{ m}$ |
| 47. 9 m | 48. 61 cm^3 |
| 49. 1:4 | 50. 25 m |

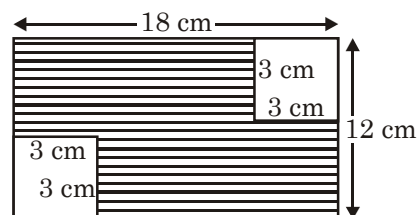
TEST YOUR KNOWLEDGE

1. Capacity of cylindrical tank is 1 m^3 . How much litre water it can contain?
2. Find the height of cuboid whose volume is 125 cm^3 and base area is 5 cm^2 .
3. Dimension of floor is $12 \text{ m} \times 3 \text{ m}$. Find the no. of tiles required to cover it if dimension of each tile is $10 \text{ cm} \times 10 \text{ cm}$.
4. Find the volume of cube whose side is 0.4 cm.
5. Find the volume of cylinder whose radius is 7 cm and height is 5 cm.
6. Find the side of a cube whose total surface area is 600 cm^2 .

7. Find the area of quadrilateral.

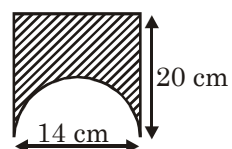


8. Find the area of shaded region.



9. The area of rhombus is 120 cm^2 and one diagonal is 5 cm. Find the length of other diagonal.

10. Find the area bounded by the figure. (Shaded region).



ANSWERS

- | | |
|-----------------------|-------------------------|
| 1. 1000 litre | 2. 25 cm |
| 3. 3600 | 4. 0.064 cm^3 |
| 5. 770 cm^3 | 6. 10 cm |
| 7. 160 cm^2 | 8. 198 cm^2 |
| 9. 48 cm | 10. 203 cm^2 |

CHAPTER 12

EXPONENTS AND POWERS

Points to Remember

- Exponent is used to express very large no. and very small numbers in standard form.
- Very large numbers can be expressed in standard form using positive exponents.
e.g., Distance between sun and moon = 1.49×10^{11} m
- Very small numbers can be expressed in standard form using negative exponents.

e.g., 1 micron = $10^{-6}m = \frac{1}{1000000}m$.

- If x, y, a, b are rational no. then

(i) $x^a \times x^b = x^{a+b}$

(ii) $x^a \div x^b = x^{a-b}$

(iii) $x^a \times y^a = (xy)^a$

(iv) $x^a \div y^a = \left(\frac{x}{y}\right)^a$

(v) $\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}$

(vi) $(x^a)^b = x^{ab}$

(vii) $x^a \times y^{-a} = \frac{x^a}{y^a} = \left(\frac{x}{y}\right)^a$

(viii) $x^0 = 1$.

(ix) $x^{-a} = \frac{1}{x^a}$.

QUESTIONS

1. 2 multiplied eleven times is written as _____.
2. What is the base of the exponent 9^6 ?
3. Simplify and give the answer.

$$\left(\frac{2}{5}\right)^5 \times \left(\frac{2}{5}\right)^{-3} = ?$$

4. Find the missing number $7^5 = \frac{1}{7\Box}$
5. Find $\left(\frac{-2}{5}\right)^2 \times \left(\frac{5}{2}\right)^2 = \underline{\hspace{2cm}}$.
6. Find the value of $(3^2)^2$.
7. Calculate $2^5 + 5^2$.
8. Find the value of x , when $2^x = 4^3$
9. How much is $(\sqrt{5})^5 \div (\sqrt{5})^3$?
10. Find the value of $3^2 \times 2^3$.
11. If $(x^5 \times x^{-2})^2 = 64$, what is x ?
12. $1^3 + 1^{-3} = ?$
13. Find the value $(2^{11} + 3^2 - 5^1)^0$.
14. The value of $\frac{x^{21}}{x^{17}} = ?$
15. Follow the pattern and complete.

Pattern

$$121 = 11^2$$

$$12321 = 111^2$$

Complete

$$123454321 = ?$$

16. Find the value of a^2b^3 when $a = 2$ and $b = 3$.
17. Find the value of x , if $2^x = \frac{1}{32}$.
18. If $2^x \times 5^x = 1000$, then $x = ?$
19. If $5^{2x-6} = 1$ then $x = ?$
20. Find the value of x if $2^{3x} = 64$.

21. What is x if $29^x = 1$?
22. If $216^x = 6$ then find x .
23. Find $3^3 + 4^3 + 5^3$ and give the answer in cube.
24. Observe the pattern and find the cubes

$$\begin{array}{rcccl}
 23^3 = & 2^3 & \xrightarrow{36} & 3^3 & = 8, 6, 4, 7 \\
 & \downarrow & & \downarrow & \\
 & (3 \times 2 \times 2 \times 3) & & (3 \times 2 \times 3 \times 3) & = 12167 \\
 \\
 32^3 = & 27 & \xrightarrow{54} & 8 & = 2^7 5^4 3^6 0^8 \\
 = & (3 \times 3^2 \times 2) & \xrightarrow{36} & (3 \times 3 \times 2^2) & \\
 = & 32768 & & &
 \end{array}$$

Find (i) 21^3

(ii) 17^3

(iii) 15^3

25. Observe the pattern and try to find squares of numbers in a line pattern.

$$\begin{array}{rcccl}
 (i) & (37)^2 = 3^2 & \xrightarrow{42} & 7^2 & \\
 & = 9 & \downarrow & & \\
 & & 42 & 49 & \\
 & & \downarrow & & \\
 & (2 \times 3 \times 7) & & & \\
 & = 1369 & & & \\
 \\
 (ii) & 26^2 = 2^2 & \xrightarrow{24} & 6^2 & \\
 & & \downarrow & & \\
 & (2 \times 2 \times 6) & & & \\
 & = 4 & 24 & 36 & \\
 & = 676 & & &
 \end{array}$$

Find (i) 81^2

(ii) 67^2

(iii) 74^2

(iv) 56^2 .

26. Find the missing number x in : $5^2 + x^2 = 13^2$
27. Find the value of $(4^3 + 12^2)$.
28. Find in the form of positive exponent $(x^{-4})^3$
29. Find in the form of positive exponent $5^4 \times 5^{-6}$
30. Find in exponent form $2^5 \times 2^7 \times 2^{-3}$
31. Find the value of $\left(\frac{3}{-2}\right)^3$.
32. Find the value of $\left(\frac{2}{3}\right)^{-4}$.

33. Find 8.469×10^3 in normal form.
34. Find 724.9×10^3 in normal form.
35. Find 72.49×10^3 in normal form.
36. Find 72.48×10^{-3} in normal form.
37. Find 5×10^{-3} in normal form.
38. Find 8465×10^{-2} in normal form.
39. Find 0.000000 375 in standard form.
40. Find 418700000 in standard form.
41. Find 87.34×10^{-3} in normal form.
42. Find 72.48×10^3 in normal form.
43. Simplify in exponent form $(3^4 \times 3^2) \div 3^{-4}$.
44. Simplify in exponent form $(2^{-3} \times 2^6) \div 2^5$.
45. Simplify in exponent form $2^{-3} \times 2^5 \times 5^2$.
46. Simplify $(-2)^4 \times \left(\frac{3}{2}\right)^4$.
47. Find the value of a if $(-2)^{3a+1} \times (-2)^4 = (-2)^8$.
48. Find the value of $(2^{-1} + 3^{-1})^2$.
49. Find the value of $\left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{4}\right)^{-2}$.
50. Find the value of $\frac{6^7 - 6^9}{6^5}$.

