केन्द्रीय विद्यालय संगठन

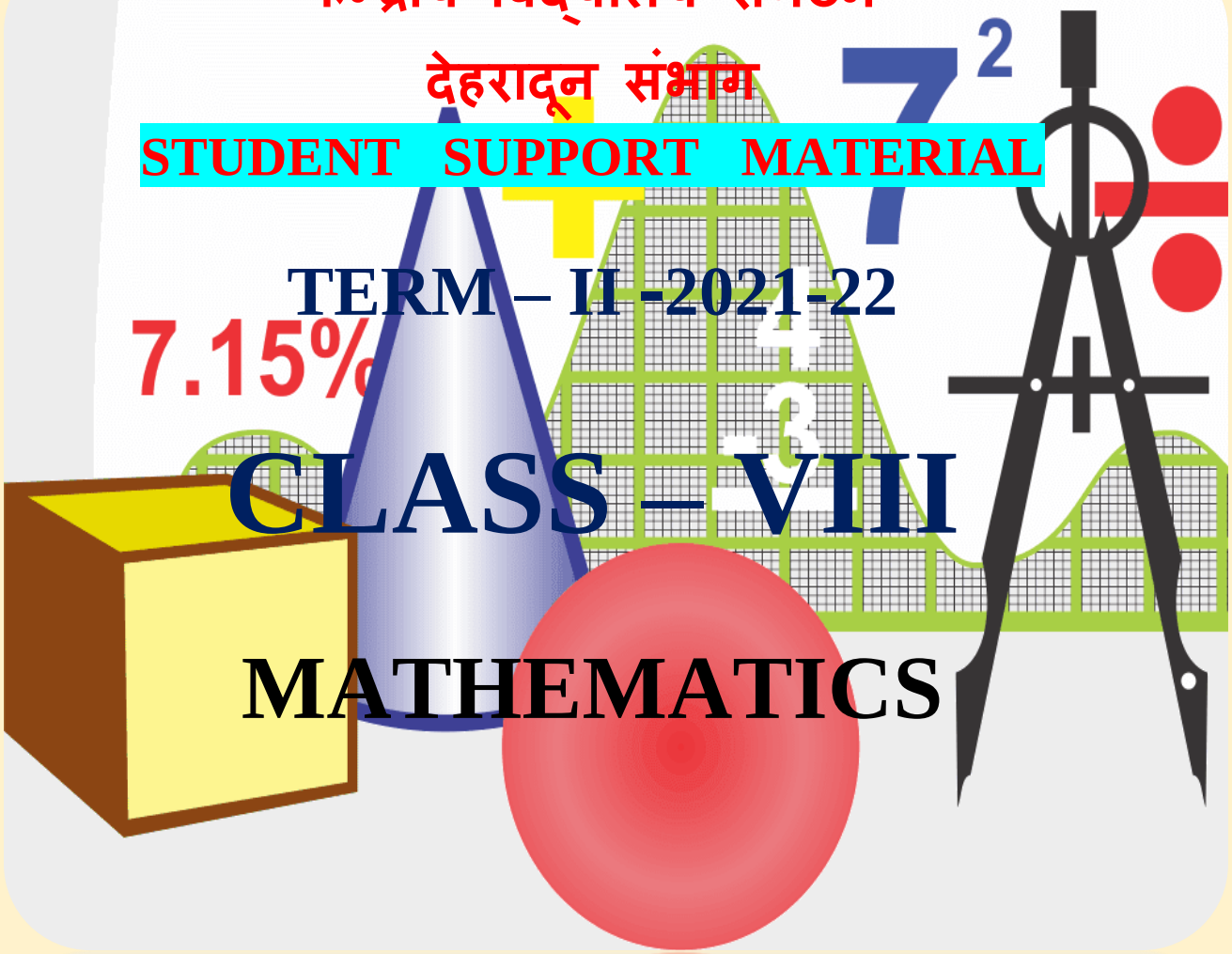
देहरादून संभाग

STUDENT SUPPORT MATERIAL

TERM – II -2021-22

CLASS – VIII

MATHEMATICS



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TERM - II
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MATHEMATICS

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A NOTE TO THE STUDENTS

Dear Students,

The current academic session has been historic in a number of ways. The pandemic not only forced shutting down of onsite classes and substituting them with online, virtual mode of teaching, a number of classroom activities, esp. writing under guidance of teachers and its prompt correction too has taken a backseat. On the examination front, the entire setup has undergone a revolutionary change. From typology of questions to their evaluation and to number of examination and duration of examination- nothing has remained untouched by these winds of change. This is the time we gear up ourselves to embrace these changes in examination landscape as we have done in case of online classes and explore possibilities in the challenges thrown before us by the pandemic.

The New Education Policy, too is an agent of massive changes in our knowledge landscape. Let us amalgamate all these changes and feel proud ourselves to be the first to answer the call of CHANGE.

In the light of new education policy new structure of assessment is proposed by Kendriya Vidyalaya Sangathan for classes VI to VIII. Multiple assessment methods are developed to assess the students in two terms (Term-I, April to September and Term-II October to March) throughout the academic session. Each term consists of Subject Enrichment Activities (SEA), Note Book submission (NB), Periodic Tests (PT), Multi-disciplinary Projects (MDP), Learners Diary (LD), and Critical & Creative Thinking (CCT).These assessments will be carried out regularly and continuously during each term. The assessment will be done through online/offline mode as per the pertaining situation of Covid-19 Pandemic SOPs. Students are advised to understand the learning and evaluation process/methods introduced as per NEP-2020, and get your all kinds of queries sorted out with proper guidance of learned subject teachers.

So, it is important to read the text and understand it thoroughly as per the guidance of your subject teachers. So, please make reading the text and practice writing in the centre of all your academic activities. Treat your NCERT books as your holy books and also go through the study material prepared by a team of dedicated teachers who have devoted sufficient time in understanding and then developing the content to suit the needs of all our dear students. Focus has been on relevance and conciseness- the content strictly is a supplement to your NCERT books and in no way it should be treated as a substitute to it.

I am sure the content in study material where you will find all units/ chapters for SECOND TERM at a glance, Chapter wise question bank , sample test items will be useful to you. However, it is imperative you keep your self-updated with regular in-touch and guidance of your teacher for any further changes that may take place after the study material has been prepared. Hope the efforts of your teachers in preparing this material will help you perform very well in your second term examination.

All the best.

MATHEMATICS

CLASS VIII

SYLLABUS FOR TERM -2 SESSION 2021-2

S.NO	CHAPTER-NO	CHAPTER NAME
1	9	ALGEBRAIC EXPRESSIONS AND IDENTITIES
2	10	VISUALISING SOLID SHAPES
3	11	MENSURATION
4	12	EXPONENTS AND POWERS
5	13	DIRECT AND INVERSE PROPORTION
6	14	FACTORISATION
7	15	INTRODUCTION TO GRAPHS
8	16	PLAYING WITH NUMBERS

CHAPTER – 9
ALGEBRAIC EXPRESSIONS AND IDENTITIES

Algebraic expressions are formed from variables and constants. The expression $2y - 5$ is formed from the variable y and constants 2 and 5. The expression $4xy + 7$ is formed from variables x and y and constants 4 and 7.

We know that, the value of y in the expression, $2y - 5$, may be anything. It can be2, 5, –3, 0, 5 /7, etc.; actually, countless different values. The value of an expression changes with the value chosen for the variables it contains. Thus as y takes on different values, the value of $2y - 5$ goes on changing

Terms, Factors and Coefficients

Take the expression $4x + 5$. This expression is made up of two terms, $4x$ and 5. **Terms are added to form expressions**. **Terms** themselves **can be** formed as **the product of factors**. The term $4x$ is the product of its factors 4 and x. The term 5 is made up of just one factor, i.e., 5.

The numerical factor of a term is called its **coefficient**. The coefficient in the term $7xy$ is 7

Monomials, Binomials and Polynomials

Expression that contains only one term is called a **monomial**. Such as 2x

Expression that contains two terms is called a **binomial**. such as $2x + 5$

An expression containing three terms is a **trinomial** and such as $3x^2 + 3x + 1$

In general, an expression containing, one or more terms with non-zero coefficient (with variables having non negative exponents) is called a **polynomial**. A polynomial may contain any number of terms, one or more than one

Like and Unlike terms

Look at the following expressions:

$7x$, $14x$, $-13x$, $5x^2$, $7y$, $7xy$, $-9y^2$, $-9x^2$, $-5yx$

Like terms from these are:

(i) $7x$, $14x$, $-13x$ are like terms.

(b)$5x^2$ and $-9x^2$ are like terms.

Like terms are formed from the same variables and the powers of these variables are also the same. But coefficients of like terms need not be the same.

Addition and Subtraction of Algebraic expressions

While adding and subtracting expressions this has to be kept in mind that only like terms are added and subtracted, unlike terms are kept as given

For example, to add $7x^2 - 4x + 5$ and $9x - 10$, we do

$$\begin{array}{r} 7x^2 - 4x + 5 \\ + \quad 9x - 10 \\ \hline 7x^2 + 5x - 5 \end{array}$$

Subtract $5x^2 - 4y^2 + 6y - 3$ from $7x^2 - 4xy + 8y^2 + 5x - 3y$.

$$\begin{array}{rrrrr} 7x^2 - 4xy + 8y^2 + 5x - 3y & & & & \\ 5x^2 & - 4y^2 & + 6y - 3 & & \\ (-) & (+) & (-) & (+) & \\ \hline 2x^2 - 4xy + 12y^2 + 5x - 9y + 3 & & & & \end{array}$$

Multiplication of Algebraic Expressions

There are number of situations like finding the area of rectangle, triangle, etc. in which we need to multiply algebraic expressions.

Multiplication of two algebraic expressions is again an algebraic expression.

Multiplying a monomial to monomial

A monomial multiplied by a monomial always gives a monomial.

$$5x \times 4x^2 = (5 \times 4) \times (x \times x^2)$$
$$= 20 \times x^3 = 20x^3$$

Note that $5 \times 4 = 20$ i.e., coefficient of product = coefficient of first monomial × coefficient of second monomial;

and $x \times x^2 = x^3$

i.e., algebraic factor of product= algebraic factor of first monomial× algebraic factor of second monomial.

Multiplying three monomials

$2x \times 5y \times 7z = (2x \times 5y) \times 7z = 10xy \times 7z = 70xyz$

We first multiply the first two monomials and then multiply the resulting monomial by the third monomial.

This method can be extended to the product of any number of monomials.

Multiplying a monomial with a polynomial

While multiplying a polynomial by a monomial, we multiply every term in the polynomial by the monomial using the distributive law a (b + c) = ab + ac.

Let us multiply the monomial $3x$ by the binomial $5y + 2$, i.e., find $3x \times (5y + 2)$ =?

Recall that $3x$ and $(5y + 2)$ represent numbers. Therefore, using the distributive law,

$3x \times (5y + 2) = (3x \times 5y) + (3x \times 2) = 15xy + 6x$

In the multiplication of a polynomial by a binomial (or trinomial), we multiply term by term, i.e. every term of the polynomial is multiplied by every term in the binomial (or trinomial) using the distributive property.

In multiplication of polynomials with polynomials, we should always look for like terms, if any, and combine them.

Algebraic Equations and Identities

Consider the equality $(a + 1)(a + 2) = a^2 + 3a + 2$

We shall evaluate both sides of this equality for some value of a, say $a = 10$.

For $a = 10$, LHS = $(a + 1)(a + 2) = (10 + 1)(10 + 2) = 11 \times 12 = 132$

RHS = $a^2 + 3a + 2 = 10^2 + 3 \times 10 + 2 = 100 + 30 + 2 = 132$

Thus, the values of the two sides of the equality are equal for $a = 10$.

Let us now take $a = -5$

LHS = $(a + 1)(a + 2) = (-5 + 1)(-5 + 2) = (-4) \times (-3) = 12$

RHS = $a^2 + 3a + 2 = (-5)^2 + 3(-5) + 2$

$= 25 - 15 + 2 = 10 + 2 = 12$

Thus, for $a = -5$, also LHS = RHS.

We shall find that for any value of a, LHS = RHS **Such an equality which is true for every value of the variable in it, is called an identity**. Thus,

$(a + 1)(a + 2) = a2 + 3a + 2$ is an identity.

An equation is true for only certain values of the variable in it. It is not true for all values of the variable.

For example, consider the equation $a^2 + 3a + 2 = 132$

It is true for $a = 10$, as seen above, but it is not true for $a = -5$ or for $a = 0$ etc

Standard Identities

(i) $(a + b)^2 = a^2 + 2ab + b^2$

(b)$(a – b)^2 = a^2 – 2ab + b^2$

(c)$(a + b)\ (a – b) = a^2 – b^2$

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

MCQ (1 MARK)

1. What is the coefficient of $x\ in\ x^2 - x + 1$

(a) 1 (b) -1 (c) 0 (d) none of these

2. How many terms are there $in\ x^2 - 5x + 3$

(a) 1 (b) 2 (c) 3 (d) 4

3. What are the coefficients of y in expression $4x - 3y$

(a) 1 (b) 4 (c) 3 (d) -3

4. The expression for statement: 3 times $x\ more\ than$ 7 is

(a) $x + 3$ (b) $7x + 3$ (c) $3x + 7$ (d) $3x - 7$

5. The statement for expression: $5x - 7$

(a) Three times x less than 5 (b) Five times x less than 3

(c) Three less than 5 times x (d) none of the above

6. Identify the coefficients of x in 8-x + y

(a) 0 (b) 1 (c) -1 (d) 8

7. $4p^2q - 3$ is

(a) Monomial (b) Binomial (c) Trinomial (d) None

8. The sum of $mn + 5 - 2\ and\ mn + 3$ is

(a) $2mn + 3$ (b) $2mn – 3$ (c) $2mn + 6$ (d) $mn + 6$

9. The constant term in the expression $1 + x^2 + x\ is$

(a) 1 (b) 0 (c) 2 (d) -1

10. Write expression for: if Raju's age is x, his father is 5year more than 3 times Raju's age

(a) $3x + 5$ (b) 3x – 5 (c) 15x (d) $5x - 3$

11. The coefficients of y^3 in the expression $y – y^3 + y^2$ is

(a) 1 (b) y (c) $–y^3$ (d) -1

12.The expression x y z

(a) Monomial (b) Binominal (c) Trinomial (d) None

13. Sum of 3m and 2n is

(a) 3m + 2n (b) 6mn (c) 5mn (d) 5n

14. Subtract a − b from a +b, the result is

(a) 2a + 2b (b) 2a (c) 2b (d) 2a – 2b

15. Sum of x y, x +y, and y + x y is

(a) 2xy + x + 2y (b) x + y + 2xy (c)2xy + 2xy (d) x y + 2x + 2y

16. the value of 21b − 32 + 7b – 20b

(a) 8b – 32 (b) −8b − 32 (c) −8b + 32 (d) 28b − 52

17. Subtracting $-5y^2$ from y^2, the result is

(a) $-4y^2$ (b) $6y^2$ (c) $5y^2$ (d) 2

18. When x = 0, y = −1, the value of 2x + 2y is

(a) 4 (b) 0 (c) -2 (d) 2

19. Factors of the terms $-4pq^2$ in the expression $ap^2q^2 - 4pq^2$ are

(a) $ap^2q^2 - 4pq^2$ (b) 9 − 4 (c) −4, p, q, q (d) -4

20. What must be subtracted from 2a + b to get 2a − b

(a) 2 (b) 4a (c) 0 (d) 4a + 4b

21. What should be value of 'a' if

(a) -1 (b) -5 (c) 5 (d) 0

22. Given expression for the statement "p is multiplied by 16"

(a) 16p (b) p/16 (c) p+16 (d) p-16

23. Given expression for the statement one fourth of a number minus 4 given 4

(a) 4x − 4 = 4 (b) $\frac{4}{x} - 4 = 4$ (c) $\frac{1}{4}x - 4 = 4$ (d) $x - 4 = \frac{1}{4}$

24. Subtract a + 2b from sum of a − b and 2a + b

(a) 2a – 2b (b) 4a + 2b (c) 2b (d) −2a + 2b

25. The value of x + 7 + 4(x − 5) for x = 2

(a) -3 (b) 31 (c) 12 (d) 37

VSA (1 MARK)

1. Factorize: $7xy$

2. Find the common factor of $2y$ and $22xy$

3. Find the value of $2(-3x)$

4. Find the area rectangle with length $2x$ and breadth y.

5. Find the product of a^3 and a^2

6. The find value of $3(4x - 5) + 3$ for $x = 3$

7. Find the coefficient of x in $\frac{x}{2} - 1$

8. Simplify: $a\,(a + b)$

9. Subtract $a - b$ from $a + b$

10. Find the product of $x + 5$ and $y + 4$

11. Identify like terms: $2x^2, 4x, 3y^2, 6x^2, 2y^2, x^2$

12. Find the product of $-4p$ and $7p$.

13. How many terms are there in $xyz + 1$

14. Add: $x + 5y$ and $2x - 3y$

15. Find the common factor of $13x^2y$ and $26y$

SA (2 MARKS)

1. Simplify: $12m^2 - 9m + 5m - 4m^2 - 7m + 10$

2. Subtract $5x^2 - 4y^2 + 6y - 3\ form\ 7x^2 - 4xy + 8y^2 + 5x - 3y$

3. What should be added to $x^2 + xy + y^2\ to\ obtain\ 2x^2 + 3x$?

4. From the sum of $3x - y + 11\ and\ -y - 11, subtract\ 3x - y - 11$

5. If $p = -10, find\ the\ value\ p^2 - 2p - 100$

6. Use identity to find 103^2

7. Use identity to calculate 194×206

8. Add: $p\,(p - q), q\,(q - r)\ and\ r\,(r - p)$

9. Multiply: $(2q + 3q^2)\ and\ (3pq - 2q^2)$

10. Subtract :$3l\,(l - 4m + 5n)\ from\ 4l\,(10n - 3m + 2l)$

LA (3 MARKS)

1. Simplify: $(x^2 + x + 1)\,(x^2 - x + 1)$
2. Use identity $(x + a)\,(x + b) = x^2 + (a + b)\,x + ab$

   (i) 501×502 (b)95×103

3. Evaluate using suitable identities.

(a) $(48)^2$ (b) 497×505

4. Verify that $(11pq + 4q)^2 - (11pq - 4q)^2 = 176pq^2$

5. Simplify (i) $(3x + 2y)^2 + (3x - 2y)^2$ (b)$(2x - 3)^2 + 6x$

6. Simplify (i) $-pqr\,(p^2 + q^2 + r^2)$ (b)$(px + qy)\,(ax - by)$

7. Multiply

(i) $(a + 7)$ and $(b - 5)$ (b)$(a^2 + 2b^2)$ and $(5a - 3b)$

8. Simplify the expression and evaluate it

$3y\,(2y - 7) - 3\,(y - 4) - 63$ for $y = -2$

ANSWER KEY

MCQ

1. **b -1**
2. **c 3**
3. **d -3**
4. **c 3x +7**
5. **d none**
6. **c -1**
7. **b binomial**
8. **c 2mn + 6**
9. **a 1**
10. **a 3x +5**
11. **d -1**
12. **a monomial**
13. a **3m + 2n**
14. c **2b**
15. a **2xy +x + 2y**
16. a **8b - 32**
17. b **$6y^2$**
18. c **-2**
19. c **-4,p,q,q**
20. a **2b**
21. a **-1**
22. a **16p**
23. (c) $\frac{1}{4}x - 4 = 4$
24. a **2a – 2b**
25. a **-3**

VSA(1Mark)

1. factors – $7xy = 7 \times x \times y$
2. common factor = 2y
3. $2x(-3x) = -6x^2$
4. Area of rectangle
   $= l \times b = 2x \times y = 2xy$
5. $a^2 \times a^3 = a^5$
6. $3x(4x - 5) + 3$
   $= 3 \times 3(4 \times 3 - 5)$
   $= 9 \times (12-5)$
   $= 63$
7. $\frac{1}{2}$
8. $ab(a + b) = a^2b + ab^2$
9. $a + b - (a - b)$
   $= a + b - a + b$
   $= 2b$
10. $(x + 5)(x + 4)$
    $= x^2 + 5x + 4x + 20$
    $= x^2 + 9x + 20$
11. $2x^2, 6x^2, x^2, 3y^2, 2y^2$
12. $-4p \times 7p = -28p^2$
13. two terms
14. $x + 5y + 2x - 3y$
    $= 3x + 2y$
15. common factor = 13y

SA(2 Marks)

1. $12m^2 - 9m + 5m - 4m^2 - 7m + 10$
   $= 8m^2 - 11m + 10$
2. $7x^2 - 4xy + 8y^2 + 5x - 3y - (5x^2 - 4y^2 + 6y - 3)$
   $=$ **$2x^2 - 4xy + 12y^2 + 5x - 9y + 3$**
3. let A be added to $x^2 + xy + y^2$
   ⇨ $A + x^2 + xy + y^2 = 2x^2 + 3xy$
   ⇨ $A = 2x^2 + 3xy - x^2 - xy - y^2$
   $=$ **$x^2 - 2xy - y^2$**
4. sum of $3x - y + 11$ and $-y - 11$
   $= 3x - 2y$
   and difference is $3x - 2y - (3x - y - 11)$
   $=$ **$-y + 11$**
5. value of $p^2 - 2p - 100$
   $= (-10)^2 - 2 \times -10 - 100$
   $= 100 + 20 - 100 = 20$
6. $(103)^2 = (100 + 3)^2$
   $= (100)^2 + (3)^2 + 2 \times 100 \times 3$
   $= 10000 + 9 + 600 = 10609$
7. $194 \times 206 = (200 - 6)(200 + 6)$
   $= (200)^2 - (6)^2 = 40000 - 36 = 39964$
8. $p(p - q) + q(q - r) + r(r - p)$
   $= p^2 - pq + q^2 - qr + r^2 - rp$
9. $(2q + 3q^2)(3pq - 2q^2)$
   $= 2q(3pq - 2p^2) + 3q^2(3pq - 2p^2)$
   $= 6pq^2 - 4p^2q + 9pq^3 - 6q^4$
10. $40ln - 12ml + 8l^2 - 3l^2 + 12lm - 15nl$
    $= 25nl + 5l^2$

LA (3 MARK)

1. $(x^2 + x + 1)(x^2 - x + 1)$ by using identity $(x + a)(x + b) = x^2 + x(a + b) + ab$

We get $(x^2 + x + 1)(x^2 - x + 1) = \{x^2 + (1 + x)\}\{x^2 + (1 - x)\} = x^4 + x^2(1 + x + 1 - x) + (1+x)(1 - x) = x^4 + 2x^2 + 1 - x^2 = x^4 + x^2 + 1$

2. (i) $501 \times 502 = (500 + 1)(500 + 2) = (500)^2 + 500(1+ 2) + 1\times 2 = 250000 + 1500 + 2 = 251502$

(b) $95 \times 103 = (100 - 5)(100 + 3) = (100)^2 + 100 \times (-5 + 3) + (-5\times 3)$

$= 10000 - 200 - 15 = 9785$

3.(i) $(48)^2 = (40 + 8)^2 = 1600 + 64 + 640 = 2304$

(b) $497 \times 505 = (500 - 3)(500 + 5)$

$= (500)^2 + 500(-3 + 5) + (-3 \times 5) = 250000 + 1000 - 15 = 250985$

4. LHS $(11pq + 4q)^2 - (11pq - 4q)^2 = 121p^2q^2 + 16q^2 + 88pq^2 - (121p^2q^2 + 16q^2 - 88pq^2)$

$= 176\, pq^2$

5. (i) $(3x + 2y)^2 + (3x - 2y)^2 = 9x^2 + 4y^2 + 12xy + 9x^2 + 4y^2 - 12xy$

$= 18\, x^2 + 8y^2$

(b) $(2x - 3)^2 + 6x = 4x^2 + 9 - 12x + 6x = = 4x^2 + 9 - 6x = (2x - 3)^2$

6. (i) $-pqr(p^2 + q^2 + r^2) = -(pqr) \times p^2 - (pqr) \times q^2 - (pqr) \times r^2$

$= -p^3qr - pq^3r - pqr^3$

(b) $(px + qy)(ax - by) = px(ax - by) + qy(ax - by)$

$= apx^2 - pbxy + aqxy - qby^2$

7. (i) $(a + 7) \times (b - 5) = a \times (b - 5) + 7 \times (b - 5)$

$= ab - 5a + 7b - 35$

(b) $(a^2 + 2b^2) \times (5a - 3b) = a^2(5a - 3b) + 2b^2 \times (5a - 3b)$

$= 5a^3 - 3a^2b + 10ab^2 - 6b^3$

8. $3y(2y - 7) - 3(y - 4) - 63 = 6y^2 - 21y - 3y + 12 - 63$

$= 6y^2 - 24y - 51$

For $y = -2$, $6y^2 - 24y - 51 = 6(-2)^2 - 24(-2) - 51$

$= 6 \times 4 + 24 \times 2 - 51$

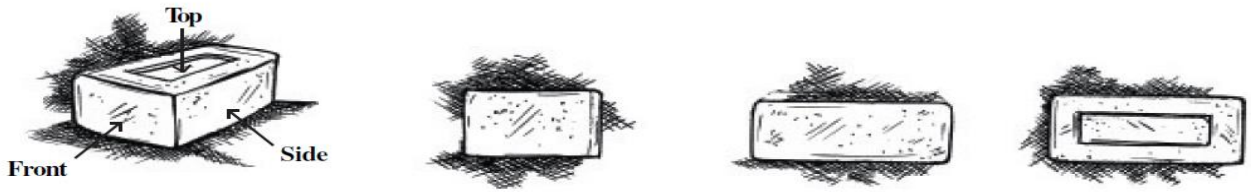
$= 24 + 48 - 51 = 72 - 51 = 21$

CHAPTER – 10
VISUALISING SOLID SHAPES

MAIN CONCEPTS

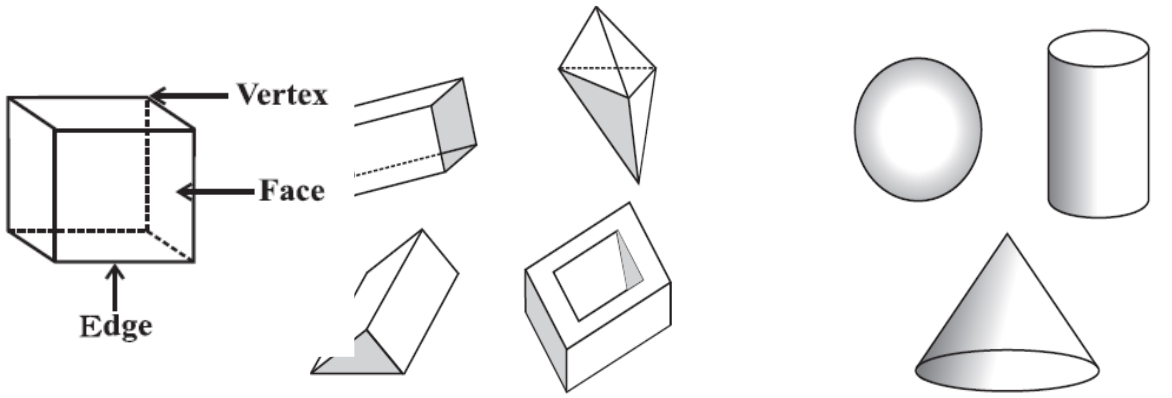
• 3D shapes/objects are those which do not lie completely in a plane.

• 3D objects have different views from different positions.



A brick | Front view | Side view | Top view

• A solid is a polyhedron if it is made up of only polygonal faces. The faces meet at lines segments and such line segments are called the edges of the polyhedron. The edges meet at a point and the point where edges meet is called a vertex. A polyhedron has many vertices.



These are polyhedrons | These are not polyhedrons

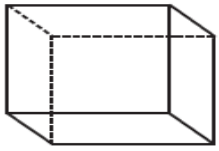
•Euler's formula for any polyhedron is,

$$F + V - E = 2$$

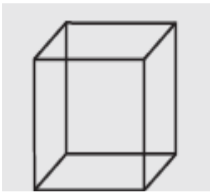
Where F stands for number of faces, V for number of vertices and E for number of edges.

• Types of polyhedrons:

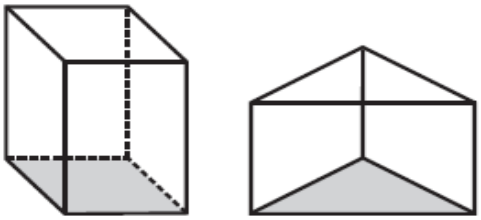
(a) Convex polyhedron: A convex polyhedron is one in which all faces make it convex.



(b) Regular polyhedron or platonic solids: A polyhedron is regular if its faces are congruent regular polygons and the same number of faces meets at each vertex. For example, a cube is a platonic solid because all six of its faces are congruent squares.

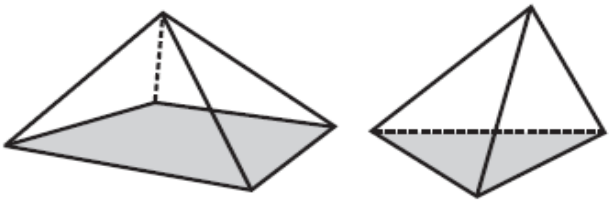


• A prism is a polyhedron whose bottom and top faces (known as bases) are congruent polygons and faces known as lateral faces are parallelograms (when the side faces are rectangles, the shape is known as right prism).



These are prisms

• A pyramid is a polyhedron whose base is a polygon and lateral faces are triangles.



These are pyramids

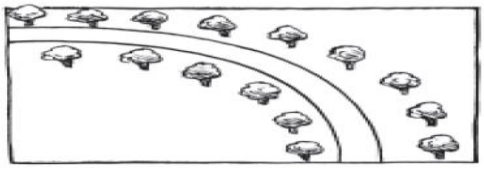
A prism or a pyramid is named after its base. Thus, a hexagonal prism has a hexagon as its base; and a triangular pyramid has a triangle as its base.

MAPPING SPACE AROUND US

1. A map depicts the location of a particular object/place in relation to other objects/places in its surroundings.

2. Symbols are used to depict the different objects/places.

3. There is no reference or perspective in map, i.e., objects that are closer to the observer are shown to be of the same size as those that are farther away.



Maps use a scale which is fixed for a particular map. It reduces the real distances proportionally to distances on the paper.

MCQ (1 MARK)

1. Cuboid is an example of

a. 2- d shape b. 3-d shape c. 1-d shape d. none

2.Which one is a 3d shape?

a. square b. rectangle c. circle d. sphere

3. A cuboid has _____ rectangular faces

a. 4 b.6 c.8 d.10

4. A cube has _____ edges.

a.4 .b. 6 c.8. d.12

5. The number of faces of a triangular prism are ____

a.4 b.5 c.6 d. none

6. The corners of a solid shapes are called _____

a. vertices b. edges c. faces d.net

7. The number of faces of a square pyramid are _____

a.6 b.8 c.5 d.4

8. A _____is a skeleton-outline of a solid that can be folded to make it

a. vertices b. faces c. edges d.net

9. What will be the number of faces if there are 6 vertices and 12 edges.

a.8 b.10 c.12 d.18

10. Which of the following is Euler's formula

a. F + V – E = 2 b. F + V = E – 2 c. F – V = E - 2 d. F – V + E = 2

11. What cross-sections do you get if you give a vertical cut to a brick?

a. cube b. cuboid c. sphere d. circle

12. What cross-sections do you get if you give a horizontal cut to a brick?

a. cube b. cuboid c. sphere d. circle

13. What cross-sections do you get if you give a vertical cut to an apple?

a. cube b. circle c. square d. rectangle

14. What cross-sections do you get if you give a vertical cut to hollow pipe?

a. rectangle b. triangle c. circle d. cylinder

15. What cross-sections do you get if you give a vertical cut to a cylinder?

a. rectangle b. triangle c. circle d. cylinder

16. What cross-sections do you get if you give a horizonal cut to cylinder?

a. rectangle b. triangle c. cube d. cylinder

17. What cross-sections do you get if you give a horizonal cut to a dice?

a. rectangle b. triangle c. circle d. cylinder

18 What cross-sections do you get if you give a vertical cut to an ice cream?

a. cube b. circle c. triangle d. rectangle

19.Two dice are placed side by side with 5 +6, what is the total on the face opposite to the given numbers

a.3 b.7 c.11 d.6

20. Two dice are placed side by side with 4+3, what is the total on the face opposite to the given numbers

a.3 b.7 c.11 d.6

21. Two dice are placed side by side with 5+2, what is the total on the face opposite to the given numbers

a.3 b.7 c.11 d.6

22 Two dice are placed side by side with 2+1, what is the total on the face opposite to the given numbers

a.3 b.7 c.11 d.6

23. The number of flat faces of a cylinder are

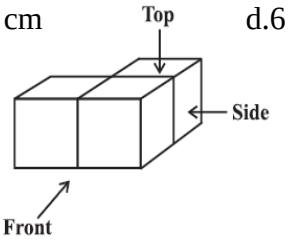
a.1 b.2 c.3 d. none

24. The number of flat faces of a cone are

a.1 b.2 c.3 d. none

25. Two cubes of sides 2cm are placed side by side, the length of resulting cuboid is

a. 2 cm b.3 cm c.4 cm d.6 cm



VSA (1 MARK)

1. Draw the top view of the given shape.

2. Draw a net of square pyramid.

3. Draw a convex polyhedron.

4. A sphere is a polyhedron. (true/false)

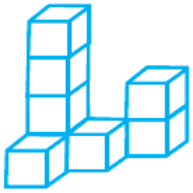
5. A pentagonal prism has _____ edges.

6. In a regular polyhedron _____ number of faces meet at each vertex.

7. A pyramid is a polyhedron whose lateral faces are_____

8. A prism is a polyhedron whose lateral faces are _____

9. Count the number of cubes in the given shape.



10. How many faces are there in a pentagonal prism.

11. What is the number of vertices for a hexagonal pyramid?

12. In a 3d shape a diagonal joins two vertices that doesn't lie in the _____face.

13. A vertex of a polyhedron is a _____

14. A prism has two _____ and pyramid has _____

15. All cubes are prisms. (true/false)

SA (2 MARK)

1. How are prisms and cylinder alike?

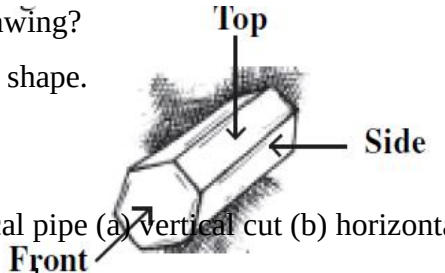
2. Is a square prism same as cube? Explain.