ANSWERS

- | | |
|-----------------------|------------|
| 1. 2^{11} | 2. 9 |
| 3. $\frac{4}{25}$ | 4. -5 |
| 5. 1 | 6. 81 |
| 7. 57 | 8. $x = 6$ |
| 9. $(\sqrt{5})^2 = 5$ | 10. 72 |
| 11. 2 | 12. 2 |
| 13. 1 | 14. x^4 |
-

- | | | | |
|----------------------------|-------------------------|------------|-----------|
| 15. $(11111)^2$ | 16. 108 | | |
| 17. -5 | 18. 3 | | |
| 19. 3 | 20. 2 | | |
| 21. 0 | 22. $\frac{1}{3}$ | | |
| 23. 6^3 | | | |
| 24. (i) 9261 | (ii) 4913 | (iii) 3375 | |
| 25. (i) 6561 | (ii) 4489 | (iii) 5476 | (iv) 3136 |
| 26. 12 | | | |
| 27. 208 | 28. $\frac{1}{x^{12}}$ | | |
| 29. $\frac{1}{5^2}$ | 30. 2^9 | | |
| 31. $\frac{-27}{8}$ | 32. $\frac{81}{16}$ | | |
| 33. 8469 | 34. 724900 | | |
| 35. 72490 | 36. 0.07248 | | |
| 37. 0.005 | 38. 84.65 | | |
| 39. 3.75×10^{-7} | 40. 4.187×10^8 | | |
| 41. 8.734×10^{-2} | 42. 7.248×10^4 | | |
| 43. 3^{10} | 44. 2^{-2} | | |
| 45. 10^2 | 46. 81 | | |
| 47. $a = 1$ | 48. $\frac{25}{36}$ | | |
| 49. 29 | 50. $-1260.$ | | |

TEST YOUR KNOWLEDGE

1. Find 3.72×10^{-2} in usual form.
2. Find 4.732×10^2 in usual form.
3. Find 326800 in standard form.
4. Find 0.000367 in standard form.
5. Simplify in exponent form. $(a^7 \div a^{-5}) \times a^{-2}$.
6. Find the value of m if $5^{2m-1} \times 5^1 = 25$.

7. Find the value of $\left(\frac{3}{-2}\right)^2 \times \left(\frac{-2}{3}\right)^3$.
8. Find the value of $(125)^2$.
9. Find the value of $\left(2^{-1} + 3^2 + \frac{1}{4}\right)^0$.
10. Find the value of ab^2c if $a = 1$, $b = 2$, $c = 3$.

ANSWERS

1. 0.0372

2. 473.2

3. 3.268×10^5

4. 3.67×10^{-4}

5. a^{10}

6. $m = 1$

7. $\frac{-2}{3}$

8. 15625

9. 1

10. 12

CHAPTER 13

DIRECT AND INVERSE PROPORTION

Key Facts

- (i) In direct proportion

$$\frac{x_1}{y_1} = \frac{x_2}{y_2}$$

- (ii) In inverse proportion

$$x_1 y_1 = x_2 y_2$$

or

$$\frac{x_1}{x_2} = \frac{y_2}{y_1}$$

QUESTIONS

- What is Ratio?
- In the table state whether x and y vary directly.

x	3	6	13	18	20	24	36
y	12	24	39	54	60	96	144

- In the table state whether x and y vary directly.

x	4	6	8	11	13	17
y	20	30	40	55	65	85

- In the table state whether x and y vary directly.

x	1	2	3	4	5	6
y	6	5	4	3	2	1

- Which of the following quantities do not vary directly with each other.
(i) Distance travelled (at constant speed) and petrol used.

- (ii) Ages of boys and their weight
 - (iii) Area of land and its price.
 - (iv) Number of pages of a book and its price.
 - (v) Number of men available and time taken to do a job.
6. Which of the following quantities do not vary directly with each other?
- (i) Time x to cover a fixed distance with speed y .
 - (ii) Number of Pens and their cost.
 - (iii) Weight of articles x and their cost y .
 - (iv) Wages y and hours of work x .
 - (v) Distance x and time y , speed remaining the same.
 - (vi) The length x of a journey by bus and the price of the ticket.
7. The cost of one dozen copies is ₹ 36. What is the cost of :
- (i) 2 copies
 - (ii) 5 copies
 - (iii) 10 copies
 - (iv) 6 copies
8. The cost of mailing 20 parcels is ₹ 160. What is cost of mailing :
- (i) 8 parcels
 - (ii) 15 parcels
 - (iii) 70 parcels
 - (iv) 200 parcels
9. 15 men can dig a 20 meters long trench in one day. How many men should be employed for digging 140 meters long trench of the same type in one day?
10. Twenty-seven tons of Iron cost ₹ 540.00. Find the cost of 120 tons of Iron.
11. The weekly consumption of rice of a hostel with 480 students is 160 kg. Find the consumption if the number of students becomes 720.
12. The shadow of Qutab Minar, which is 72 m high is 80m at a particular time on a day. Find the height of an electric pole which cast a shadow of 10m under similar condition.
13. If the weight of 6 sheets of paper is 45gms. How many sheets would weigh $1\frac{1}{2}$ kg ?
14. A man whose height is 165 cm casts a shadow of 55 cm at a particular time of the day. Find the length of shadow of a tree 33m high under similar weather conditions.
15. Raghav takes 75 steps to cover a distance of 50 m. How much distance will he cover in 375 steps?
16. The minimum speed for passing a typing test is 40 words per minute. How many words should an examinee type in half an hour so as to pass the typing test?
17. If 15 stamps of a denomination occupy an area of 60 sq. cm. How much area of paper is required for putting 120 stamps assuming that no area is wasted in between the stamps?

18. A machine takes 5 hours in cutting 120 tools. How many tools will it cut in 20 hours?
19. 20 pumps can empty a reservoir in 12 hours. In how many hours can 45 such pumps do the same work?
20. 36 books are packed in 2 carton of the same size. How many such cartons will it require to pack 144 books?

Fill in the blanks : (Q. 21 to Q. 24)

21. Ratio $\frac{a}{b}$ remain _____ in direct Variation.
22. In direct Variation $\frac{a_1}{b_1} \square \frac{a_2}{b_2}$.
23. ab is constant in _____ variation.
24. In Inverse Variation $\frac{a_1}{\square} = \frac{b_2}{\square}$.
25. Which of the following vary inversely to each other?
 - (i) The number of labourers engaged to dig a trench and time to complete the digging.
 - (ii) The length of journey by train and price paid for the ticket.
 - (iii) The number of subjects and time to do the home work in each subject.
 - (iv) Speed of vehicles and time taken to cover a fixed distance.
26. Shabnam takes 20 minutes to reach her school at an average speed of 6 km/hour. If she is required to reach school in 24 minutes, what should be her speed?
27. If 6 men can complete the wiring of a house in 7 days. In how many days 21 men can do this work.
28. A vegetable vendor has ₹ 2000 to buy potatoes which are available at the rate of ₹ 8 per kg. If the price of potatoes increases by 25%, find how much potatoes he can purchase with same amount?
29. If the 45 men can do a work in 20 days. Then how many men can do the same work in 75 days?
30. x and y are inversely proportional. If the value of x is 15 and value of y is 5 then which pair is not corresponding to x and y ?

(i) 25 and 3	(ii) 14 and 5
(iii) 16 and 6	(iv) 18.75 and 4.
31. In a military camp there is a food for 30 days for 50 soldiers. Assuming that average meal of every soldier is same. If 25 more soldiers join them then how many days this food will last.

32. A contractor employs a work force of 500 persons to complete construction of a bridge in six months. If he is asked to complete the work in 4 months then how many extra persons will he have to employ?
33. A train of length 315m is travelling at a speed of 54 km/hour. In what time will it pass a pole?
34. A group of 100 masons can make a road in 3 months while another group of 60 masons can build the same length of road in 4 months. Which group is more efficient in the construction of the road?
35. Fill in the blanks in the following table :

Time (in second)	1	4	15	30	x
Speed	150	37.5	10	y	3

36. If there is indirect variation between x and y then find the value of l , m and n .

x	1	2	3	l
y	m	n	$\frac{4}{3}$	$\frac{1}{3}$

37. If 721 men construct a bridge in 48 days then in how many days 1442 men can do this work?
38. If 10 men can do a work in 8 days then in how many days 2 men can do this work?
39. Rita can finish a work in 9 days. How much work she do in 2 days?
40. Seema and Riya can do a piece of work in 9 days but Seema alone can do it in 12 days. How long will Riya take to finish this work alone?
41. The speed of a car is 90km/hour. What is its speed in m/sec.?
42. A train is running at a speed of 18 km/hr. If it crosses a pole in 35 seconds find the length of the train.
43. The speed of a train 200 m long is 50 km per hour. How much time will it take to pass a platform 550m long?
44. A Hero Honda motor bike is running at 72km/hr. How much distance will it cover in 5 sec.?
45. A person cycles at a distance of 64 km. at a speed of 12 km/hr. How much time does he take to cover the distance?
46. Two trains 500m and 700m long are going with speeds 70km/hr. and 50km/hr. respectively in opposite direction. How long will it take to pass each other?
47. How long will a boy take to run around a square field of side 35m, if he runs at a speed of 9km/hr?
48. A train 154 m long is running at 60km/hr. It takes 30 seconds to cross a bridge, find the length of the bridge.