3. Can a polygon have 10 faces, 20 edges and 15 vertices?

4. If a length of 100 m is represented on a map by 1 cm, then what will be the actual distance corresponding to 3.5 cm.

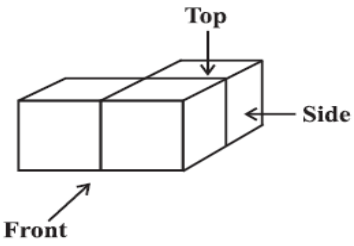
5. If the actual width of a store room is 280 cm and the scale chosen to make its drawing is 1:7, then what will be the width of the room in the drawing?

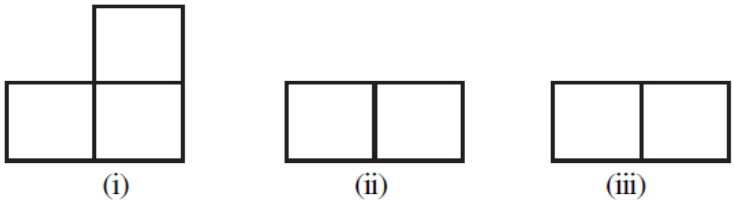
6. Identify the number of edges in the given solid shape.



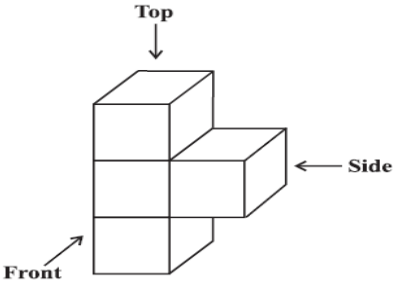
7. What shape will you get if you give a cylindrical pipe (a) vertical cut (b) horizontal cut

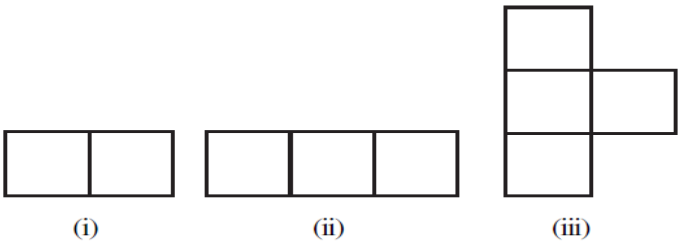
8. Identify the top front and side view of the given shape





9.Identify the top, front and side view of the given shape.



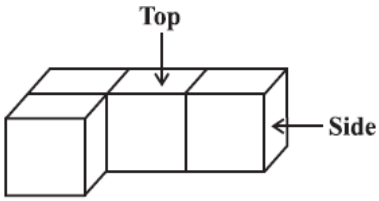


10. If the polyhedrons are possible, then find the missing values:

FACES	12	?
VERTICES	14	14
EDGES	?	36

LA (3 MARK)

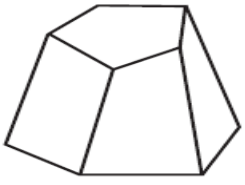
1. Draw the top, front and side view of the given solid shape



2.How many vertices do the following solids have?

(a)hexagonal prism (b)octagonal prism (c)triangular prism

3. Verify Euler's formula for the given solid



4. Draw a hexagonal prism and prove Euler's formula for it.

5.

Which are prisms among the following?

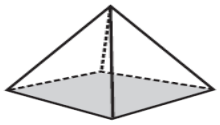
(i)

A nail

(ii)

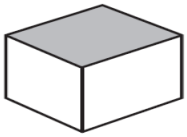
Unsharpened pencil

(iii)



A table weight

(iv)



A box

6.Using Euler's formula, find the unknown

FACES	?	5	20
VERTICES	6	?	12
EDGES	12	9	?

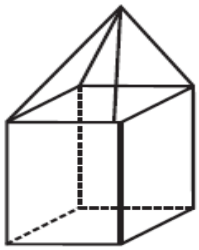
7. Can a polyhedron have for its faces

(i) 3 triangles?

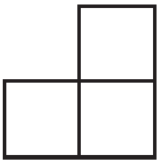
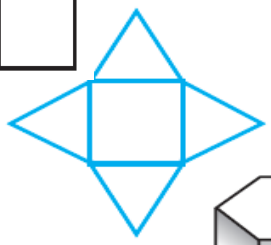
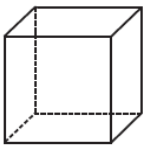
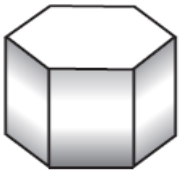
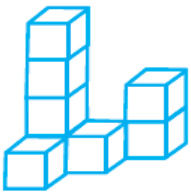
(b)4 triangles?

(c)a square and four triangles?

8.Verify Euler's formula for the given solid.



ANSWER KEY

MCQ	VSA(1 Mark)
1. b. 3-d shape 2. d. sphere 3. b. 6 4. d. 12 5. c .6 6. a. Vertices 7. c.5 8. d.net 9. a.8 10. F + V – E = 2 11. b. cuboid 12. b. cuboid 13. b. circle 14. a. rectangle 15. a. rectangle 16. d. cylinder 17. a. rectangle 18. c. triangle 19. a.3 20.b.7 21.b.7 22.c.11 23.b.2 24.a.1 25.c.4 cm	1 top view  2. square pyramid.    3. convex polyhedron. or 4. false. 5. A pentagonal prism has **15** edges. 6. In a regular polyhedron **same** number of faces meet at each vertex. 7. A pyramid is a polyhedron whose lateral faces are **triangles.** 8. A prism is a polyhedron whose lateral faces are **polygons.** 9. Number of cubes in the given shape = 8  10.10 faces. 11.the number of vertices for a hexagonal pyramid - 7 12. In a 3d shape a diagonal joins two vertices that doesn't lie in the **same** face. 13. A vertex of a polyhedron is a **point** 14. A prism has two **bases** and pyramid has **one** 15.true

SA (2 MARK)

1. Both prism and cylinder are alike because both have their base and top as congruent faces, also a

prism becomes a cylinder as the number of sides of its base becomes larger and larger.

2.A cube is same as a prism as it has congruent base and top(square) like we have in a prism.

3. As per Euler's formula, F + V = E – 2

F + V = 10 + 15 = 25

E – 2 = 20 – 2 = 18

F + V ≠ E - 2, As the Euler's formula is not applied, such polygon is not possible

4. 1 cm = 100 m

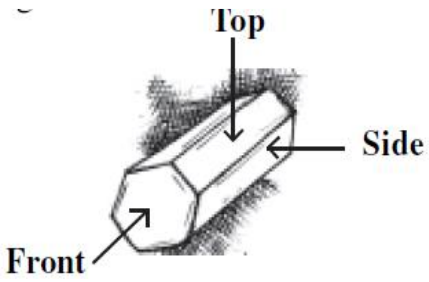
3.5 cm = 350 m

5. For 7cm of actual width= 1 cm drawing

1 cm actual width = 1 /7 cm

280 cm actual width = 1/7 × 280 cm

= 40 cm



6. The number of edges in the given solid shape= 18

7. (a) rectangle (b)cylinder

8. (i) top (ii)front (iii)side

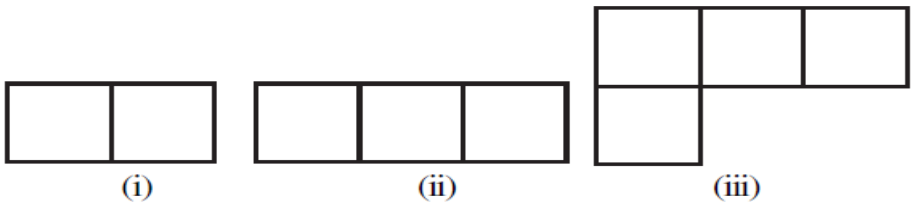
9.(i) top (b)side (iii)front

10.

FACES	12	20	14
VERTICES	14	14	16
EDGES	28	36	42

LA (3 MARK)

1. (i) side (b)front (c)top



2. (a)12 (b) 16 (c) 6

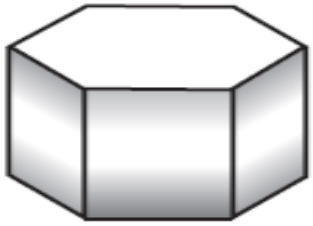
3. Verify Euler's formula for the given solid

Faces = 7, vertices= 10, edges = 15

F + V = E – 2

7 + 10 = 15 + 2 LHS = RHS

Hence Euler's formula is verified



4. F=8, V =12,E=18

F + V = E + 2 ⇨ 8 + 12 = 18 + 2 ⇨ LHS = RHS

Hence Euler's formula is verified

5. fig (b) and (iv) are prisms

6.

FACES	8	5	20
VERTICES	6	6	12
EDGES	12	9	30

7. (i) No, because polyhedron must have edges that meet at vertices which are points.

(ii)Yes, because all the edges are meeting at the vertices (triangular pyramid)

(c)Yes, because all the eight edges are meeting at the vertices. (square pyramid)

8. F = 9, V = 9 , E = 16

Euler's formula F +V = E +2; LHS = 9 + 9 =18

RHS = 16 + 2 = 18 As LHS = RHS. Hence Euler's formula is verified

CHAPTER – 11.
MENSURATION

• Length of boundary of a simple plane closed figure is known as **perimeter**.

• Area is the measure of region enclosed in a simple closed curve.

• Perimeter of a rectangle = 2 (length + breadth).

• Area of a rectangle = length × breadth.

• Perimeter of a square = 4 × side.

• Area of a square = side × side.

• Area of a triangle =1/2 × Base × Corresponding Height.

• Area of a parallelogram = Base × Corresponding Height.

• Area of a circle = πr^2 , where r is the radius.

• Area of a trapezium =1/2× (Sum of parallel sides) × Height.

• Area of a rhombus =1/2 × Product of diagonals.

• Lateral surface area of a cube = 4 $(side)^2$.

• Total surface area of a cube = 6 $(side)^2$.

• Lateral surface area of a cuboid = 2 × height × (length + breadth).

• Total surface area of a cuboid = $2(l\,b + b\,h + hl)$.

• Lateral (curved) surface area of a cylinder = $2rh$.

• Total surface area of a cylinder = $2\,\pi\,r\,(r + h)$, where r is the radius and h is the height.

Amount of space occupied by a solid is called its **volume**.

• Volume of a cube = $(side)^3$.

• Volume of a cuboid = length × breadth × height.

• Volume of a cylinder = $\pi r^2 h$.

• 1cm = 1ml

• 1L = 1000 cm^3.

• 1m3 = 10,00,000 cm^3 = 1,000 L.

MCQ(1 MARK)

1 What will be the area of circular button of radius 7 cm?

(a) 154 cm^2 (b) 49 cm^2 (c) 154 cm (d) 3.14 x 7 cm^2

2 The circumference of circle whose diameter is 14 cm will be

(a) 44 cm (b) 88 cm (c) 44 cm^2 (d) 88 cm^2

3 The perimeter of circle is its

a. area (b) circumference (c) radius (d) diameter

4 Diameter is_____.

a) twice of radius (b) half of radius (c) equal to radius (d) one-third of radius

5. π is

a) ratio of circumference to diameter (b) diameter to circumference

(c) 21/17 (d) 3.41

6. If the area of circle is 44 cm^2, the perimeter will be

a) 11 cm^2 (b) 11 cm

(c) 22 cm^2 (d) none of these

7. If the radius of a pipe is 1 cm, then its circumference will be

(a) 62.8 cm (b) 6.28 cm (c) 62.8 cm^2 (d) 6.28 cm

8 The circumference of a circle is

(a) π r (b) 2 π r^2 (c) π x 2r (d) πr + 2r

9 The diameter of a circle is

(a) r^2 (b) 2r (c) 2 π r^3 (d) r^2 π

10 Which of the following is an example of circle?

(a) a chair (b) a bottle cap (c) a cup (d) a table

11. The area of a circle is

(a) 2 π r (b) 2 π r^2 (c) π r^2 (d) π d

12. 1 m^2 =_____.

(a) 100 cm^2 (b) 1000 cm^2 (c) 10000 m^2 (d) 10000 cm^2

13. One hectare is equal to

(a) 100 m^2 (b) 1000 m^2 (c) 10,000 m^2 (d) 10,000 m

14. The circumference of a circle with radius 7 cm is

(a) 11 cm (b) 22 cm (c) 44 cm (d) 49 cm

15. The area of a circle is 49 π cm^2. Its circumference is

(a) 7 π cm (b) 14 π cm (c) 21 π cm (d) 28 π cm

16. What is the area of a rhombus whose diagonals are of lengths 10cm & 8.2 cm?

(a)24cm^2 (b)41cm^2 (c)42 cm^2 (d) 25cm^2

17.What is the area of a trapezium whose two parallel sides are 10 cm & 12cm & height 4cm?

(a)42cm^2 (b)44cm^2 (c) 46 cm^2 (d) 48cm^2

18.The area of a rhombus is 240 cm^2. If one of its diagonals is 16 cm, what the length of its other diagonal is?

(a)32cm (b)30cm (c)45 cm (d) 48cm

19.If each side of an equilateral triangle is doubled, then its area becomes how many times?

(a)2 (b)3 (c)4 (d) 8

20.What is the total surface area of a cuboid of dimensions 4cm, 5cm &6cm ?

(a) 142cm^2 (b)144cm^2 (c)146 cm^2 (d) 148cm^2

21.What is the lateral surface area of a cube of side 5cm?

(a) 150cm^2 (b)100cm^2 (c)140 cm^2 (d) 130cm^2

22.What is the volume of a cuboid whose dimensions are 5cm x 3cm x 2cm ?

(a)24cm^3 (b)20cm^3 (c)30 cm^3 (d) 17cm^3

23.What is the volume of a sphere whose radius is 3 cm ?

(a)24πcm^3 (b)36πcm^3 (c)30π cm^3 (d) 27πcm^3

24.What is the curved surface area of a cone of radius 3cm & height 4 cm?

(a)14πcm^2 (b)15πcm^2 (c)16π cm^2 (d) 17πcm^2

25. If the height of a cylinder is halved, its volume becomes how many times?

(a) 1/ 2 (b)1/ 3 (c)2 (d)3

VSA (1 MARK)

1. Write the formula to find the area of a parallelogram.
2. Find the lateral surface area of a cube of edge a cm
3. **1** Litre = _____ .

4. If the edge of a cube is 1 cm then, find its volume.
5. Find the area of rhombus whose diagonals are 8 cm and 6 cm.
6. If the parallel sides of a parallelogram are 2 cm apart and their sum is 10 cm then, find its area.
7. Compare the area and perimeter numerically of a square of side 1 cm.
8. If the edge of a cube is 1 cm then, what is its total surface area?
9. Find the volume of cylinder whose radius of the base is 7 cm and height is 10 cm.
10. If the dimensions of a room are I, b and h, ($\therefore$ l $\rightarrow$ length, b $\rightarrow$ breadth and h $\rightarrow$ height) then write the area of its four walls.
11. If the dimensions of a room are 2 m, 3 and 4 m then, write the number of cubes of size 1cm which can be placed in the room.
12. If base area of a room 12 m^2 and height is 3 m, then find its volume.
13. One side of a rhombus is 6.5 cm and altitude is 4 cm. Find the area of rhombus.
14. What is value of 5cm in terms of mm.
15. What is value of 1km in cm ?

SA (2-MARKS)

16. Three identical cubes each of side 8 cm are joined end to end. Find the total surface area of the cuboid so formed.
17. Area of a trapezium is 234 cm^2. The length of its parallel sides are 20 cm and 32 cm. Find its altitude.
18. Area of the base of a cuboid is 90 cm^2. Its height is 6 cm. Find the volume.
19. Find the volume of cylinder where the area of its base is 45 cm^2 and height is 9 cm.
20. A cuboidal tin open at the top has dimension 20cmX16cmX14cm. What is the total area of a sheet of metal required to make 10 such tins?
21. A closed circular cylinder has diameter 10 cm and height 16 cm. Find the total surface area of cylinder.
22. It is required to make a closed cylindrical tank whose height is 1 m and radius of whose base is 70 cm from a sheet of metal. How many square meters of metal sheet is required?
23. A room is 6.5m long ,4 m wide and 4.5 m high. Find the area of four walls of this room.
24. If the rainfall on a certain day was 5cm, how many litres of water fell on a field whose area is 1 hectare field on that day?
25. Find the area of a parallelogram whose base is 14 cm and height is 16.5 cm

LA (3 MARKS)

26. The area of a square field is 24,200 sq m. How long will a lady take to cross the field diagonally if she is walking at the speed of 6.6 km/hr?
27. A square sheet of paper is converted into a cylinder by rolling it along its length. What is the ratio of the base radius to the side of the square?
28. The area of a trapezium is 360 m^2 and the distance between two parallel sides is 20m and one of the parallel sides is 25 m. Find the other parallel side.
29. Find the area of a rhombus whose side is 6.5 cm and whose altitude is 5 cm. If one of its diagonals is 13cm long, find the length of the other diagonal.
30. An aquarium is in the form of a cuboid whose external measures are 70 cm × 28cm × 35 cm. The base, side faces and back face are to be covered with a coloured paper. Find the area of the paper needed?
31. The area of a square is 42.25m^2. Find the side of this square if the tiles measuring 13cmX13cm are paved on the square area. Find how many tiles are required for paving it?
32. The length and breadth of a rectangular field are in the ratio of 4:3 and the area is 3072m^2, find the cost of fencing it at the rate of Rs 4 per m.
33. How many wooden cubical blocks of side 25cm can be cut from a log of wood of size 3m 75cm by 50cm, assuming that there is no wastage?