49. A gun is fixed at a distance of 1.75 km away from a watch point. The watchman hears the sound of the gun fire after 5 seconds. Find the speed at which sound travels.
50. Arnav weaves 35 seats of chairs in 7 days. How many days will he take to weave 140 similar seats of chairs?

ANSWERS

- | | |
|---|---|
| 1. It is comparison of two quantities of same kind in terms of magnitude. | |
| 2. No. | |
| 3. Yes | 4. No. |
| 5. (ii) and (v) | 6. (i) |
| 7. (i) ₹ 6 (ii) ₹ 15 (iii) ₹ 30 (iv) ₹ 18 | |
| 8. (i) ₹ 64 (ii) ₹ 120 (iii) ₹ 560 (iv) ₹ 1600 | |
| 9. 105 men | 10. ₹ 2400 |
| 11. 240 kg | 12. 9 meters |
| 13. 200 sheets | 14. 11 m |
| 15. 250 m | 16. 1200 |
| 17. 480 cm ² | 18. 480 |
| 19. $5\frac{1}{3}$ Hours | 20. 8 cartoons |
| 21. Constant | 22. Equal |
| 23. Inverse Variation | 24. $\frac{a_1}{a_2} = \frac{b_2}{b_1}$ |
| 25. (i) and (iv) | 26. 5 km/h |
| 27. 2 days | 28. 200kg |
| 29. 12 men | 30. (ii), (iii) |
| 31. 20 Days | 32. 250 |
| 33. 21sec. | 34. Second Group |
| 35. $x = 50, y = 5$ | 36. $l = 12, m = 4, n = 2.$ |
| 37. 24 Days | 38. 40 Days |
| 39. $\frac{2}{9}$ part | 40. 36 Days |
| 41. 25 m/sec. | 42. 175m |
| 43. 54 sec. | 44. 100 m |

45. 5 Hours 20 Minutes

46. 36 sec.

47. 56 sec.

48. 346 m

49. 350 m/sec.

50. 28 Days

TEST YOUR KNOWLEDGE

1. In the following table a and b are in direct proportion. Find the value of p .

a	2	p	100
b	$\frac{1}{2}$	$\frac{3}{4}$	q

2. In the above table (Q. 1) find the value of q .

In the following table l and m vary inversely. Study the table and answer question 3 and 4.

l	4	x	.001
m	.25	$\frac{1}{7}$	y

3. Find the value of x .

4. Find the value of y .

Read the following statements in which two quantities are inter-related. Then answer question 5 to 7.

- (i) Speed and distance covered
 - (ii) Speed and time taken
 - (iii) Distance covered and time taken
 - (iv) Age and height of a person.
5. In which statements the quantities vary directly.
6. In which statements the quantities vary inversely.
7. In which statement quantities neither vary directly nor inversely.
8. Mahesh goes 5 km with a speed of 10 km/hr. If he doubles his speed, find the time taken to cover the same distance.
9. If a minute hand in a clock makes an angle of 30° in 5 minutes. Find the angle covered by it between 4:10 p.m. and 4:30 p.m.
10. In one day Ramesh completes $\frac{1}{6}$ part of a work. In how many days he can finish the whole work?

ANSWERS

- | | |
|----------------|---------------|
| 1. 3 | 2. 25 |
| 3. 7 | 4. 1000 |
| 5. (i), (iii) | 6. (ii) |
| 7. (iv) | 8. 15 Minutes |
| 9. 120° | 10. 6 Days. |

CHAPTER 14

FACTORISATION

Key Facts

Factorisation using following methods and identities :

- (i) Regrouping method
- (ii) $a^2 + 2ab + b^2 = (a + b)^2$
- (iii) $a^2 - 2ab + b^2 = (a - b)^2$
- (iv) $a^2 - b^2 = (a + b)(a - b)$
- (v) $x^2 + (a + b)x + ab = (x + a)(x + b)$

The general relation for division is –

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

When Remainder = 0

$$\text{Dividend} = \text{Divisor} \times \text{Quotient}$$

Which shows if one factor is known, then other can be found by dividing the original expression by that factor.

QUESTIONS

1. Find all the factors of $14xy^2$.
2. Give the factors which are common in $6xyz$ and $9yz^2$
3. Factorize the expression $2xy + 6y^2$
4. Which is the factor common in all terms? $3xy + 15x^2y + 9xy^2 + 21y^3$
5. Give the two factors of $x^2 + 6x + 5$.
6. Find two numbers A and B so that $A + B = 12$ and $AB = 27$.
7. Factorise $x^2 + 12x + 35$
8. Find two numbers 'a' and 'b' so that $ab = 36$ and $(a - b) = 5$.

9. Factorize $6x^3 - 4x^2$.
10. Simplify $[10^2 - 18 \times 10 + 81]$
11. Put appropriate sign in the place of boxes :

$$(x^2 - 5x - 36) \square (x \square 9) = (x + 4).$$
12. $(x + 1)^2 - (x - 1)^2 = \underline{\hspace{2cm}}$.
13. Simplify : $\frac{(x^2 + 11x + 28)}{(x + 4)}$.
14. Find the product : $(a - b - c)(a - b + c)$
15. Find x if $x(y - z) = \frac{(4y^2 - 4z^2)}{(y + z)}$.
16. Factorize : $6xy - 2y + 3 - 9x$.
17. Express $y^2 - 9y + 20$ as product of two expressions.
18. Simplify : $\frac{4m^2 - 169n^2}{2m + 13n}$.
19. Complete it $(a^3 + b^3)(a^3 - b^3) = \underline{\hspace{2cm}}$.
20. Find the value of $3^4 - 1^4$ using the identity $x^4 - y^4 = (x + y)(x - y)(x^2 + y^2)$.
21. Factorize : $x^2 - 11x - 60$.
22. Find two numbers so that their product is 56 and difference is 10.
23. Simplify : $x^2 - 10x - 96$.
24. Simplify : $\frac{x^2 - 13x + 40}{(x - 8)}$.
25. $x^2 - x - 12 = (x - 4) \times \underline{\hspace{2cm}}$.
26. Find x and y that $xy = 72$, $x + y = 17$.
27. Factorize : $x^2 + 4x - 21$.
28. Simplify : $\frac{x^2 - 12x - 45}{x^2 + 4x + 3}$.
29. Express as product of two linear factors. $x^2 - 17x + 16$.
30. Find the remainder in the following : $(x^4 - a^4) \div (x^2 + a^2)$.
31. Simplify : $\frac{(0.87)^2 - (0.13)^2}{(0.87 - 0.13)}$.

32. Find dividend, when

$$\text{Divisor} = x + 3, \quad \text{Quotient} = x + 2, \quad \text{Remainder} = 0.$$

33. Find Quotient if

$$\text{Dividend} = x^2, \quad \text{Divisor} = x - 3, \quad \text{Remainder} = 9.$$

34. Factorize : $3x^2 - 10x + 8$.

35. Complete it : $x^2 + 25x + 84 = (x + 21) \times \underline{\hspace{2cm}}$.

36. Complete it : $x^2 - x - 156 = (\underline{\hspace{2cm}}) \times (x + 12)$.

37. Factorize : $x^2 - 30x - 216$.

38. Find $x^2 - y^2$ if $x = 5, y = 7$.

39. Find two numbers m and n so that

$$m + n = 19$$

$$mn = 70$$

40. Find y if, $(2x + 7)(2x - 7) + y = 4x^2$

41. Find the value of : $(3a + b)^2 - (3a - b)^2$.

42. Find z if, $(x + 4)(x - 5) - z = x(x - 1)$

43. Find the value of $81x^2 + 36xy + 4y^2$ if $x = \frac{1}{9}, y = \frac{-1}{2}$.

44. Put appropriate sign in the place of boxes

$$(x^2 \square 10x - 56) \div (x \square 4) = x - 14$$

45. Factorize : $4x^2 - 12xy + 9y^2$.

46. Factorize : $(x + y)^2 - (x - y)^2$.

47. Divide $100abc(3a - 12)(6b - 36)$ by $9(a - 4)(b - 6)$.

48. Find the quotient : $z(4y^2 - 64) \div 4z(y - 4)$

49. Complete the brackets –

$$(x + a)(x + b) = x^2 + (\quad)x + (\quad)$$

50. The sum and product of two numbers is same and both equal to 4. Find the numbers.

ANSWERS

1. $2 \times 7 \times x \times y \times y$

2. $3yz$

3. $2y(x + 3y)$

4. $3y$

5. $(x + 1)(x + 5)$

6. $A = 9, B = 3$ or $A = 3, B = 9$.

7. $(x + 5)(x + 7)$

8. $a = 9, b = 4$.

9. $2x^2(3x - 2)$

10. 1

11. $\div, -$

12. $4x$

- | | |
|--|--|
| 13. $x + 7$ | 14. $a^2 - 2ab + b^2 - c^2$ |
| 15. 4 | 16. $(3x - 1)(2y - 3)$ |
| 17. $(y - 4)(y - 5)$ | 18. $2m - 13n$ |
| 19. $a^6 - b^6$ | 20. 80 |
| 21. $(x - 15)(x + 4)$ | 22. 14, 4 |
| 23. $(x - 16)(x + 6)$ | 24. $x - 5$ |
| 25. $x + 3$ | 26. $x = 9, y = 8$ or $x = 8, y = 9$. |
| 27. $(x + 7)(x - 3)$ | 28. $\frac{x - 15}{x + 1}$ |
| 29. $(x - 16)(x - 1)$ | 30. $x^2 - a^2$ |
| 31. 1 | 32. $x^2 + 5x + 6$ |
| 33. $x + 3$ | 34. $(x - 2)(3x - 4)$ |
| 35. $(x + 4)$ | 36. $(x - 13)$ |
| 37. $(x - 36)(x + 6)$ | 38. -24 |
| 39. $m = 14, n = 5$ or $m = 5, n = 14$ | 40. $y = 49$ |
| 41. $12ab$ | 42. -20 |
| 43. 0 | 44. -, +. |
| 45. $(2x - 3y)^2$ | 46. $4xy$ |
| 47. $200abc$ | 48. $y + 4$ |
| 49. $a + b, ab$ | 50. 2, 2 |

TEST YOUR KNOWLEDGE

- Factorize : $x^2(y + 5) - 4(y + 5)$
- Find $(x^4 + y^4)(x^4 - y^4)$ if $x = 1, y = 1$.
- Factorize : $16x^2 + 40xy + 25y^2$
- Divide $121x^5y^4z^3$ by $11x^3y^2z$.
- Complete it : $(x + 3)(x - 5) = x^2 + (\quad)x + (\quad)$.
- Simplify : $\frac{(1.9)^2 - (1.1)^2}{3}$
- Factorize : $x^2 - 3x + 2$.
- Find the value of $25^2 - 24^2$.
- Find the common factor in $7x^2y + 49xy^2 + 343x^3y^2$.
- Find the value of $\frac{x^3y - xy^3}{xy}$ as a product of two factors.

ANSWERS

1. $(y + 5)(x + 2)(x - 2)$

2. 0

3. $(4x + 5y)^2$

4. $11x^2y^2z^2$

5. -2, -15.

6. 0.8

7. $(x - 2)(x - 1)$

8. 49

9. $7xy$

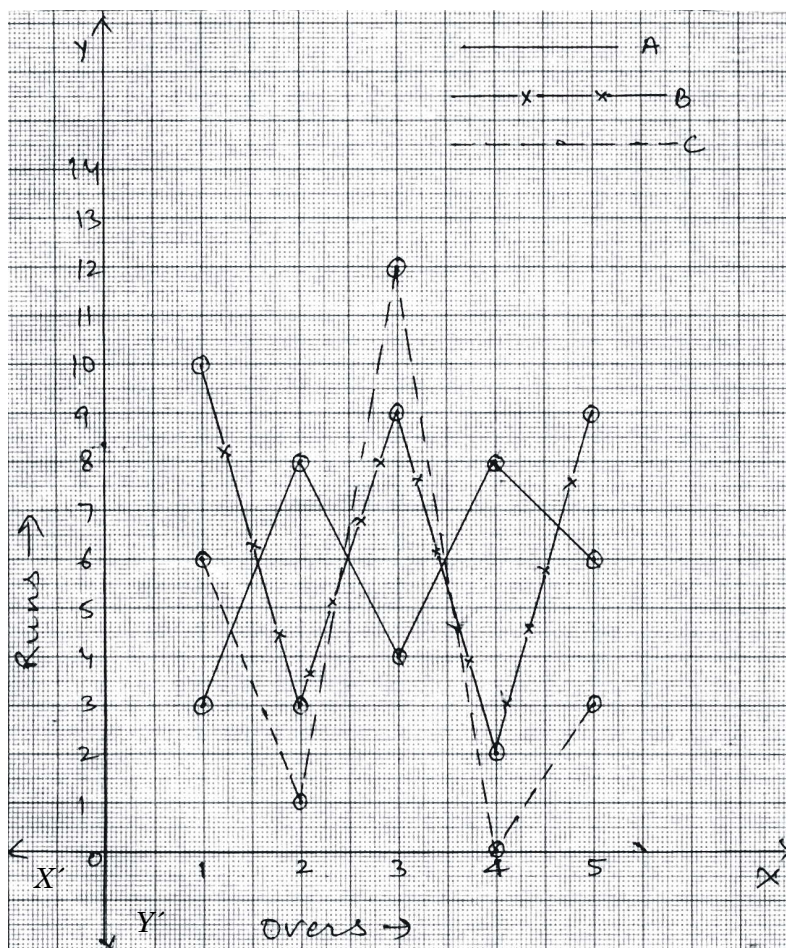
10. $(x + y)(x - y)$.

CHAPTER 15

INTRODUCTION TO GRAPHS

QUESTIONS

Read the following graph carefully in which runs scored by three batsman A , B and C are shown. Answer the questions that follow (1 – 6) :



1. Name the batsman who scored 9 runs twice in his allotted 5 overs.
2. Which of the three batsman could not score even a single run in any one of the 5 overs?
3. Whose performance was most steady?
4. What is the total score of batsman A after 5 overs?
5. Which batsman scored highest runs in an over?
6. Which batsman scored thrice the score more than 8?
7. Choose the points whose joining will result in a square :

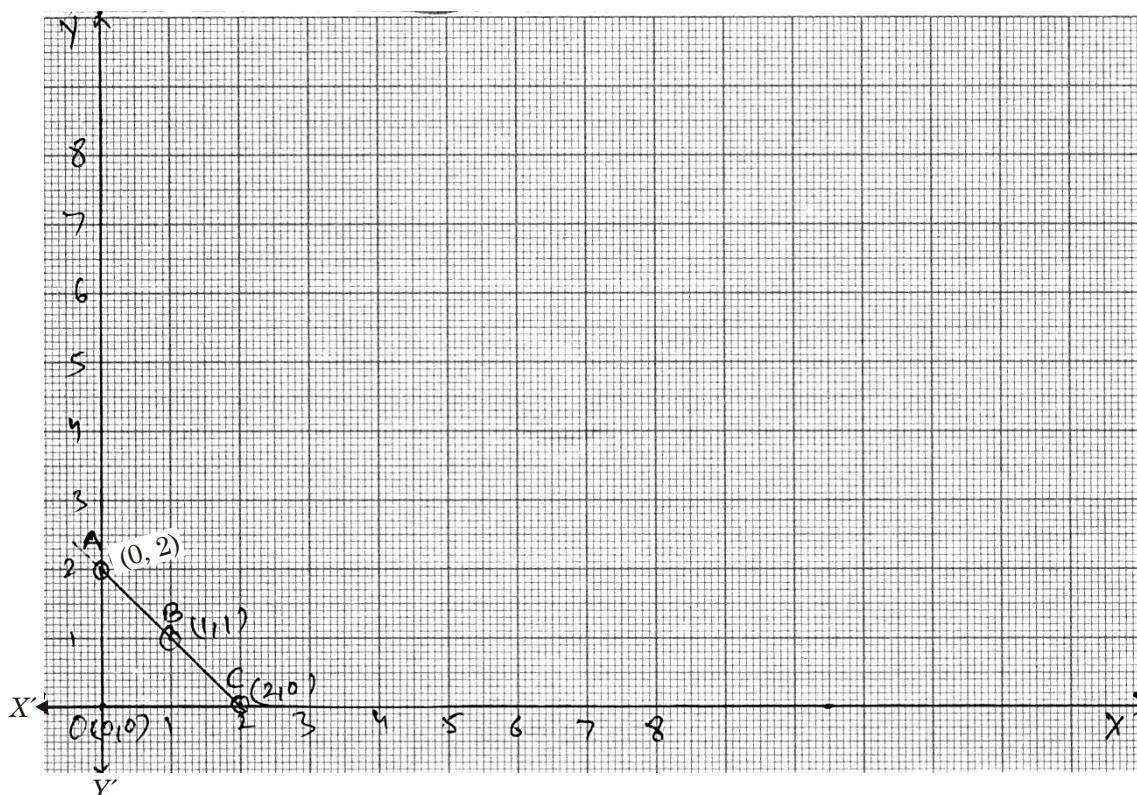
$A(0, 0), B(4, 3), C(0, 2), D(2, 0), E(3, 4), F(2, 2)$

8. Ramesh Kumar's water bill shows quantity of water consumed in litres and cost of water consumed. Identify the dependent and independent variables in the above statement.