ANSWERS

MCQ

1. a
2.a
3.b
4.a
5.a
6.d
7.b
8.c
9.b
10.b
11.c
12.a
13.c
14.c
15.b
16.b
17.b
18.b
19.c
20.d
21.b
22.c
23.b
24.b
25.a

VSA (1 MARK)

1. ½ x d1 x d2
2. 4 (a x a)
3. 1000 ml
4. $1cm^3$
5. Ans:$24cm^2$
6. Ans: 10 cm^2
7. Ans: equal
8. Ans:6 cm^2
9. Ans:1540 cm^3
10. Ans:2 h(l + b)
11. Ans:24000000 boxes
12. Ans: 36 m^3
13. Ans:$26cm^2$
14. Ans; 50 m.m.
15. Ans ; 100000

LA-3 MARKS

1. Ans:896 cm^2
2. Ans:9cm
3. Ans:$540cm^3$
4. Ans:$405cm^3$
5. Ans:$13280cm^2$
6. Ans:$660cm^2$
7. Ans:$7.48m^2$
8. Ans:94.5 m^2
9. Ans: 500000 liters
10 Ans:$231cm^2$

SA (2 MARKS)

1. Ans:2 minutes
2. Ans:$1/2\pi$
3. Ans-11m
4. Ans-32.5 cm^2 ,5cm
5. Ans-$6370cm^2$.
6. Ans: 6.5 m ,2500 tiles
7. Ans:Rs896
8. [Ans: 72]

CHAPTER-12
EXPONENTS AND POWERS

Main Concepts and Results

• Exponential notation is a powerful way to express repeated multiplication of the same number. Specifically, powers of 10 express very large and very small numbers in a manner which is convenient to read, write and compare.

• For any non-zero integer a, $a^{-m} = \frac{1}{a^m}$

• Laws of exponents are

(a) Product Law: $a^m \times a^n = a^{m+n}$

(b) Quotient Law: $a^m \div a^n = a^{m-n}$

(c) Power Law: $a^{m^n} = a^{mn}$

(d) $a^m \times b^m = (ab)^m$

(e) $a^\circ = 1$,

• Numbers can be expressed in expanded form by using exponents.

• Very large and very small numbers can be expressed in standard form.

• Standard form is also called **scientific notation form.**

MCQ(1 MARK)

1. Which of the following is the multiplicative inverse of $(3 \times 4)^{--2}$

(a) 12 (b)1/ 144 (c) 144 (d) 1 / 12

2.What is the value of ' m ' if $(-- 2)^2 \times (-- 5)^3 = 50$ m ?

(a) 10 (b) -- 10 (c) 100 (d) -- 100

3.What is the scientific notation of 0.0023 ?

(a) $2.3 \times 10^{--3}$ (b) $23 \times 10^{--3}$ (c) 2.3×10^3 (d) 23×10^3

4.What is the usual form of $7.54 \times 10^{--3}$?

(a) 0.0754 (b) 0.00754 (c)0.000754 (d) 0.0000754

5.What is the value of ($3^0 + 4^0 + 5^0$) ?

(a) 7 (b) -- 7 (c) 3 (d) -- 3

6. Express 256 as a power 4.

(a) 4^8 (b) 2^8 (c) 4^4 (d) none of these

7. Express 729 as a power of 3

(b) 3^8 (b) 3^6 (c) 9^3 (d) none of these

8. Express 2048 as a power 2.

a) 2^{16} (b) 2^8 (c) 4^8 (d) none of these

9. Which one is greater?

(a) 2^3 (b) 3^2 (c) 1^8 (d) 4^2

10. Express 432 as a product of powers of prime factors.

(a) $2^3 \times 3^5$ (b) $2^4 \times 3^5$ (c) $1^6 \times 2^7$ (d) none of these

11. The value of $(-1)^{55}$

(a) –1 (b) 1 (c) 0 (d) none of these

12.The value of $(-1)^{500}$ is

(a) –1 (b) 1 (c) 0 (d) none of these

13. The value of 2^8 is

(a) 128 (b) 256 (c) 512 (d) none of these

14. Simplify and write in exponential form of $2^2 \times 2^5$

(a) 2^3 (b) 2^7 (c) 128 (d) none of these

15. Simplify and write in exponential form of $(-4)^{100} \times (-4)^{20}$

(a) $(-4)^{120}$ (b) $(-4)^{80}$ (c) $(-4)^{2000}$ (d) none of these

16. Simplify and write in exponential form of $5^2 \times 5^7 \times 5^{12}$

(a) 5^3 (b) 5^7 (c) 5^{21} (d) none of these

17. The value of 2^2

(a) 3 (b) 10 (c) 4 (d) 7

18. The exponent in the expression 3^7 is_____.

(a) 1 (b) 7 (c) 0 (d) 3

19. The value of 30 is .

(a) 0 (b) 3 (c) 1 (d) None of these

20. Fill in the Blank $a^m \div a^n = a^{\cdots\cdots}$ Where m and n are natural numbers:-

(a) mn (b) m + n (c) m - n (d) m ÷n

21. Express $(2a)^4$ in exponential form.

(a) $4a^3$ (b) $16a^4$ (c) $2a^4$ (d) $8a^4$

22. Find the value of 11^2

(a) 22 (b) 9 (c) 121 (d) 13

23.In simplified form $(30 + 40 + 50)^0$ is equals to

(a) 12 (b) 3 (c) 12 (d) 1

24. In standard form 52,00,00,000 is equal to_____.

(a) 5.2×10^7 (b) 5.2×10^8 (c) 52×10^8 (d) 52 x 100,00,000

25. Usual form of the expression 10^4 is given by_____.

(a) 100,00 (b) 1,000 (c) 10×10^4 (d) 10,0000

VSA (1 MARK)

1. Find the multiplicative inverse of 9^{-1}.
2. Evaluate: $(3/2)^{-2}$.
3. Write in exponential form. $(-2)^{-3} \times (-2)^{-4}$.
4. Express 4^{-3} as a power with the base 2.
5. Write the standard form of 0.000000564
6. Express in usual form. 3.52×10^5
7. $(-1)^{51} = ?$

8. If $3^m \div 3^{-3} = 3^5$. Find the value of m.
9. $(2^{-1}+3^{-1})^0$= ?
10. 2x2x2x2x2x2x2= ?
11. In a stack there are 5 books each of thickness 25mm and 5 paper sheets each of thickness 0.018 mm. What is the total thickness of the stack.
12. Express the following numbers in standard form.
    (a) 0.0000378
    (b) 405076
13. Find the value of $(4)^{-4}$.
14. Find the value of $(1/3+3/4-5/6)^0$.
15. Expand the following numbers using exponents.
    (a) 175.68
    (b) 156.28

SA(2 MARKS)

1. Simplify and write in exponential form.
    (a) $(-2)^{-4} \times (-2)^{-5}$
    (b) $t^3 \times p^{-10}$.
2. Find m so that $(-5)^{m+1} \times (-5)^3 = (-5)^6$.
3. Evaluate: $\{(1/4)^{-2}-(1/3)^{-1}\}$
4. By what number should -8/25 be divided to get -5/2 ?
5. Express 125^{-4} as a power with base 5.
6. Find the multiplicative inverse of the following.
    (a) 4^{-4}
    (b) 11^{-5}
    (c) 5^{-2}
7. Simplify (a) $(-5)^5 \times (-3)^{-10}$
    (b) $36 \div 2^{-6}$
8. Simplify and write the answer in the exponential form.
    (a) $(25 \div 5)^5 \times 5^{-5}$
    (b) $(-6)^{-3} \times (5)^{-3} \times (-4)^{-3}$
9. If $(12/13)^4 x (13/12)^{-8} = (12/13)^{2t}$, then find the value of t.
10. Find the value of $(729/4096)^{-1/3}$.

LA(3MARKS)

1. If $2^4x4^3 = 4^t$, find the value of t.
2. Find the multiplicative inverse of $(125/27)^{-2/3}$.
3. Simplify $(0.00000625)^{-3/4}$.
4. Express the following numbers using exponents:

   (a) 1025.63

   (b) 1256.249
5. Mass of the Earth is $5.97x10^{24}$ kg and mass of the Moon is $7.35x10^{22}$ kg. what is the the difference of their masses ?
6. If $(9/4)^{-4}x(2/3)^3=(p/q)^{11}$, find the value of $(p/q)^{-2}$.
7. Simplify: $[2^{-1}+3^0+5^1+7^2+9^3]\div(2/3)^{-1}$.
8. Express the following numbers in standard form.

   (a) 0.00000000000885

   (b) 0.00000000000962

   (c)603000000000

   (d)0.0000000067

Answer Key

<table>
<tr><td colspan="2"><u>MCQ</u></td><td colspan="2"><u>VSA(1 MARK)</u></td><td><u>SA(2 MARKS)</u></td></tr>
<tr><td>1. c
2.a
3.a
4.b
5.c
6.b
7.c
8.d
9.d
10.b
11.a
12.b
13.b</td><td>14.c
15.a
16.c
17.c
18.b
19.c
20.c
21.b
22.c
23.b
24.b
25.a</td><td>1. 9
2 .4/9
3.$(-2)^{-7}$
4.2^{-6}
5.5.64x10^{-7}
6.352000
7.-1
8.m=2
9.1
10.2^{7}</td><td>11. 125.09 mm
12. (a) 3.78x10^{-5}
(b)4.0576x10^{5}
13. 1/256
15. 1</td><td>1. (a) $(-2)^{-9}$ (b) $t^{3}xp^{-10}$
2. m=7
3. 13
4. 16/125
5 . 5^{-12}
6 (a)1/256
(b) 1/125
(c)1/25
7- (a) $5^{5}x2^{-5}$
(b) $1/2^{9}x3^{3}x5^{3}$
8. 1
9. .t=6
10. 9/16</td></tr>
<tr><td colspan="5"><u>LA(3 MARKS)</u></td></tr>
<tr><td colspan="2">1. t=10
2. 9/25
3. 8000
4.
(a)1x10^{3}+2x10+5x10^{0}+6x10^{-1}+3 x 10^{-2}
(b) 1x10^{3}+2x10^{2}+5x10^{1}+6x10^{0}+2x 10^{-1}+4x10^{-2}+9x10^{-3}
5.9/4
6.784/3</td><td colspan="3">7. (a) 8.85x10^{-12}
(b) 9.62x10^{-12}
(c)6.03x10^{11}
(d)6.7x10^{-9}
8. (a) 0.0000302
(b) 453000
(c)0.00003
(d)10006000</td></tr>
</table>

CHAPTER 13
DIRECT AND INVERSE PROPORTION

Variations and Proportions:

When the values of two quantities depend on one another in a way, such that the change in one quantity causes change in the other, the two quantities are said to be in variation.

Direct Proportion:

1. The two quantities are said to be directly proportional if:

- An increase in one leads to a corresponding increase in the other.
- A decrease in one leads to a corresponding decrease in the other.

2. If x varies directly as y then the ratio x/y=k (constant) symbolically, x α y, where α is symbol of proportionality or x = ky, x1/y1=x2/y2=x3/y3=k

Example: If the radius of a circle increases, the area of that circle also increases.

Inverse Proportion:

1. The two quantities are said to be inversely proportional if

- an increase in one leads to a corresponding decrease in the other.
- a decrease in one leads to a corresponding increase in the other.

2. If x varies inversely with y, then x α y ⇒ x/y = k(constant) or $xy = x_1y_1 = x_2y_2 = k$.

Example: As the speed of a vehicle increases, time taken to cover a particular distance decreases.

3.. Speed = Distance / Time or Distance = Speed x time or time = Distance / Speed

MCQ(1-MARK)

1. 10 meters of cloth cost Rs 1000. What will 4 meters cost ?

(a) Rs 400 (b) Rs 800 (c) Rs 200 (d) Rs 100.

2. 15 books weigh 6 kg. What will 6 books weigh ?

(a) 1.2 kg (b) 2.4 kg (c) 3.8 kg (d) 3 kg.

3. A horse eats 18 kg of com in 12 days? How much does he eat in 9 days?

(a) 11.5 kg (b) 12.5 kg (c) 13.5 kg (d) 14.5 kg.

4. 20 trucks can hold 150 metric tons. How much will 12 trucks hold?

(a) 80 metric tons (b) 90 metric tons (c) 60 metric tons (d) 40 metric tons.

5. 120 copies of a book cost Rs 600. What will 400 copies cost ?

(a) Rs 1000 (b) Rs 2000 (c) Rs 3000 (d) Rs 2400

6. A boy runs 1 km in 10 minutes. How long will he take to ran 600 m ?

(a) 2 minutes (b) 3 minutes (c) 4 minutes (d) 6 minutes.

7. A man walks 20 km in 5 hours. How long would he take in walking 32 km?

(a) 3 hours (b) 4 hours (c) 6 hours (d) 8 hours.

8. If 3 quintals of coal cost Rs 6000, what is the cost of 120 kg?

(a) Rs 1200 (b) Rs 2400 (c) Rs 3600 (d) Rs 4800.

9. A machine in a soft drink factory fills 600 bottles in 5 hours. How many bottles will it fill in 2 hours?

(a) 120 (b) 180 (c) 150 (d) 240.

10. If 8 men can do a piece of work in 20 days, in how many days could 20 men take to do the same work ?

(a) 6 days (b) 8 days (c) 4 days (d) 10 days.

11. If an amount of food lasts for 40 days for 120 men, how long will it last for 80 men at the same rate?

(a) 50 days (b) 60 days (c) 80 days (d) 100 days.

12. If 18 women can reap a field in 7 days, in what time can 6 women reap the same field?

(a) 15 days (b) 21 days (c) 30 days (d) 36 days.

13. 10 men can dig a trench in 15 days. How long will 3 men take to dig the same trench?

(a) 50 days (b) 60 days (c) 100 days (d) 75 days.

14. 6 pipes are required to fill a tank in 1 hour. How long will it take if only 5 pipes of the same type are used?

(a) 75 minutes (b) 72 minutes (c) 80 minutes (d) 90 minutes.

15. 40 cows can graze a field in 16 days. How many cows will graze the same field in 10 days ?

(a) 60 (b) 64 (c) 80 (d) 75.

16. If $x = ky$ and when $y = 4$, $x = 8$ then k is

(a) 1 (b) 2 (c) 3 (d) 4.

17. x and y vary inversely with each other. If $x - 15$ when $y = 6$, then the value of x when $y = 15$ is

(a) 2 (b) 4 (c) 5 (d) 6.

18. If x = 20 and y = 40, then x and y are:

(a) Directly proportional (b) Inversely proportional

(c) Neither directly nor inversely proportional (d) Cannot be determined

19. If x = 15 and y = 1/30, then x and y are:

(a) Directly proportional (b) Inversely proportional

(c) Neither directly nor inversely proportional (d) Cannot be determined

20. If x and y are directly proportional, then which of the following is correct?

(a) x + y = constant (b) x – y = constant

(c) xy = constant (d) x/y = constant

21. If x and y are inversely proportional, then:

(a) x + y = constant (b) x – y = constant (c) xy = constant (d) x/y = constant

22. If $x \propto y$ and $x_1 = 5$, $y_1 = 210$ and $x_2 = 2$, then find y_2 ?

(a) 200 (b) 84 (c) 99 (d) 70

23. The scale of a map is given as 1 : 300. Two cities are 4 km apart on the map. The actual distance between them is:

(a) 1000 km (b) 1100 km (c) 1200 km (d) 1300 km

24. 6 pipes are required to fill a tank in 1 hour 20 minutes. If we use 5 such type of pipes, how much time it will take to fill the tank?

(a) 120 minutes (b) 96 minutes (c) 80 minutes (d) 85 minutes

25. If x and y are inversely proportional, then which one is true?

(a) $x_1/y_1 = x_2/y_2$ (b) $x_1/x_2 = y_1/y_2$ (c) $x_1/x_2 = y_2/y_1$ (d) $x_1.x_2 = y_1.y_2$

VSA (1-MARK)

1 If the weight of 12 sheets of thick paper is 40 grams, how many sheets of the same paper would weigh 2500 grams?

2 If x1 = 5, y1 = 7.5, x2 = 7.5 then find y2 if x and y vary directly.

3 If the cost of 20 books is ₹ 180, how much will 15 books cost?

4 If 300 Kg of coal costs 6000₹, then find the cost of 120 kg of coal?

5 Manvi types 200 words in 30 minutes. How many words will she type in 12 minutes?

6 If 12 labours can construct a road in 50 hours, how many labours will be required to construct the

same road in 40 hours?

7 A car takes 18 hours to ride 720 Km. Find the time taken by the car to travel 360 Km.

8 The scale of a map is given as 1: 50,000. Two villages are 5 cm apart on the map. Find the actual distance between them.

9 If 15 men can do a work in 12 days, how many men will do the same work in 6 days?

10 If it takes 40 days for 120 men to complete a work, how long will it take for 80 men to complete the same work?

11 8 g of sandal wood cost Rs 40. What will 10 g cost?

12 The rent of 7 hectares is Rs 875. What is the rent of 16 hectares?

13 A shot travels 90 m in 1 second. How long will it take to go 225 m?

14 3 knives cost Rs 63. What will 17 knives cost?

15 15 men can mow 40 hectares of land in 1 day. How much will 6 men mow in 1 day?

SA (2 MARKS)

1. A train is moving at a uniform speed of 100 km/h. How far will it travel in 20 minutes?
2. What is the cost of 50 sticks at Rs 24 per score?
3. If 3 quintals of coal cost Rs 6000, what is the cost of 120 kg?
4. If 20 cows eat as much as 15 oxen, how many cows will eat at much as 36 oxen?
5. The fare for a journey of 40 km is Rs 25. How much can be travelled for Rs. 40?
6. Geeta types 200 words in half an hour. How many words will she type in 12 minutes?
7. 3 lambs finish eating turnips in 8 days. In how many days will 2 lambs finish them?
8. A labourer is paid Rs 400 for 2 days work. If he works for 5 days, how much will he get?
9. If 100 students took 20 days to clean a garden. How many days will it take to clean the garden if 25 more students are added?
10. There are 150 students in a hostel. Food provision for them is for 20 days. How long will these provisions last, if 50 more students join the group?