9. Choose the points which if joined, the obtained figure will be a rectangle :

$A(1, 1), B(7, 6), C(1, 4), D(1, 0), E(3, 4), F(3, 1).$

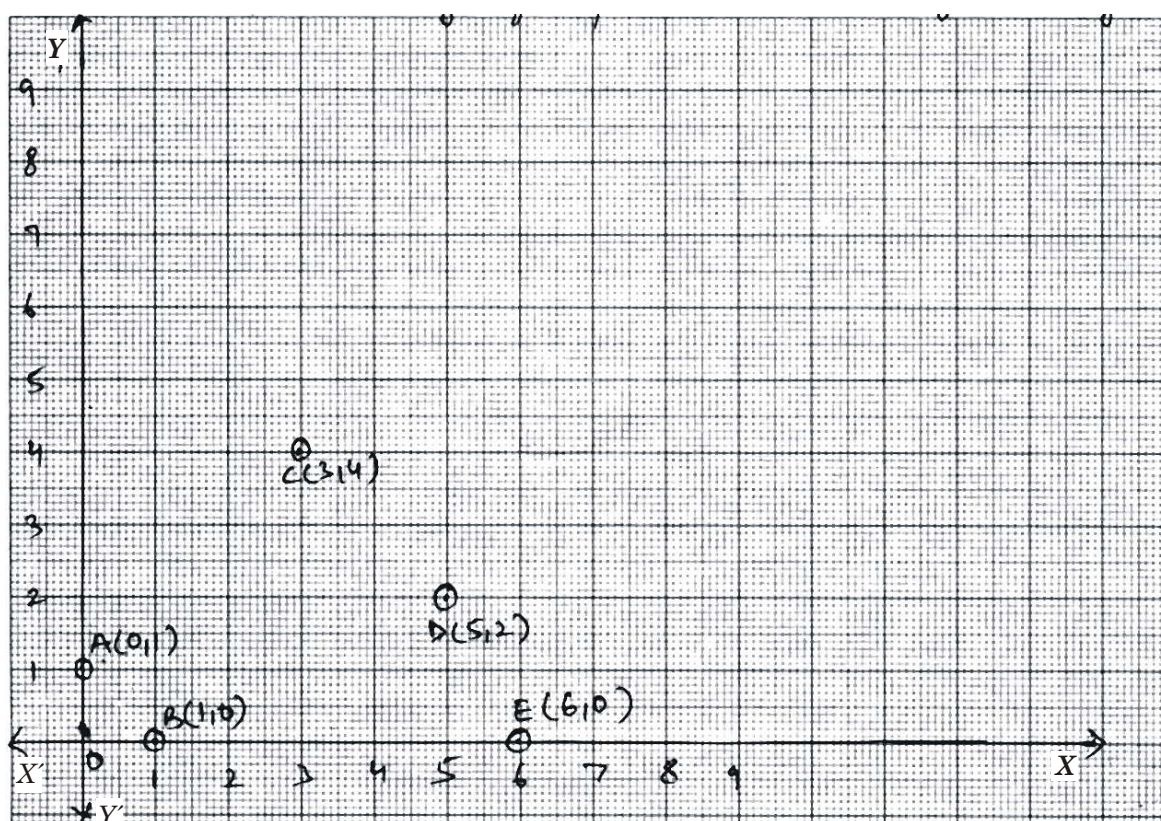
Using following graph, answer following question :



10. Which is the nearest point to the origin?

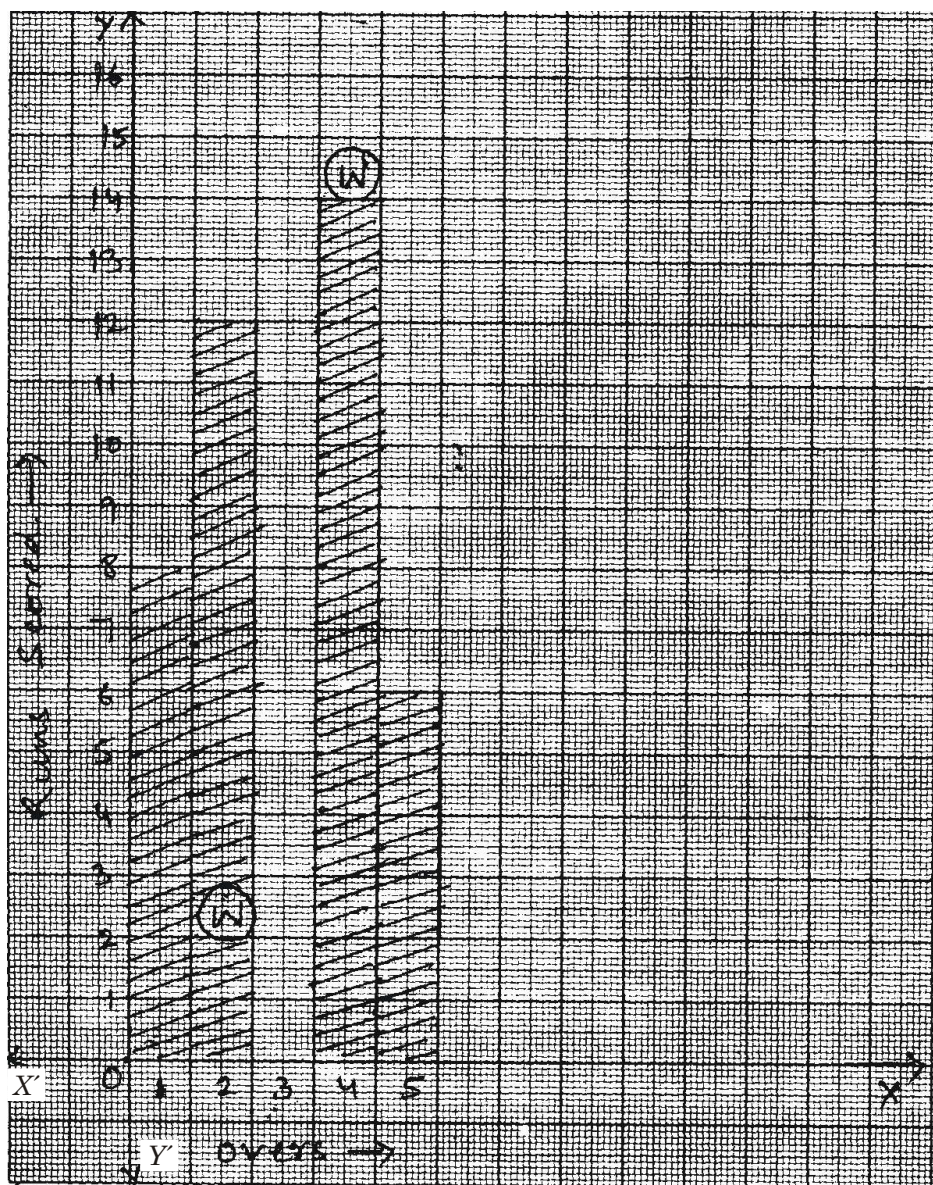
11. If a man covers 5 units right (due east) from point A , then find the co-ordinates of his new position.
12. A person moves 3 units upwards (due north) from point B , find the co-ordinates of new position.
13. A person moves 4 units right (due east) from point C and then moves 5 units upwards (due north), find his new position.