LA (3MARKS)

1. A train is moving at a uniform speed of 105 km/hr.
   (i) How far will it travel in 20 minutes?
   (ii) Find the time required to cover a distance of 210 km.
2. 2 kg of sugar contains 9×10^6 crystals. How many sugar crystals are there in (a) 5 kg of sugar? (b) 1.2 kg of sugar?
3. The cost of 5 m of cloth is Rs.210. Tabulate the cost of 2,4 and 10 m of cloth of the same type.
4. A mixture of paint is prepared by mixing 1 part of blue pigments with 5 parts of base. In the following table, find the parts of base that need to be added.

Parts of blue pigment	1	4	9	12
Parts of base	5	-	-	-

5. In a school, the prize money of Rs. 2,00,000 is to be divided equally amongst the top scores. Complete the following table and find the prize money to be given to individual scorer.

Number of top scorers	1	2	4	6	8
Prize for each scorer	2,00,000	1,00,000	Y_1	Y_2	Y_3

6. Two persons could fit new windows in a house in 3 days.
   (i) One of the persons fell ill before the work started. How long would the job take now ?
   (ii) How many persons would be needed to fit the windows in one day?
7. A car takes 3 hrs to reach a destination by travelling at the speed of 60 km/hr. How long will it take when the car travels at the speed of (a) 90 km/hr ? (b) 45 km/hr ?

8. A 5m60cm high vertical pole casts a shadow 3m20cm long. Find at the same time (a) the length of the shadow cast by another pole 10m50cm high (b) the height of a pole which casts a shadow 5m long.

CCT questions

Rahul is making a wheel using spokes. He wants to fix equal spokes in such a way that the angles between any pair of consecutive spokes are equal. Help him by completing the following table:

Number of spokes	3	6	9	12	15
Angle between a pair of consecutive spokes	90^0	60^0	…….	.....	…..

(i) Are the number of spokes and the angles formed between the pairs of consecutive spokes in inverse proportion?

(ii) Calculate the angle between a pair of consecutive spokes on a wheel with 15 spokes.

(iii) How many spokes would be needed, if the angle between a pair of consecutive spokes is 40^0?

Answer Key

MCQ (1 mark)	VSA (1 mark)	SA (2 marks)	LA (3 marks)
1. Rs.400 2. 2.4 kg 3. 13.5 kg 4. 90 metric tons 5. Rs.2000 6. 6 minutes 7. 8 hrs. 8. Rs.2400 9. 240 10. 8 days 11. 60 days 12. 21 days 13. 50 days 14. 72 minutes 15. 64 16. 2 17. 6 18. directly proportional 19. indirectly proportional 20. x/y = constant 21. xy = constant 22. 84 23. 1200 km 24. 96 min **25.** $x_1/x_2 = y_2/y_1$	1. 750 2. 11.25 3. Rs.135 4. 2400 5. 80 6. 15 7. 9 hr 8. 2.5 km 9. 30 min 10. 60 days 11. Rs.50 12. Rs.2000 13. 2.5 sec 14. Rs.357 15. 16 hectares	1. 33.3 km 2. 60 3. Rs.2400 4. 48 5. 64 km 6. 80 7. 12 8. Rs.1000 9. 16 days 10. 15 days	1. (a) 35km (b) 120 min 2. (a) 2.25 x 10^7 crystals (b) 5.4 x 10^6 crystals 3. Rs.84,Rs.168,Rs.420 respectively 4. 20,45,60 respectively 5. y_1 = 50,000 , y_2 = 33,333 , y_3 = 25,000 6. (a) 6 days (b) 6 persons 7. (a) 2 hr (b) 4 hr 8. (a) 6 m (b) 8m75cm **CCT answers:** **9→40^0,** **12→30^0,** **15→24^0** **(i) yes** **(ii) 24^0** **(iii) 9**

CHAPTER :14
FACTORISATION

What is Factorization?

When we factorize an algebraic expression, we write it as a product of factors. These factors may be numbers, algebraic variables or algebraic expressions. Expressions like $3xy$, $5x^2y$, $2x\ (y + 2)$, $5\ (y + 1)\ (x + 2)$ are already in factor form. Their factors can be just read off from them, as we already know. On the other hand, consider expressions like $2x + 4$, $3x + 3y$, $x^2 + 5x$, $x^2 + 5x + 6$. It is not obvious what their factors are. We need to develop systematic methods to factorise these expressions, i.e., to find their factors.

1. Method of common factors

• We begin with a simple example:

Factorise: $2x + 4$.

We shall write each term as a product of irreducible factors;

$2x = 2 \times x$

$4 = 2 \times 2$

Hence $2x + 4 = (2 \times x) + (2 \times 2)$

Notice that factor 2 is common to both the terms.

Observe, by distributive law $2 \times (x + 2) = (2 \times x) + (2 \times 2)$

Therefore, we can write $2x + 4 = 2 \times (x + 2) = 2\ (x + 2)$

Thus, the expression $2x + 4$ is the same as $2\ (x + 2)$.

Now we can read off its factors: they are 2 and $(x + 2)$. These factors are irreducible.

2. Factorisation by regrouping terms

Look at the expression $2xy + 2y + 3x + 3$.

You will notice that the first two terms have common factors 2 and y and the last two terms have a common factor 3. But there is no single factor common to all the terms. How shall we proceed?

Let us write $(2xy + 2y)$ in the factor form:

$2xy + 2y = (2 \times x \times y) + (2 \times y)$

$= (2 \times y \times x) + (2 \times y \times 1)$

$= (2y \times x) + (2y \times 1)$

$= 2y\ (x + 1)$

Similarly, $3x + 3 = (3 \times x) + (3 \times 1)$

$= 3 \times (x + 1)$

= 3 (x + 1)

Hence, 2xy + 2y + 3x + 3 = 2y (x + 1) + 3 (x +1)

Observe, now we have a common factor (x + 1) in both the terms on the right-hand side.

Combining the two terms, 2xy + 2y + 3x + 3 = 2y (x + 1) + 3 (x + 1)

= (x + 1) (2y + 3)

The expression 2xy + 2y + 3x + 3 is now in the form of a product of factors.

Its factors are (x + 1) and (2y + 3). Note, these factors are irreducible.

REGROUPING THE TERMS

Suppose, the above expression was given as 2xy + 3 + 2y + 3x; then it will not be easy to see the factorization.

Rearranging the expression, as 2xy + 2y + 3x + 3,

allows us to form groups (2xy + 2y) and (3x + 3) leading to factorization.

This is regrouping.

Regrouping may be possible in more than one way.

Suppose, we regroup the expression as: 2xy + 3x + 2y + 3.

This will also lead to factors.

Let us try: $2xy + 3x + 2y + 3 = 2 \times x \times y + 3 \times x + 2 \times y + 3$

$= x \times (2y + 3) + 1 \times (2y + 3)$

$= (2y + 3) (x + 1)$

The factors are the same (as they have to be), although they appear in different order.

3. Factorisation using identities

We know that

(a) $(a + b)^2 = a^2 + 2ab + b^2$

(b) $(a – b)^2 = a^2 – 2ab + b^2$

(c) $(a + b) (a – b) = a^2 – b^2$

The following solved examples illustrate how to use these identities for factorisation. What we do is to observe the given expression. If it has a form that fits the right hand side of one of the identities, then the expression corresponding to the left hand side of the identity gives the desired factorisation.

Example :

Factorise : $x^2 + 8x + 16$

Solution: Observe the expression; it has three terms.

Therefore, it does not fit Identity III.

Also, it's first and third terms are perfect squares with a positive sign before the middle term.

So, it is of the form $a^2 + 2ab + b^2$ where a = x and b = 4

such that $a^2 + 2ab + b^2 = x^2 + 2\,(x)\,(4) + 4^2$

$= x^2 + 8x + 16$

Since $a^2 + 2ab + b^2 = (a + b)^2$,

by comparison $x^2 + 8x + 16 = (x + 4)^2$ (the required factorisation).

Example :

Factorise $4y^2 – 12y + 9$

Solution: Observe $4y^2 = (2y)^2$, $9 = 3^2$ and $12y = 2 \times 3 \times (2y)$

Therefore, $4y^2 – 12y + 9 = (2y)^2 – 2 \times 3 \times (2y) + (3)^2$

$= (2y – 3)^2$ (required factorisation)

Example :

Factorise $49p^2 – 36$

Solution: There are two terms; both are squares and the second one is negative.

The expression is of the form $(a^2 – b^2)$.

Identity (c)is applicable here;

$49p^2 – 36 = (7p)^2 – (6)^2 = (7p – 6)(7p + 6)$ (required factorisation)

Factors of the form (x + a) (x + b)

$(x + a)(x + b) = x^2 + (a + b)x + ab$

Example :

Factorise : $x^2 + 5x + 6$

Solution: If we compare the R.H.S. of Identity (d)with $x^2 + 5x + 6$, we find ab = 6, and a + b = 5.

From this, we must obtain a and b.

The factors then will be (x + a) and (x + b). If a b = 6, it means that a and b are factors of 6.

Let us try a = 6, b = 1. For these values a + b = 7, and not 5, So this choice is not right.

Let us try a = 2, b = 3. For this a + b = 5 exactly as required.

The factorised form of this given expression is then (x +2) (x + 3).

Division of Algebraic Expressions

Division of a monomial by another monomial

Consider $6x^3 \div 2x$

We may write 2x and $6x^3$ in irreducible factor forms, $2x = 2 \times x$

$6x^3 = 2 \times 3 \times x \times x \times x$

Now we group factors of $6x^3$ to separate 2x,

$6x^3 = 2 \times x \times (3 \times x \times x) = (2x) \times (3x^2)$

Therefore, $6x^3 \div 2x = 3x^2$.

Division of a polynomial by a monomial

When you divide polynomials you may have to factor the polynomial to find a common factor between the numerator and the denominator. For example: Divide the following polynomial: $(2x^2 + 4x) \div 2x$.

Both the numerator and denominator have a common factor of 2x.

Thus, the expression can be written as $2x(x + 2) / 2x$.

Cancelling out the common term 2x, we get x+2 as the answer.

Division of Algebraic Expressions Continued (Polynomial ÷ Polynomial) •

Consider $(7x^2 + 14x) \div (x + 2)$

We shall factorise $(7x^2 + 14x)$

first to check and match factors with the denominator:

$7x^2 + 14x = (7 \times x \times x) + (2 \times 7 \times x)$

$= 7 \times x \times (x + 2)$

$= 7x(x + 2)$

Now $(7x^2 + 14x) \div (x + 2) = 7x(x+2) \div (x+2) = 7x$ (Cancelling the factor (x + 2))

MCQ(1 MARK)

1. The common factor of x^2y^2 and x^3y^3 is

(a) x^2y^2 (b) x^3y^3

(c) x^2y^3 (d) x^3y^2.

2. The common factor of x^3y^2 and x^4y is

(a) $x^{43}y^2$ (b) x^4y

(c) x^3y^2 (d) x^3y.

3. The common factor of $a^2 m^4$ and a^4m^2 is

(a) a^4m^4 (b) a^2m^2

(c) a^2m^4 (d) a^4m^2

4. The common factor of p3q4 and p4q3 is

(a) p^4q^4 (b) p^4q^3

(c) p^3q^3 (d) p^3q^4

5. The common factor of $8a^2b^4c^2$, $12a^4bc^4$ and $20a^3b^4$ is

(a) a^4b^4 (b) a^2b^2

(c) $4a^2b^2$ (d) $4a^2b$.

6. The factorisation of $12a^2b + 15ab^2$ is

(a) $3ab\ (4a + 5b)$ (b) $3a^2b\ (4a + 5b)$

(c) $3ab^2\ (4a + 5b)$ (d) $3a^2b^2\ (4a + 5b)$.

7. The factorisation of $10x^2 – 18x^3 + 14x^4$ is

(a) $2x^2\ (7x^2 – 9x + 5)$ (b) $2x\ (7x^2 – 9x + 5)$

(c) $2\ (7x^2 – 9x + 5)$ (d) $2x^3\ (7x^2 – 9x + 5)$.

8. The factorisation of $6x – 42$ is

(a) $6(x – 7)$ (b) $3(x – 7)$

(c) $2(x – 7)$ (d) $6(x + 7)$

9. The factorisation of $6x + 12y$ is

(a) $6(x + 2y)$ (b) $3(x + 4y)$

(c) $2(3x + 12y)$ (d) none of these.

10. The factorisation of $28a^3b^5 – 42a^5b^3$ is

(a) $14a^3b^3(2b^2 – 3a^2)$ (b) $14a^2b^3(2b^2 – 3a^2)$

(c) $14a^3b^2(2b^2 – 3a^2)$ (d) none of these.

11. The factorisation of $a^3 + a^2b + ab^2$ is

(a) $a(a^2 + ab + b^2)$ (b) $6(a^2 + ab + b^2)$

(c) $ab(a^2 + ab + b^2)$ (d) none of these.

12. The factorisation of $x^2yz + xy^2z + xyz^2$ is

(a) $xyz(x + y + z)$ (b) $x^2yz(x + y + z)$

(c) $xy^2z(x + y + z)$ (d) $xyz^2(x + y + z)$.

13. The factorisation of $ax^2y + bxy^2 + cxyz$ is

(a) $xy(ax + by + cz)$ (b) $axy(ax + by + cz)$

(c) $bxy(ax + by + cz)$ (d) $cxy(ax + by + cz)$.

14. The factorisation of $a\ (x + y + z) + b(x + y + z) + c(x + y + z)$ is

(a) $(a + b + c)(x + y + z)$ (b) $(ab + bc + ca)(x + y + z)$

(c) $(xy + yz + zx)(a + b + c)$ (d) none of these.

15. The factorisation of $6xy - 4y + 6 - 9x$ is

(a) $(3x - 2)(2y - 3)$ (b) $(3x + 2)(2y - 3)$

(c) $(3x - 2)(2y + 3)$ (d) $(3x + 2)(2y + 3)$.

16. The factorisation of $x^2 + xy + 2x + 2y$ is

(a) $(x + 2)(x + y)$ (b) $(x + 2)(x - y)$

(c) $(x - 2)(x + y)$ (d) $(x - 2)(x - y)$.

17. The factorisation of $ax + bx - ay - by$ is

(a) $(x - y)(a + b)$ (b) $(x + y)(a + b)$

(c) $(x - y)(a - b)$ (d) $(x + y)(a - b)$.

18. The factorisation of $ab - a - b + 1$ is

(a) $(a - 1)(b - 1)$ (b) $(a + 1)(b + 1)$

(c) $(a - 1)(b + 1)$ (d) $(a + 1)(b - 1)$.

19. The factorisation of $x^2 + x + xy + y + zx + z$ is

(a) $(x + y + z)(x + 1)$ (b) $(x + y + z)(x + y)$

(c) $(x + y + z)(y + z)$ (d) $(x + y + z)(z + x)$.

20. The factorisation of $x^2y^2 + xy + xy^2z + yz + x^2yz + xz$ is

(a) $(xy + yz + zx)(xy + 1)$ (b) $(xy + yz + zx)(yz + 1)$

(c) $(xy + yz + zx)(zx + 1)$ (d) none of these.

21. The factorisation of $x^2 + 8x + 16$ is

(a) $(x + 2)^2$ (b) $(x + 4)^2$

(c) $(x - 2)^2$ (d) $(x - 4)^2$

22. The factorisation of $4y^2 - 12y + 9$ is

(a) $(2y + 3)^2$ (b) $(2y - 3)^2$

(c) $(3y + 2)^2$ (d) $(3y - 2)^2$

23. The factorisation of $y^2 - 7y + 12$ is

(a) $(y + 3)(y + 4)$ (b) $(y + 3)(y - 4)$

(c) $(y - 3)(y + 4)$ (d) $(y - 3)(y - 4)$.

24. The factorisation of $z^2 - 4z - 12$ is

(a) $(z + 6)(z + 2)$ (b) $(z - 6)(z - 2)$

(c) $(z - 6)(z + 2)$ (d) $(z + 6)(z - 2)$.

25. The factorisation of $am^2 + bm^2 + bn^2 + an^2$ is

(a) $(a + b)(m^2 – n^2)$ (b) $(a + b)(m^2 + n^2)$

(c) $(a – b)(m^2 + n^2)$ (d) $(a – b)(m^2 – n^2)$.