Read the following graph and the following questions :



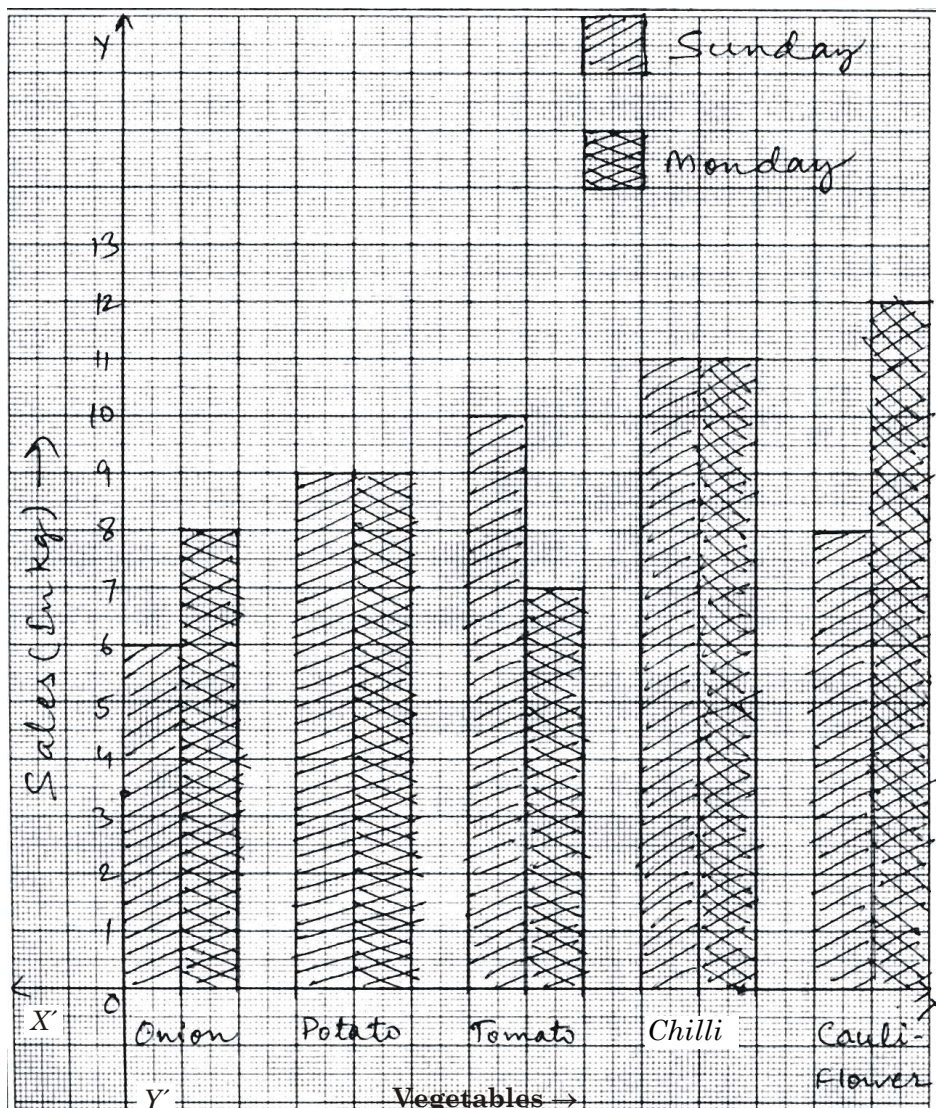
14. Name the point whose abscissa is same as ordinate of A and ordinate same as abscissa of A .
15. Find the point which is farthest from x -axis.
16. Find the point with one of its co-ordinates as zero and farthest from the origin.

The following graph shows analysis of first five overs of a team in a T-20 match. Study it and answer the following questions (17–21) :



17. When the first wicket was down, what was the score?
18. What was the score after 5 overs?
19. Which one was the only maiden (runless) over?
20. What was the run rate after 5 overs?
21. When did second wicket fall?

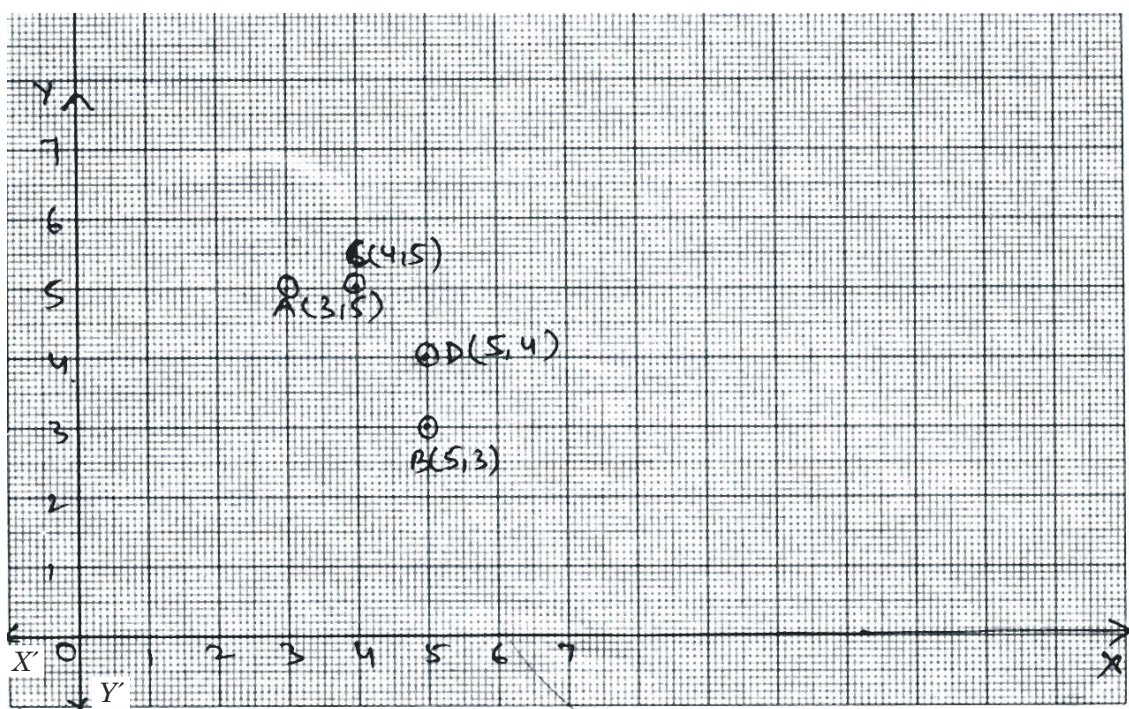
The following bar graph shows comparative sale of different vegetables of a store for two days. Study it and answer the questions that follows (22–26) :



22. Which vegetables experienced same amount of sale on both days?
23. Which vegetable experienced biggest decrease in consecutive days?
24. For which vegetable the increase is highest and what is the percent increase for this vegetable?
25. What is the lowest total sale in kg for any of the vegetables?
26. In terms of total sale of both days, which is the most in demand vegetable?
27. Which axis will be intersected by the extended line segment joining the points $A(2, 3)$ and $B(2, 5)$?

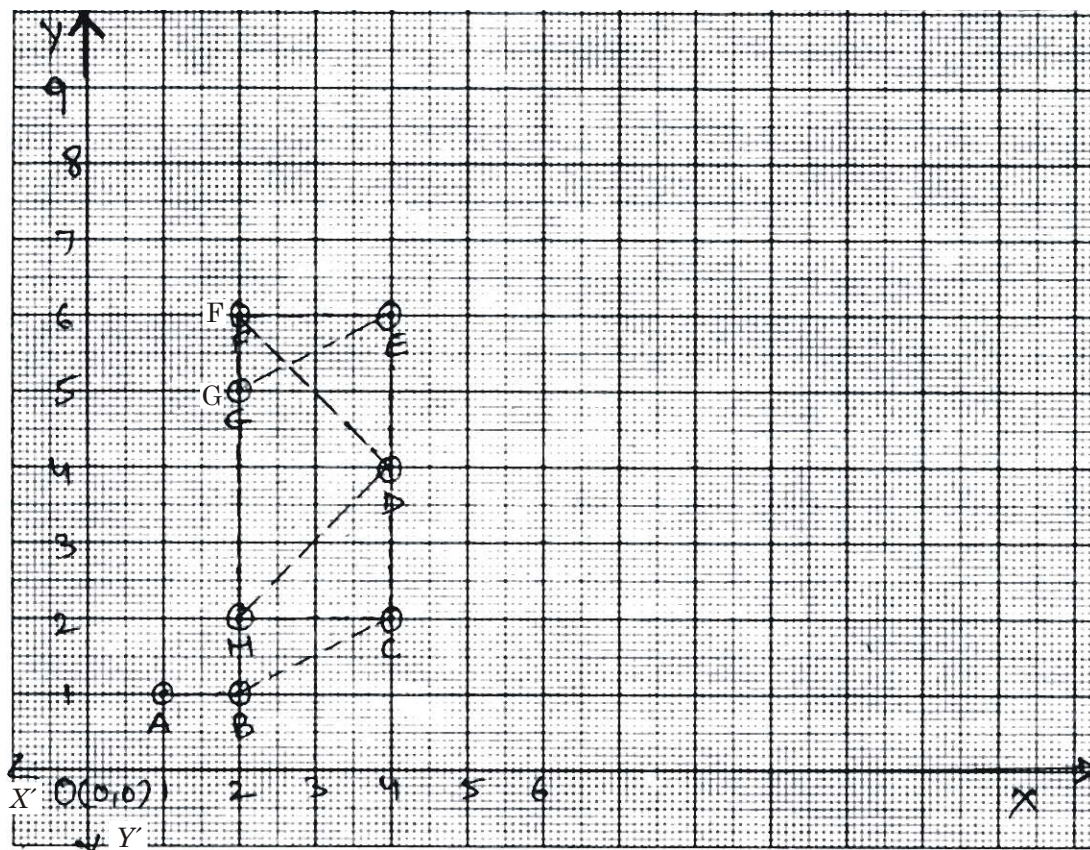
28. Two points $C(3, 3)$ and $D(5, 3)$ are joined and the line segment so obtained is extended in both the directions. Find the co-ordinates of the point of intersection of this extended line segment and y -axis.

Study the following graph and answer the following questions (29–30) :



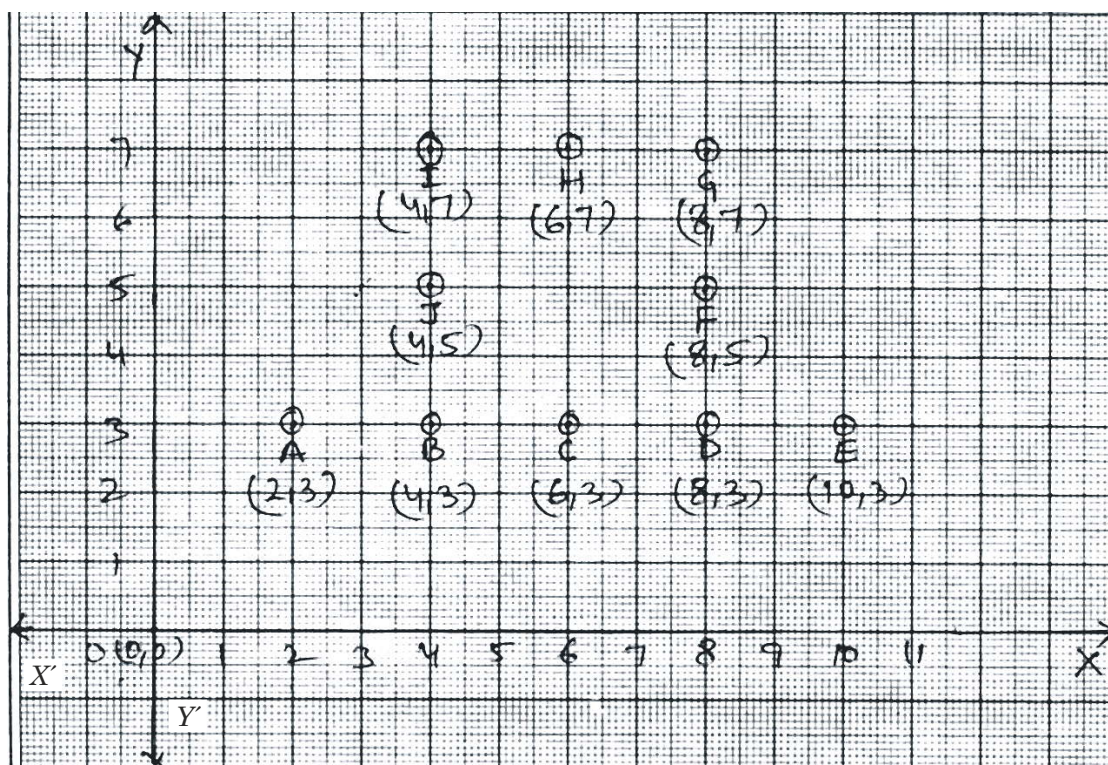
29. Find the co-ordinates of the point which if joined with point A , will give us a line segment parallel to x -axis.
30. Name the points whose joining will result in a line segment parallel to y -axis.

Read the following graph and answer the following questions (31–34) :



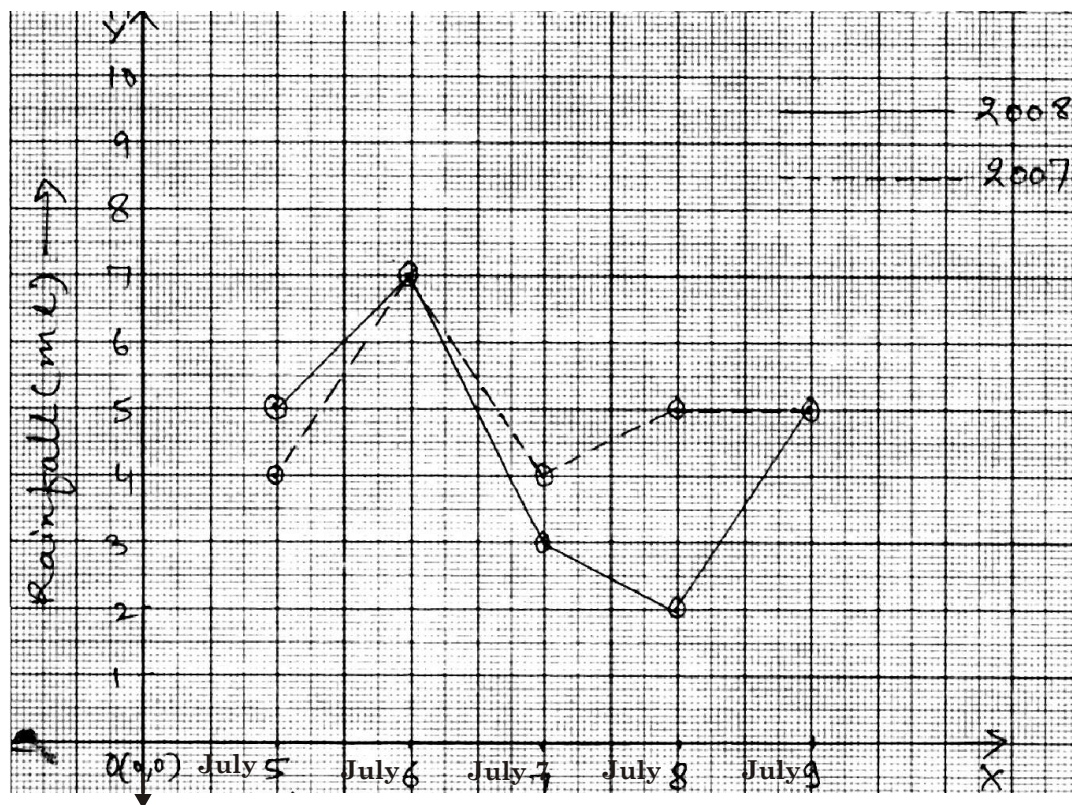
31. Identify the points and their co-ordinates which can form a parallelogram.
32. Name the points which can make an isosceles triangle.
33. Which are the points whose joining will give us a rectangle?
34. Identify the co-ordinates of the points whose joining will result in a line segment parallel to line segment HC .

Read the following graph and answer the following questions (35–37) :



35. Name the mid point of points D and G .
36. Find the co-ordinates of mid point of points I and G .
37. Find the co-ordinates of mid point of points A and E .

Study the following graph and answer the following questions (38–42) :



38. Which year experienced better overall rainfall for these five days?
39. On how many days the rainfall was same?
40. Which was the only day in 2008 when rainfall was more than in 2007?
41. On which date the difference between the rainfall of the two years was biggest?
42. If the average rainfall for a day is 4 ml, then in 2008 how many days were there on which the rainfall was more than average?