VSA (1 MARK)

1. The factorisation of $(lm + l) + m + 1$ is
2. The factorisation of $(l + m)^2 – 4lm$ is
3. The factorisation of $1 + p + q + r + pq + qr + pr + pqr$ is
4. The factorisation of $1 + 16x + 64x^2$ is
5. The value of 99^2 is
6. The value of 49^2 is
7. The factorisation of $x^2 – 9$ is
8. The factorisation of $36x^2y^2 – 1$ is
9. The factorisation of $3x^2 + 10x + 8$ is
10. The factorisation of $3x^2 – 16x + 16$ is
11. The factorisation of $6x^2 – 5x – 6$ is
12. The factorisation of $6 – x – 2x^2$ is
13. If $x^2 – x – 42 = (x + k)(x + 6)$, then k =
14. The value of $3.5 \times 3.5 – 2.5 \times 2.5$ is
15. If x = 2, y = -1 then the value of $x^2 -+ 4xy + 4y^2$ is

SA (2 MARKS)

1. Factorise the polynomial. $2axy^2 + 10x + 3ay^2 + 15$
2. Factorise the expression. $x^2 + 4x + 8y + 4xy + 4y^2$
3. Factorise: $a^2 + 14a + 48$
4. Factorise: $m^2 – 10m – 56$
5. Factorise: $x^4 – (x – y)^4$
6. Factorise: $4x^2 + 9 – 12x – a^2 – b^2 + 2ab$
7. Factorise the polynomial $16x^4 – 81$
8. Factorise the polynomial $(a – b)^2 + 4ab$
9. If one of the factors of $(5x^2 + 70x – 160)$ is $(x – 2)$. Find the other factor.
10. Evaluate the following divisions: $(3b – 6a) \div (30a – 15b)$

LA (3 MARKS)

1. Factorise the polynomial. $xy(z^2 + 1) + z(x^2 + y^2)$
2. Factorise the polynomial. $2axy^2 + 10x + 3ay^2 + 15$
3. Factorise the expression. $x^2 + 4x + 8y + 4xy + 4y^2$
4. Factorise the expression. (b) $4p^2 + 2q^2 + p^2q^2 + 8$
5. Factorise: $x^4 – (x – y)^4$
6. Factorise: $4x^2 + 9 – 12x – a^2 – b^2 + 2ab$
7. Factorise: $(x + y)^2 – 4xy – 9z^2$
8. Factorise: $25x^2 – 4y^2 + 28yz – 49z^2$

FACTORISATION
ANSWER KEYS
MCQ

1 a	2 d	3 b	4 c	5 d
6 a	7 a	8 a	9 a	10 a
11 a	12 a	13 a	14 a	15 a
16 a	17 a	18 a	19 a	20 a
21 b	22 b	23 d	24 c	25 b

VSA (1 MARK EACH)

1. $(l+1)(m+1)$
2. $(l-m)^2$
3. $(1+p)(1+q)(1+r)$
4. $(1+8x)^2$
5. $(90)^2 + 2(90)(9) + 9^2$
6. $(50)^2 – 2(50)(1) + 1^2$
7. $(x+3)(x-3)$
8. $(6xy-1)(6xy+1)$
9. $(3x+4)(x+2)$
10. $(x-4)(3x-4)$
11. $(2x-3)(3x+2)$
12. $(2+x)(3-2x)$
13. (-7)
14. 6
15. 0

SA (2 MARKS EACH)

1. $(2X+3)(ay^2+5)$
2. $(x+2y)(x+2y+4)$
3. $(a+6)(a+8)$
4. $(m-14)(m+6)$
5. $y(2x-y)(2x^2-2xy+y^2)$
6. $(2x-3+a-b)(2x-3-a+b)$
7. $(4x^2+9)(2x+3)(2x-3)$
8. $(a+b)^2$
9. $5(x+16)$
10. $(\frac{-1}{5})$

LA(3 MARKS EACH)

1. $(x+yz)(zx+y)$
2. $(2x+3)(ay^2+5)$
3. $(x+2y)(x+2y+4)$
4. $(p^2+2)(4+q^2)$
5. $y(2x-y)(2x^2-2xy+y^2)$
6. $(2x-3+a-b)(2x-3-a+b)$
7. $(x-y+3z)(x-y-3z)$
8. $(5x+2y-7)(5x-2y+7)$

CHAPTER – 15
INTRODUCTION TO GRAPHS

• Graphical presentation of data is easier to understand.

(a) A bar graph is used to show comparison among categories.

(b) A pie graph is used to compare parts of a whole.

(c)A Histogram is a bar graph that shows data in intervals.

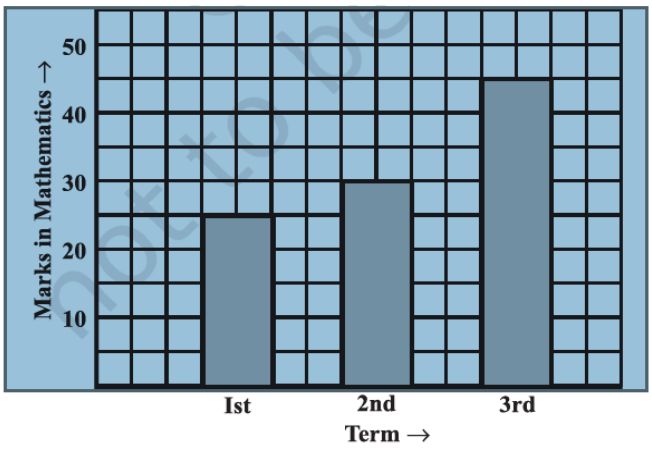
• A line graph displays data that changes continuously over periods of time.

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

• For fixing a point on the graph sheet we need, x-coordinate and y-coordinate. Any point on X axis has the y- coordinate always 0, represented as (x, 0) and any point of Y axis has X – coordinate always 0, represented as (0, y).

• The relation between dependent variable and independent variable is shown through a graph.

• **A Bar Graph:** A pictorial representation of numerical data in the form of bars (rectangles) of uniform width with equal spacing. The length (or height) of each bar represents the given number.



A Pie Graph: A pie graph is used to compare parts of a whole. The various observations or components are represented by the sectors of the circle.

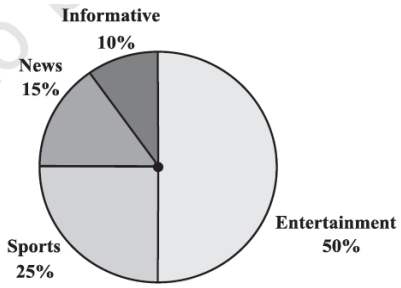
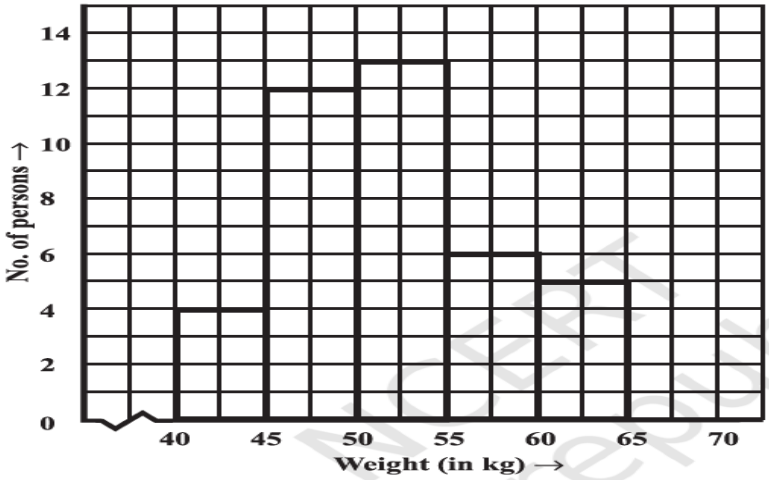
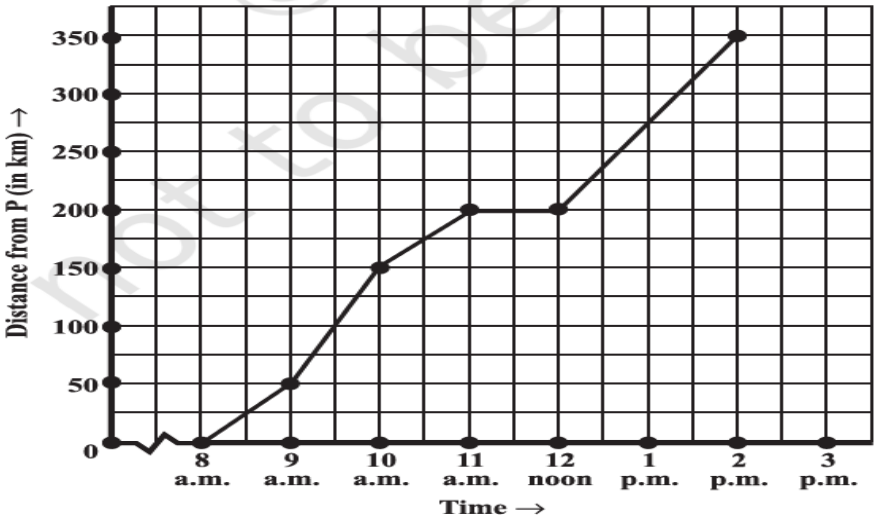


Fig 15.3

A Histogram: Histogram is a type of bar diagram, where the class intervals are shown on the horizontal axis and the heights of the bars (rectangles) show the frequency of the class interval, but there is no gap between the bars as there is no gap between the class intervals.



• **Linear Graph:** A line graph in which all the line segments form a part of a single line.



• **Coordinates:** A point in Cartesian plane is represented by an ordered pair of numbers.

• **Ordered Pair:** A pair of numbers written in specified order.

MCQ (1 MARK)

1. If y – coordinate of a point is zero, then this point always lies:

(a) I quadrant (b) II quadrant (c) x – axis (d) y – axis

2. If x – coordinate of a point is zero, then this point always lies:

(a) I quadrant (b) II quadrant (c) x – axis (d) y – axis

3. Point (–6, 4) lies in the quadrant:

(a) I (b) II (c) III (d) IV

4. The point (–4, –3) means:

(a) x = –4, y = –3 (b) x = –3, y = –4 (c) x = 4, y = 3 (d) None of these

5. Point (0, 4) lies on the:

(a) I quadrant (b) II quadrant (c) x – axis (d) y – axis

6. Point (5, 0) lies on the:

(a) I quadrant (b) II quadrant (c) x – axis (d) y – axis

7. On joining points (0, 0), (0, 2), (2,2) and (2, 0) we obtain a:

(a) Square (b) Rectangle (c) Rhombus (d) Parallelogram

8. Point (–2, 3) lies in the:

(a) I quadrant (b) II quadrant (c) III quadrant (d) IV quadrant

9. Point (0, –2) lies:

(a) on the x-axis (b) in the II quadrant (c) on the y-axis (d) in the IV quadrant

10. Abscissa of the all the points on x – axis is:

(a) 0 (b) 1 (c) –1 (d) any number

11. Ordinate of the all the points on x – axis is:

(a) 0 (b) 1 (c) –1 (d) any number

12. Abscissa of the all the points on y – axis is:

(a) 0 (b) 1 (c) –1 (d) any number

13. Ordinate of the all the points on y – axis is:

(a) 0 (b) 1 (c) –1 (d) any number

14. The point whose ordinate is 4 and which lies on y – axis is:

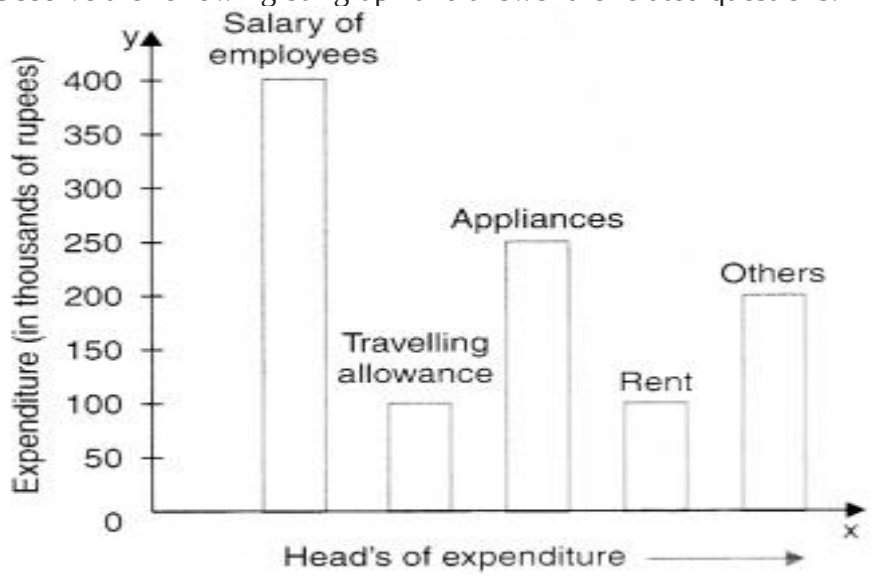
(a) (4, 0) (b) (0, 4) (c) (1, 4) d)(4,2)

15. The perpendicular distance of the point P(3,4) from the y – axis is:

(a) 3 (b) 4 (c) 5

(d) 7

Observe the following bar graph and answer the related questions:



16.On which head, is the expenditure maximum?

(a) Travelling allowance (b) Rent (c) Appliances (d) Salary of employees.

17.On which head/heads, is the expenditure minimum?

(a) Travelling allowance/rent (b) Appliances (c) Salary of employees (d) Others.

18.On which two heads, is the expenditure same?

(a) Salary of employees and others (b) Travelling allowance and rent

(c) Appliances and rent (d) Appliances and others.

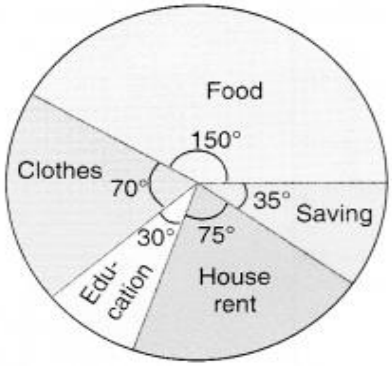
19.What is the difference of expenditures (in thousands of rupees) on salary of employees and rent?

(a) 100 (b) 200 (c) 300 (d) 400.

20.What is the sum of the expenditures (in thousands of rupees) on travelling allowance and rent?

(a) 100 (b) 200 (c) 300 (d) 400.

21. Observe the following circle-graph and answer the related questions:



21. On which head is the expenditure maximum?

(a) Food (b) Clothes (c) House rent (d) Education.

22. On which head is the expenditure minimum ?

(a) Education (b) House rent (c) Food (d) Clothes.

23.If the budget of the family is Rs 10800, what is the saving ?

(a) Rs 1050 (b) Rs 1000 (c) Rs 950 (d) Rs 1200

24.What is the difference of expenditures on clothes and education if the budget of the family is Rs 10800

(a) Rs 1200 (b) Rs 1000 (c) Rs 800 (d) Rs 1500.

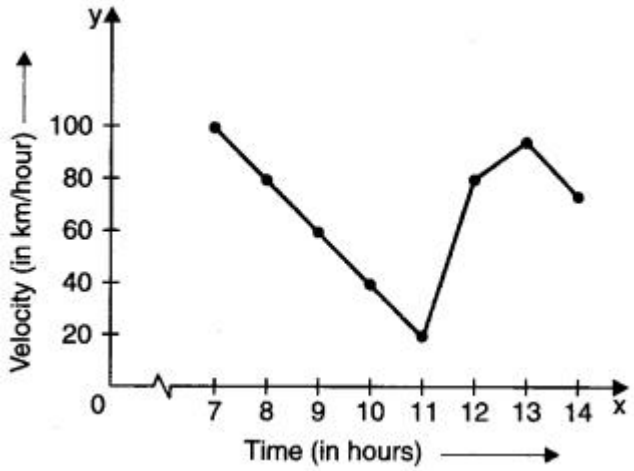
25. What is the sum of the expenditures on food and education if the budget of the family is Rs 10800 ?

(a) Rs 5000 (b) Rs 8000 (c) Rs 5400 (d) Rs 6000.

VSA(1-MARK)

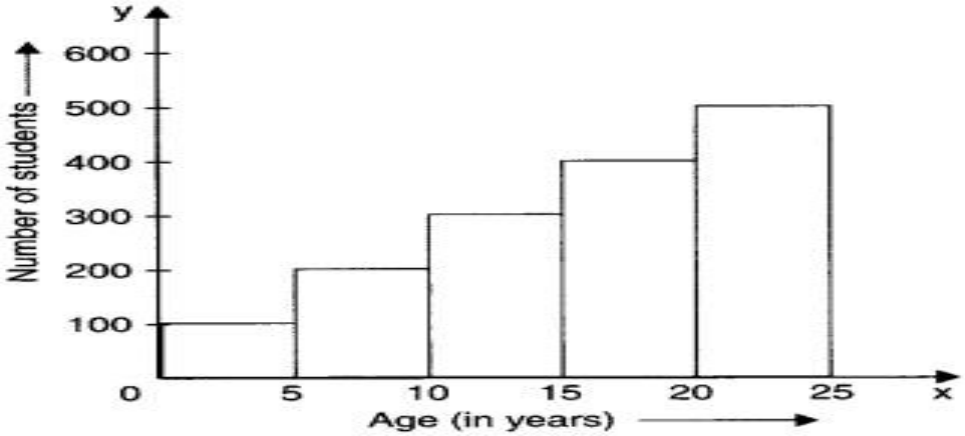
1. What is the name of horizontal and the vertical lines drawn to determine the position of any point in the Cartesian plane?
2. What is the name of each part of the plane formed by these two lines?
3. Write the name of the point where these two lines intersect.
4. What are the coordinates of the origin?
5. What are the coordinates of a point whose x-coordinate is 3 and y-coordinate is 4?
6. What are the coordinates of a point whose x-coordinate is 1 and y-coordinate is 0?
7. What are the coordinates of a point whose x-coordinate is 0 and y-coordinate is 1?

Observe the following velocity-time graph and answer the related questions:



8. At what time is the velocity maximum?
9. At what time is the velocity minimum?
10. At what times are the velocities equal?
11. What is the fall in velocity from 7 to 11?