ANSWERS

- | | |
|--|-------------------------------------|
| 1. <i>B</i> | 2. <i>C</i> |
| 3. <i>A</i> | 4. 29 |
| 5. <i>C</i> | 6. <i>B</i> |
| 7. $A(0, 0)$, $C(0, 2)$, $F(2, 2)$, $D(2, 0)$. | |
| 8. Independent variable – Quantity of water. | Dependent variable – cost of water. |
| 9. $A(1, 1)$, $C(1, 4)$, $E(3, 4)$, $F(3, 1)$ | 10. <i>B</i> |
-

- | | |
|---|---|
| 11. (5, 2) | 12. (1, 4) |
| 13. (6, 5) | 14. B |
| 15. $C(3, 4)$ | 16. $E(6, 0)$ |
| 17. 10 Runs | 18. 40 Runs for 2 Wickets |
| 19. 3rd Over | 20. 8 Runs per over. |
| 21. On last ball of 4th over | 22. Potato and Chilli |
| 23. tomato | 24. Cauliflower, 50% |
| 25. 14 kg for Onion | 26. Chilli |
| 27. x -axis | 28. (0, 3) |
| 29. $C(4, 5)$ | 30. $B(5, 3)$ and $D(5, 4)$ |
| 31. $B(2, 1)$, $C(4, 2)$, $E(4, 6)$, $G(2, 5)$ | 32. Points H , D and F . |
| 33. Points H , C , E and F . | 34. $F(2, 6)$ and $E(4, 6)$ and $A(1, 1)$ and $B(2, 1)$ |
| 35. F | 36. (6, 7) |
| 37. (6, 3) | 38. 2007 |
| 39. Two | 40. July 5 |
| 41. July 8 | 42. Three |

CHAPTER 16

PLAYING WITH NUMBERS

Points to Remember

- ❑ Any number can be written in general form as following $= 10a + b$ where b is units digit and a is ten's digit.
- ❑ The general form of numbers are helpful in solving puzzles or number games.
- ❑ Test of Divisibility :
 - If the ones digit of a number is 0, 2, 4, 6 or 8 then it is divisible by 2.
 - If the ones digit of a number is 0 or 5 then it is divisible by 5.
 - If the ones digit of a number is 0 then it is divisible by 10.
 - If the sum of the digit of a number is divisible by 3 then the number is also divisible by 3.
 - If the sum of the digits of a number is divisible by 9 then the number is also divisible by 9.
 - A number will be divisible by 11 if the difference between the sum of the digits at its odd places and that of digits at the even places is divisible by 11.

QUESTIONS

1. Find Q in addition

$$\begin{array}{r} 31Q \\ + 1Q3 \\ \hline 468 \end{array}$$

2. Find the digits A and B.

$$\begin{array}{r} BA \\ \times B3 \\ \hline 46A \end{array}$$

3. Find the digits A and B.

$$\begin{array}{r} 12A \\ + 6AB \\ \hline A09 \end{array}$$

4. If a number $N \div 5$ Leaves a remainder of 3. What are the possible one's digit of N.

5. If a number $N \div 5$ leaves a remainder of 1. What are the possible one's place digit of N ?
6. If $312x$ is a multiple of 5, where x is a digit, what is the least value of x ?
7. Write two digit no. in general form.
8. If the division $N \div 2$ leaves a remainder of 1. What might be the highest ones digit of N ?
9. If the division $N \div 5$ leaves a remainder 4 and the division $N \div 2$ leaves a remainder 1. What must be the ones digit of N ?
10. If the sum of a two digit number and number obtained by reverse the digit is divide by 11. What is the remainder?
11. If the difference of a two digit number (ab) where $a > b$ and number obtained by reverse the digit is divided by 9. What is the remainder?
12. If $376x5$ is a multiple of 3, where x is a digit. What is the highest value of x ?
13. If $98m341$ is a multiple of 3, where m is a digit. What is the least value of m ?
14. If the division $1234x \div 3$ leaves a remainder of 1. What might be the least value of x ?
15. If the number $123A4$ is divide by 3. It leaves a remainder 1. What is the least value of A ?
16. If $23B4$ is a multiple of 3, where B is a digit. What is the least value of B ?
17. $21y5$ is a multiple of 3, where y is a digit. What is the least value of y ?
18. What least number should be added to 98455 so that the number is divisible by 3?
19. What least number should be subtract from 15287 so that the number is divisible by 3?
20. Which number is divisible by 10?
82513, 42165, 12540, 34255, 16751
21. Which number is divisible by 2?
35243, 10301, 34567, 12345, 24680
22. Which number is divisible by 3?
10301, 24680, 12345, 35243, 34567
23. Which number is divisible by 5?
20304, 8009, 15432, 9875, 26257
24. What least number should be added to 16751, so that the number is divisible by 10?
25. What least number should be subtract from 26257, so that the number is divisible by 10?
26. Which number is divisible by both 2 and 3?
12345, 24680, 20304, 8007, 8642

27. If the three digit number $3x5$ is divisible by 9. What is the value of x ?
28. Which number is divisible by both 5 and 10?
98175, 13260, 12345, 5675, 74384
29. What should be added to 981753 so that the number is divisible by both 5 and 10?
30. Which number is divisible by 9?
152875, 423513, 910542, 634526, 543215
31. Find the smallest four digit number which is divisible by 3.
32. Find the greatest five digit number which is divisible by 5.
33. What is the difference between the smallest three digit number and largest two digit number, divisible by 3?
34. Find smallest four digit number which is divisible by 9.
35. What is the difference between three digit largest and smallest number which is divisible by 3?
36. What is the difference between two digit largest and smallest number which is divisible by 2?
37. If $343M587$ is a multiple of 9 where M is a digit. What is the value of M ?
38. What number should be added to 152875 to make it exactly divisible by 9?
39. If $21433k$ is a multiple of 9 where k is a digit. What is the value of k ?
40. What should be subtracted from 7528764 to make it exactly divisible by 9?
41. Which number is divisible by 11?
15287, 16181, 35685, 84215
42. Which number is divisible by both 2 and 11?
1749, 2760, 8118, 2462
43. Which least number should be added to 13076 to make it exactly divisible by 11?
44. Which least number should be subtracted from 42384 to make it exactly divisible by 11?
45. What is the smallest four digit number exactly division by 11?
46. What is the greatest four digit number exactly divisible by 11?
47. What is the difference between four digit greatest and smallest number, divisible by 11?
48. If $26436T$ is a multiple of 11, where T is a digit. What is the value of T ?
49. If $39P625$ is a multiple of 11, where P is a digit. What is the value of P ?
50. What least number should be subtracted from 35875 to make it exactly divisible by 11?

ANSWERS

- | | |
|-------------------|-------------------|
| 1. 5 | 2. $A = 0, B = 2$ |
| 3. $A = 8, B = 1$ | 4. 3 and 8 |
| 5. 1 and 6 | 6. 0 |
| 7. $10a + b$ | 8. 9 |
| 9. 9 | 10. 0 |
| 11. 0 | 12. 9 |
| 13. 2 | 14. 0 |
| 15. 0 | 16. 0 |
| 17. 1 | 18. 2 |
| 19. 2 | 20. 12540 |
| 21. 24680 | 22. 12345 |
| 23. 9875 | 24. 9 |
| 25. 7 | 26. 20304 |
| 27. 1 | 28. 13260 |
| 29. 7 | 30. 423513 |
| 31. 1002 | 32. 99995 |
| 33. 3 | 34. 1008 |
| 35. 897 | 36. 88 |
| 37. 6 | 38. 8 |
| 39. 5 | 40. 3 |
| 41. 16181 | 42. 8118 |
| 43. 3 | 44. 1 |
| 45. 1001 | 46. 9999 |
| 47. 8998 | 48. 3 |
| 49. 4 | 50. 4 |

TEST YOUR KNOWLEDGE

1. Find A and B in addition.

$$\begin{array}{r}
 A \\
 + A \\
 \hline
 BA
 \end{array}$$

$\swarrow$ $\searrow$
Ten's place *One's place*

2. If $357x$ is a multiple of 2, where x is a digit. What is the least value of x ?
3. What least number should be added to 13723 to make it exactly divisible by 3?
4. Which number is divisible by 3?
653, 423, 983, 674, 908
5. What is the greatest two digit number exactly divisible by 2?
6. What least number should be added to smallest four digit number to make it exactly divisible by 9?
7. What least number should be subtracted from smallest four digit number to make it greatest three digit number exactly divisible by 9?
8. What is the greatest four digit number exactly divisible by 5?
9. What least number should be added to smallest four digit number to make it exactly divisible by 11?
10. Which number is divisible by 9?
2345, 3456, 4567, 5654, 5678

ANSWERS

1. $A = 5, \quad B = 1$

2. 0

3. 2

4. 423

5. 98

6. 8

7. 1

8. 9995

9. 1

10. 3456