Observe the following histogram and answer the related questions:



12. In which class interval, are the maximum number of students ?
13. In which class interval, are the minimum number of students ?
14. In which class interval, is the number of students 200 ?
15. The difference in the number of students of class intervals 0-5 and 5-10 is

SA(2 MARKS)

1. Locate the points (5, 0), (0, 5), (2, 5), (5, 2), (–3, 5), (–3, –5), (5, –3) and (6, 1) in the Cartesian plane.

2. Plot the following ordered pairs of number (*x*, *y*) as points in the Cartesian plane.
   Use the scale 1cm = 1 unit on the axes.

x	–3	0	–1	4	2
y	7	–3.5	–3	4	–3

3. Draw the line passing through (2, 3) and (3, 2). Find the coordinates of the points at which thisline meets the *x*-axis and *y*-axis.
4. Plot the point (4, 3) on a graph sheet. Is it the same as the point (3, 4)?
5. Plot the points A (5, 5) and point B (–5, 5) on a graph sheet. Join the lines OA, OB and BA. Name thefigure obtained and find the area of the figure so obtained
6. Plot the points (0, 2), (3, 0), (–3, 0) and (0, –2) in the graph sheet. Join these points. Name the figure obtained and find the area of the figure so obtained.
7. Draw the graph of y = 3x. From the graph, find the value of y when (a) x = 4 and (b) x =5.
8. The following table gives the quantity of petrol and its cost. Plot a graph to show the data.

No. of litres of petrol	10	15	20	25
Cost of petrol in Rs.	500	750	1000	1250

9. In which quadrant or on which axis do each of the points (5, 0), (0, 5), (2, 5), (5, 2), (–3, 5), (–3,–5), (5, –3) and (6, 1) in the Cartesian plane.
10. Plot the points A (4, 4) and (–4, 4) on a graph sheet. Join the lines OA, OB and BA. What figuredo you obtain?

LA(3-MARKS)

1. Use the tables below to draw linear graphs.

(a) The number of days a hill side city received snow in different years.

Year	2003	2004	2005	2006
Days	8	10	5	12

(b) Population (in thousands) of men and women in a village in different years.

Year	2003	2004	2005	2006	2007
Number of Men	12	12.5	13	13.2	13.5
Number of Women	11.3	11.9	13	13.6	12.8

2. A bank gives 10% Simple Interest (S.I.) on deposits by senior citizens. Draw a graph to illustratethe relation between the sum deposited and simple interest earned. Find from your graph

   (a) the annual interest obtainable for an investment of Rs 250.

   (b) the investment one has to make to get an annual simple interest of Rs 70.

3. Ajit can ride a scooter constantly at a speed of 30 kms/hour. Draw a time-distance graph for this situation. Use it to find

   (a)the time taken by Ajit to ride 75 km. (b) the distance covered by Ajit in $3\frac{1}{2}$ hours.

4. Draw the graphs for the following table of values, with suitable scales on the axes.

Time (in hours)	6 am	7 am	8 am	9 am
Distances (in km)	40	80	120	160

Distance travelled by a car

   a. How much distance did the car cover during the period 7.30 a.m. to 8 a.m?

   b. What was the time when the car had covered a distance of 100 km since it started?

5. Plot the following points on a graph sheet. Verify if they lie

   on a line(a) A(4, 0), B(4, 2), C(4, 6), D(4, 2.5)

   (b) P(1, 1), Q(2, 2), R(3, 3), S(4, 4)

   (c) K(2, 3), L(5, 3), M(5, 5), N(2, 5)

6. Consider the relation between the perimeter and the side of a square, given by P = 4a. Draw a graph to show this relation. From the graph, find the value of P when (a) a = 4 and (b) a =5.

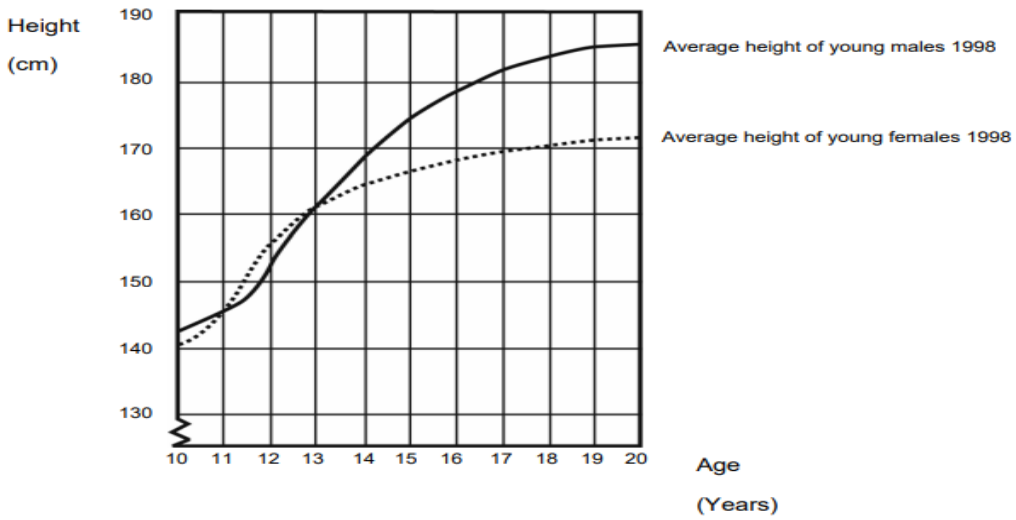
7. Consider the relation between the area and the side of a square, given by $A = x^2$. Draw a graph to show this relation. From the graph, find the value of P when x = 4.

8. Simple interest on a certain sum is Rs. 40 per year then S = 40x, where x is the number of years.

   Draw a graph of this relation. From the graph, find the value of S when (a) x = 5 and (b) x =6.

Case study(4 MARKS)

1. In 1998 the average height of both young males and young females in the Netherlands is represented in this graph.

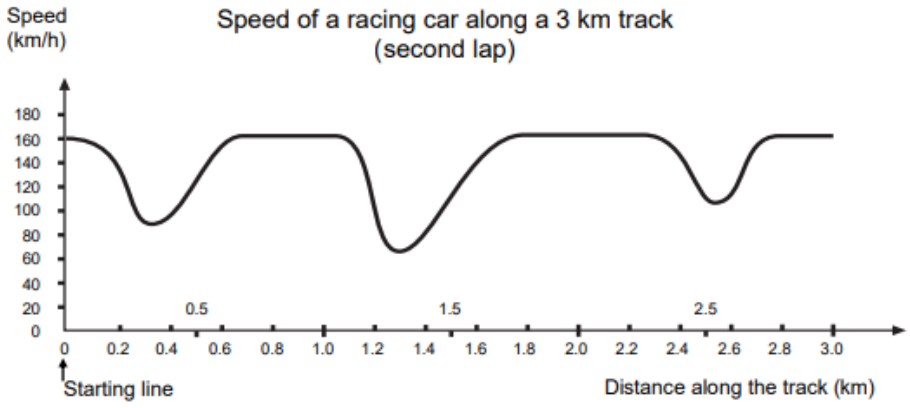


A: Since 1980 the average height of 20-year-old females has increased by 2.3 cm, to 170.6 cm. What was the average height of a 20-year-old female in 1980?

Answer: .....cm

B. Explain how the graph shows that on average the growth rate for girls slows down after 12 years of age.

2. This graph shows how the speed of a racing car varies along a flat 3-kilometer track during its second lap.



A: What is the approximate distance from the starting line to the beginning of the longest straight section of the track?

a 0.5 km b 1.5 km c2.3 km d 2.6 km

B: SPEED OF RACING CAR M159Q02 Where was the lowest speed recorded during the second lap?

a.at the starting line. b. at about 0.8 km.

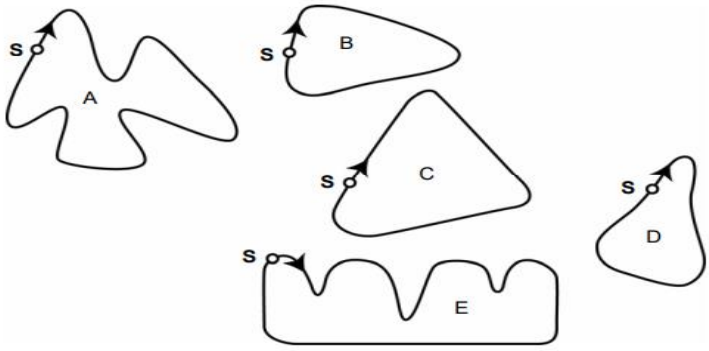
c. at about 1.3 km. d. halfway around the track.

C: What can you say about the speed of the car between the 2.6 km and 2.8 km marks?

a. The speed of the car remains constant. b. The speed of the car is increasing.

d. The speed of the car is decreasing. d. The speed of the car cannot be determined from the graph.

D: Here are pictures of five tracks: Along which one of these tracks was the car driven to produce the speed graph shown earlier?



S: Starting point

Answer key

MCQ (1 MARK)

1	C	6	C	11	A	16	D	21	A
2	A	7	A	12	D	17	A	22	A
3	B	8	B	13	D	18	B	23	A
4	C	9	C	14	B	19	C	24	A
5	D	10	D	15	A	20	B	25	C

VSA(1 MARKS)

1. X- Axis and Y- Axis
2. Quadrant
3. Origin
4. (0,0)
5. (3,4)
6. (1,0)
7. (0,1)
8. At 7 hours
9. At 11 hours
10. At 8 hours and 12 hours
11. (100 – 20) = 80 km/h
12. 20-25
13. 0-5
14. 5-10
15. 100 student

SA (2 MARKS)

1. Draw a graph and locate the given point.
2. Draw a graph and locate the given point.
3. Draw a liner graph for the given point.
4. Draw a graph and locate the given point. The given points are not same.
5. Draw a graph and locate the given point. join the points to origin than we find a triangle.
6. Draw a graph and locate the given point. We get a rhombus by joining these point
7. (5,0) – x -axis, (0,5) – y-axis ,

   (5,2), (2,5) and 6,1) in I-quadrant, (-3,5) in II-quadrant

   (-3,-5) in III-quadrant and (5,-3) in IV-quadrant

8.

x	0	1	4	5	-2
Y= 3x	0	3	12	15	-6

Draw graph for given data. at X=4 Y=12 and at X= 5 Y=20.

9. (5,0) – x -axis , (0,5) – y-axis ,

(5,2),(2,5)and 6,1) in I-quadrant , (-3,5) in II-quadrant

(-3,-5) in III-quadrant and (5,-3) in IV-quadrant

10. Draw a graph and locate the given point. join the points to origin than we find a triangle.

LA(3 MARKS)

1. A) Draw a liner graph for the given point. B) Draw a liner graph for the given point.
2. Draw a liner graph for the given data. A) 25 b) 700
3. Draw a liner graph for the given data. A) $2\frac{1}{2}$ hours B) 105 km
4. Draw a liner graph for the given data. A) 20 km B) $2\frac{1}{2}$ hours
5. Draw a liner graph for the given data. A) not lie on a line B) lie on a line c) not lie on a line
6. Draw a liner graph for the given data. A) a=4 , P= 16 B) a=5 P= 20
7. Draw a liner graph for the given data. X=4 than A= $(4)^2$=16
8. Draw a liner graph for the given data. i) x=5 S=200 ii) x=6 S=2400

Case Study (4 MARKS)

1. A. 168.3 cm (unit already given).

B. The key here is that the response should refer to the "change" of the gradient of the graph for female. This (can be done explicitly or implicitly. Code 11 and code 12 are for explicitly mentioning about the steepness of the curve of the graph, while code 13 is for implicit comparison using the actual amount of growth before 12 years and after 12 years of age. According to this graph, on average, during which period in their life are females taller than males of the same age?

Gives the correct interval, from 11-13 years. • Between age 11 and 13. • From 11 years old to 13 years old, girls are taller than boys on average. • 11-13

States that girls are taller than boys when they are 11 and 12 years old. (This answer is correct in daily-life language, because it means the interval from 11 to 13). • Girls are taller than boys when they are 11 and 12 years old. • 11 and 12 years old.

2.This graph shows how the speed of a racing car varies along a flat 3-kilometer track during its second lap.

A. b. 1.5 km

B. c. at about 1.3 km.

C. b. The speed of the car is increasing.

D. b

CHAPTER – 16
PLAYING WITH NUMBERS

• Number in general form: A number is said to be in a general form if it is expressed as the sum of the products of its digits with their respective place values.

• Numbers can be written in general form. Thus, a two-digit number ab will be written as ab = 10a +b.

• The general form of numbers is helpful in solving puzzles or number games.

• The reasons for the divisibility of numbers by 10, 5, 2, 9 or 3 can be given when numbers are written in general form.

• Tests of Divisibility:

(a) Divisibility by 2: A number is divisible by 2 when its one's digit is 0, 2, 4, 6 or 8.

Explanation: Given number abc = 100a +10b +c. 100a and 10b are divisible by 2 because 100 and 10 are divisible by 2. Thus, given number is divisible by 2 only when a = 0, 2, 4, 6 or 8.

(b) Divisibility by 3: A number is divisible by 3 when the sum of its digits is divisible byn3. Example: given number = 61785. Sum of digits = 6+1+7+8+5 = 27 which is divisible by 3. Therefore, 61785 is divisible y 3.

(c) Divisibility by 4: A number is divisible by 4 when the number formed by its last two digits is divisible by 4. Example: 6216, 548, etc.

(d) Divisibility by 5: A number is divisible by 5 when its ones digit is 0 or 5. Example: 645, 540 etc.

(v) Divisibility by 6: A number is divisible by 6 when it is divisible by both 2 and 3.

Example: 246, 7230, etc.

(vi) Divisibility by 9: A number is divisible by 9 when the sum of its digits is divisible by 9. Example: consider a number 215847. Sum of digits = 2+1+5+8+4+7 = 27 which is

divisible by 9. Therefore, 215847 is divisible by 9.

(vii) Divisibility by 10: A number is divisible by 10 when its ones digit is 0. Example: 540, 890, etc.

(viii) Divisibility by 11: A number is divisible by 11 when the difference of the sum of its

digits in odd places and the sum of its digits in even places is either o or a multiple of 11.

Example: consider a number 462.

Sum of digits in odd places = 4+2 = 6

Sum of digits in even places = 6

Difference = 6-6=0, which is zero. So, the number is divisible by 11.

MCQ (1-MARK)

1. The generalized form of the number 52 is

(a) 10 × 5 + 2 (b) 100 × 5 + 2 (c) 10 × 2 + 5 (d) 10 × 5.

2. The number 10 × 7 + 5 in usual form is

(a) 57 (b) 75 (c) 55 (d) 77.

3. The number 100 × b + 10 × c + a in usual form is

(a) bac (b) bca (c) cab (d) cba

4. Find the value of A, B in the following:

$$\begin{array}{r} 2A \\ +3B \\ \hline B1 \end{array}$$

(a) 5, 6 (b) 5, 5 (c) 6, 5 (d) 6, 6.

5. If AB7 + 7AB = 98A, then the value of A and B is:

(a)A = 8 , B = 1 (b) A = 2 , B = 5 (c) A = 7 , B = 9 (d) A = 4, B = 7

6. If AB x 6 = BBB, then the value of A and B is:

(a)A = 7 , B = 4 b) A = 0 , B = 1 (c) A = 1 , B = 0 (d) A = 9 , B = 7

7. If B9 + 4A =65, then the value of A and B is:

(a)A = 8 , B = 1 (b) A = 6 , B = 1 (c) A = 7 , B = 9 (d) A = 4, B = 7

8. If A + A + A = BA, then the value of A and B is:

(a)A = 5 , B = 2 (b) A = 2 , B = 5 (c) A = 5 , B = 1 (d) A = 3,B = 5

9. If 8A5 + 94A = 1A33 , then what is the value of A?

(a)0 (b) 4 (c) 8 (d) 9

10. If 24a is a multiple of 9 then the value of a is

(a)0 (b) 3 (c) 8 (d) 9

11. If 21y5 is a multiple of 9, where y is a digit then the value of y is

(a)0 (b) 3 (c) 1 (d) 9

12. If 2y25 is a multiple of 9, where y is a digit then the value of y is

(a)0 (b) 3 (c) 1 (d) 2

13. If 24a is a multiple of 3, where a is a digit then the value of a is

(a) 0 (b) 1 (c) 2 (d) none of these

14. If 24y5 is a multiple of 3, where y is a digit then the value of y is

a. 0 (b) 1 (c) 2 (d) none of these

15. If 31y5 is a multiple of 3, where y is a digit then the value of y is

(a) 0 (b) 1 (c) 2 (d) none of these

16. If 24y is a multiple of 6, where y is a digit then the value of y is

(a) 0 (b) 1 (c) 2 (d) none of these

17. If 21y8 is a multiple of 6, where y is a digit then the value of y is

(a) 0 (b) 1 (c) 2 (d) none of these

18. If 2y5 is a multiple of 11, where y is a digit then the value of y is

(a) 7 (b) 4 (c) 2 (d) none of these

19. If 31y is a multiple of 11, where y is a digit then the value of y is

(a) 7 (b) 8 (c) 9 (d) none of these

20. If 35a64 is divisible by 3, where a is a digit then the value of a is

(a) 0 (b) 1 (c) 2 (d) none of these

VSA(1-MARK)

1. Check the divisibility of 21436587 by 9.

2. If the three-digit number 24*x* is divisible by 9, what is the value of *x*?

3. Check the divisibility of 2146587 by 3.

4. Write the following numbers in generalised form.

(a) 25 (b) 73

5. Write the following in the usual form.

(i) $10 \times 5 + 6$ (b) $100 \times 7 + 10 \times 1 + 8$

6. Without performing actual division, find the remainders left when 192837465 is divided by 9.

7. Given that the number 7713a8 is divisible by 4, where a is some digit, what are the possiblevalues of a?

8. If the number 9 y 7 is a multiple of 3, then find the value of y.

9. If the three-digit number 4 3 x is divisible by 9, what is the value of x?

10. If the division N ÷2 leaves a remainder of 1, what might be the one's digit of N?

11. If the division N ÷5 leaves a remainder of 3, what might be the ones digit of N?

12. If the division N ÷5 leaves a remainder of 1, what might be the one's digit of N?

13. Find the value of A in the following:

$$\begin{array}{r} 1A \\ \times A \\ \hline A9 \end{array}$$

14. Find the value of A, B in the following:

$$\begin{array}{r} AB \\ +62 \\ \hline 9A \\ \hline \end{array}$$

15. Find the values of A, B in the following:

$$\begin{array}{r} AB \\ \times 3 \\ \hline B2 \end{array}$$

SA(2 MARKS)

1. Find Q in the addition.

$$\begin{array}{r} 3\ 1\ Q \\ +\ 1\ Q\ 3 \\ \hline 5\ 0\ 1 \\ \hline \end{array}$$

2. Find A and B in the addition.

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

3. Find the digits A and B.

$$\begin{array}{r} B\ A \\ \times\ B\ 3 \\ \hline 5\ 7\ A \\ \hline \end{array}$$

4. If 31z5 is a multiple of 3, where z is a digit, what might be the values of z?
5. Check the divisibility of the following numbers by 9.

   1. 108 2. 616 3. 294 4. 432

   5. 927
6. Without performing actual division, find the remainders left when 192837465 is divided by 11.
7. Without performing actual division, find the remainders left when 28735429 is divided by 11.
8. If the number 67x19 is divisible by 11, where x is some digit, what are the possible values of x?
9. Using divisibility tests, determine which of the following numbers are divisible by 4; by 8

   (a) 572 (b) 6000
10. If 31z5 is a multiple of 9, where z is a digit, what is the value of z?

LA(3-MARKS)

Find the values of the letters in each of the following and give reasons for the steps involved.

4.
$$\begin{array}{r} A\ 1 \\ +\ 1\ B \\ \hline B\ 0 \end{array}$$

5.
$$\begin{array}{r} 2\ A\ B \\ +\ A\ B\ 1 \\ \hline B\ 1\ 8 \end{array}$$

6.
$$\begin{array}{r} A\ B \\ \times\ \ 5 \\ \hline C\ A\ B \end{array} \qquad \begin{array}{r} 2\ A \\ A\ B \\ \hline 0\ 9 \end{array}$$

7. Using divisibility tests, determine which of following numbers are divisible by 6:

   (a) 297144 (b) 1258 (c) 4335 (d) 61233 (e) 901352 (f) 438750

8. Using divisibility tests, determine which of the following numbers are divisible by 11:

   (a) 5445 (b) 10824 (c) 7138965

Answer key

MCQ(1 MARK)

1	A	6	A	11	C	16	A
2	B	7	B	12	A	17	B
3	B	8	C	13	A	18	A
4	A	9	C	14	B	19	C
5	B	10	B	15	A	20	A

VSA (1-MARK)

1. 2+1+4+3+6+5+8+7 = 36 and 36 is divisible by 9

   So, the given number is also divisible by 9
2. 2+4+x = will be divisible by 9

   So, x= 3
3. 2+1+4+6+5+8+7 = 33 and 33 is divisible by 3

   So, the given number is also divisible by 3
4. (a) 10 × 2 +5 (b) 10×7 +3
5. (a) 56 (b) 718
6. 1+9+2+8+3+7+4+6+5 = 45 and 45 is divisible by 9

   So, the given number is also divisible by 9 so that remainder is 0
7. A number is divisible by 4 when the number formed by its last two digits is divisible by 4.

   a = 0,2,4,6,8
8. 9+y+7 = will be divisible by 3. So that y =2,5,8
9. 4+3+x = will be divisible by 9. So that x =2
10. 3,5,7,9
11. 8
12. 6
13. 13 X 3 = 39. So that A=3
14. 31+62=93. So that A=3 and B=1
15. 14 X 3=42. So that A=1 and B=4

SA(2 MARKS)

1. 319+193= 501. So that Q=9
2. 5+5+5=15. So that A=5 and B=1
3. 25 x 23 =575. So that A= 5 B=2
4. 3+1+z+5 = will be divisible by 3. So that z= 0,3,6,9.
5. A number is divisible by 9 when the sum of its digits is divisible by 9. 108- divisible, 616- not divisible ,294- not divisible , 432- divisible, 927- divisible
6. A number is divisible by 11 when the difference of the sum of its digits in odd places and the sum of its digits in even places is either o or a multiple of 11. number 192837465.
   Sum of digits in odd places = 1+2+3+4+5 = 15
   Sum of digits in even places = 9+8+7+6= 30
   Difference = 30-15=15, not divisible by 11. So, the number is not divisible by 11.
   Reminder = 15-11=04
7. A number is divisible by 11 when the difference of the sum of its digits in odd places and the sum of its digits in even places is either o or a multiple of 11. number 28735429.
   Sum of digits in odd places = 2+7+5+2 = 16
   Sum of digits in even places = 8+3+4+9= 24
   Difference = 24-16=8, not divisible by 11. So, the number is not divisible by 11.

Reminder =8

8. A number is divisible by 11 when the difference of the sum of its digits in odd places and the sum of its digits in even places is either o or a multiple of 11. So value of x is 4
9. A number is divisible by 4 when the number formed by its last two digits is divisible by 4. A number is divisible by 8 when the number formed by its last three digits is divisible by 8. A) 572 = divisible by only 4 not 8 B) 6000= divisible by 4 and 8 both
10. 3+1+z+5 = will be divisible by 9
    So z= 0

LA(3 MARKS)

1. 25+37=62 , A=2, B=5
2. 74x6=444 , A=7, B=4

3. 128+688=809, A=8, B=1
4. 71+19=90, A=7, B=9
5. 247+471=718, A=4, B=7
6. 25x5=125, A=2, B=5, C=1
7. A number is divisible by 6 when it is divisible by both 2 and 3.
   a) Divisible b) not divisible c) not divisible
   d) not divisible e) not divisible f) divisible

8. A number is divisible by 11 when the difference of the sum of its digits in odd places and the sum of its digits in even places is either o or a multiple of 11.

a) 5445.

Sum of digits in odd places = 5+4 = 9

Sum of digits in even places = 4+5 = 9

Difference = 9-9=0, it is zero. So, the number is divisible by 11.

b. 10824

Sum of digits in odd places = 4+8+1=13

Sum of digits in even places = 2+0=2

Difference = 13-2=11, it is multiple of 11. So, the number is divisible by 11.

c. 7138965

Sum of digits in odd places = 5+9+3+7=24

Sum of digits in even places = 6+8+1=15

Difference = 24-15=9, it is not multiple of 11. So, the number is not divisible by 11.

KENDRIYA VIDYALAYA SANGATHAN
TERM-2 SESSION 2021-22
BLUE PRINT (MATHEMATICS)
SET – A
CLASS VIII

S. No.	UNIT/CHAPTER	Name of Chapter	Type 1 (1 marks each (MCQ)	Type 2 (1 marks each)	Type 3 (1marks each)	Type 4 (2marks each)	LA/ Case Study (3 marks each)	Total
1	ALGEBRA	1.Algebraic Expressions and Identities 2. Factorisation	3(3)	3(3)	2(2)	1(2)	-	9(10)
2	MENSURATION	1.Visualising solid shapes 2. Mensuration	3(3)	3(3)	1(1)	1(2)	1(3)	9(12)
3	ARITHMATICS	1.Exponents and Powers 2.Direct and Inverse Proportions 3. Playing with Numbers	3(3)	3(3)	3(3)	2(4)	-	11(13)
4	GRAPHS	1.Introduction to Graphs	1(1)	1(1)	-	-	1(3)	3(5)
Total Questions			**10(10)**	**10(10)**	**6(6)**	**4(8)**	**2(6)**	**32(40)**

KENDRIYA VIDYALAYA SANGATHAN

CLASS: VIII Session: 2021-22

Mathematics Term - II

Time Allowed: 90 minutes ***SET- A*** *Maximum Marks: 40*

General Instructions:

1. This question paper contains three sections – A, B, C, D and E. Each part is compulsory.

2. Section - A has 10 MCQs, each carry 1 mark.

3. Section - B has 10 Questions, each carry 1 mark.

4. Section - C has 6 Very Short Answer Type Questions, each carry 1 mark.

5. Section - D has 4 Short Answer type Questions, each carry 2 marks.

6. Section - C has 2 Long Answer type/Case Study Questions, each carry 3 mark.

7. All questions are compulsory.

SECTION – A

In this section from Question 1 – 10,

Each Question is of 1 mark weightage.

1. The highest common factor in $p^2qr \text{ and } q^2pr \text{ is}$

a) p^2 b) q^2 c) r d) pqr 1

2. The value of $a^2 - b^2 \text{ is same as}$

a) $(a+b)^2$ b) $(a-b)^2$ c) $(a+b)(a-b)$ d) $none\ of\ these$ 1

3. The value of $x^2y^3z^2 \div xyz \text{ is}$

a) xyz b)xy^2z c) xyz^2 d)yz 1

4. The Euler's formula is

a) $F - V + E = 2$ b) $F + V + E = 2$ c) $F + V - E = 2$ d) $F - V - E = 2$ 1

5. The area of base of cuboid is $24\ cm^2$and its height is 3 cm, the volume of cuboid is

a) $72cm^3$ b) $12\ cm^3$ c) $48cm^3$ d) $24cm^3$ 1

6. The area of a parallelogram is 60 cm^2 and one of its altitudes is 5 cm. The length of its corresponding side is 1

a) 12 cm b) 5 cm c) 10 cm d) 2 cm

7. 6 pipes are required to fill a tank in 1 hour 20 minutes. How long will it take if only 5 pipes of the same type are used? 1

a) 96 min b) 69 min c) 36 min d) 80 min

8. The value of "A" if $2A + 32 = 61\ is$

a) 9 b) 0 c) 8 d) 1 1

9. The value of $2^0 + 3^0 - 4^0\ is$

a) 9 b) 0 c) 1 d) -1 1

10. The point (-1,3) lies in

a) I quadrant b) $II\ quadrant$ c) $III\ quadrant$ d) $IV\ quadrant$ 1

SECTION – B
In this section from Question 11 – 20,
Each Question is of 1 mark weightage.

11. Factorise: $p^4 - q^4$. 1

12. Simplify: $2x \times (-2xy) \times (-2y)$. 1

13. Find the value of $-(-x)$ if $x = -7$? 1

14. Find the volume of a cube whose edge is 3x? 1

15. Can a polyhedron have 10 faces, 20 edges and 12 vertices. 1

16. Find the area of Rhombus whose diagonals are 6 cm and 8 cm? 1

17. If 2x06 is divisible by 3 then then value of x is…… 1

18. The standard form 0.000000564 is…….. 1

19. "The number of workers on a job and the time to complete the job" is an example of …… proportion". 1

20. Is the following data representing line graph? 1

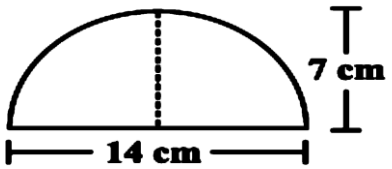
Side of Square(cm)	1	2	3	4
Area (sq cm)	1	4	9	16

SECTION – C
In this section 6 questions from Questions 21 - 26.
Each Question is of 1 mark weightage.

21. Multiply $x^2 - 2x + 5\ by\ x + 6$. 1

22. Find the value of 99^2 using identity. 1

23. Find the perimeter of the garden shown in the figure. 1



24. Find the value of $(5^{-1} \times 2^{-1}) \times 6^{-1}$ 1

25. If 15 workers can build a wall in 48 hours, how many workers will be required to do the same work in 30 hours? 1

26. Find the values of A and B in following expression. 1

$$\begin{array}{cccc} & A & B \\ \times & & 6 \\ \hline B & B & B \\ \hline \end{array}$$

SECTION – D
In this section 4 questions from Question 27 – 30,
Each Question is of 2 marks weightage.

27. Factorise : $p^2 + 6p - 16$. 2

28. Find the height of the cylinder whose volume is 1.54 m^3 and diameter of the base is 140 cm? 2

29. Find the value of x if $5^x \div 5^{-3} = 5^5$. 2

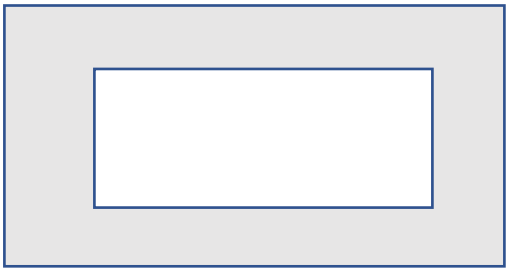
30. Rashmi has a road map with a scale of 1 cm representing 18 km. She drives on a road for 72 km. What would be her distance covered in the map? 2

SECTION – E
In this section 2 questions from Question 31 – 32,
Each Question is of 3 marks weightage.

31. Draw the graph for the interest on deposits for a year. 3

Deposit (in Rs)	1000	2000	3000	4000	5000
Simple Interest (in Rs)	80	160	240	320	400

32. Rashid has decided to build a swimming pool as shown in the figure on an empty plot 25 metres long and 15 metres wide. He is discussing with his son Majid about his plan to build the pool $15m \times 5m \times 6m$ in length, breadth and depth, put tiles on the bottom of the pool and other requirements of the pool. Help Majid to answer the questions asked by his father in their discussion.



a. What is the Surface area of the pool?
a) 390 m^2 b) 300 m^2 c) 290 m^2 d) 315 m^2 **1**

b. What will be the cost of tiling the floor and four walls of the pool at the rate of $Rs.20\ per\ m^2$. **1**

a) $Rs.6300$ b) $Rs.6000$ c) $Rs.6000$ d) Rs. 3600

c. How many litres of water the pool can hold?

a) $450\ l$ b) $450000l$ c) $4500l$ d) $45000\ l$ **1**

……. **END**……

Q. No.	CORRECT ANSWER	MP	Q. No.	CORRECT ANSWER	MP
1	(d). p q r	1	16	Area = 1/2 product of diagonals = 1/2 × 6 × 8 =24 cm^2	1/2 1/2
2	(c). (a + b)(a - b)	1	17	X = 1, 4, 7	1
3	(b). xy^2z	1	18	5.64×10^{-7}	1
4	(c). $F + V - E = 2$	1	19	Inverse proportion	1
5	(a). $72cm^3$	1	20	No	1
6	(a) . 12cm	1	21	$(x^2 - 2x + 5)(x + 6) = x (x^2 - 2x + 5) + 6 (x^2 - 2x + 5) = x^3 + 4x^2 - 7 x + 30$	1/2 1/2
7	(a). 96min	1	22	For using $99^2 = (100 - 1)^2$ = 10000 + 1 -200 =9801	1/2 1/2
8	(a). 9	1	23	Perimeter of garden =Diameter + Half of circumference of the circle = $14 + \frac{1}{2} \times \frac{22}{7} \times 7 = 25$	1/2 1/2
9	(c). 1	1	24	$5^{-1} \times 2^{-1} \times 6^{-1} = 1/5 \times 1/2 \times 1/6$ 1/60	1/2 1/2
10	(b). *II quadrant*	1	25	By inverse proportional x × 30 =15 × 48 X = 24 workers needed	1/2
11	$(p^2)^2 - (q^2)^2 = (p^2 - q^2)(p^2 + q^2)$ $= (p - q)(p + q) (p^2 + q^2)$	1/2 1/2	26	A = 7 and B= 4	1
12	$(- 4x^2 y) \times (- 2 y)$ $= (8x^2y^2)$	1/2 1/2	27	$P^2 + 6p - 16 = P^2 + 8p - 2p - 16$ (By splitting middle term = p(p + 8) -2(p + 8) = (p+8)(p-2)	1 1
13	$-(-(-7)) = - (7)$ = - 7	1/2 1/2	28	Let height of cylinder = h Diameter = 2r = 140, r = 140/2 = 70cm =0.7m Volume of cylinder = 1.54 m^3 $\pi r^2 h = 1.54$, $h = \frac{1.54 \times 7}{22 \times 0.7 \times 0.7} = 1m = 100cm$	1/2 1/2 1
14	$(3x)^3 = (3x) \times (3x) \times (3x)$ $= 27x^3$	1/2 1/2	29	$5^x \div 5^{-3} = 5^5 \rightarrow 5^{x-(-3)} = 5^5$ By comparing x + 3 =5, x = 2	1 1
15	Yes Euler's formula F + V - E = 2 10 +12 - 20 =2	1/2 1/2	30	18km = 1cm in map 1km = 1/18 cm Therefore 72km = 72/18 = 4 cm	1 1
31	Suitable Scale, proper drawing, proper graph				3
32(a)	(d) 315m2 Surface area of the pool = lb + 2bh +2hl =315				1
32(b)	(a) . 6300 Rupees Cost of tilling in pool = 315 × 20 = 6300				1
32(c)	(b) 450000 L Volume of pool =Water in pool =15 × 5×6 =450m^3 = 450 × 1000 = 450000L				1

KENDRIYA VIDYALAYA SANGATHAN
TERM-2 SESSION 2021-22
BLUE PRINT (MATHEMATICS)
SET – B
CLASS VIII

S. No.	UNIT/CHAPTER	Name of Chapter	Type 1 (1 marks each (MCQ)	Type 2 (1 marks each)	Type 3 (1marks each)	Type 4 (2marks each)	LA/ Case Study (3 marks each)	Total
1	ALGEBRA	1.Algebraic Expressions and Identities 2. Factorisation	3(3)	3(3)	2(2)	1(2)	-	9(10)
2	MENSURATION	1.Visualising solid shapes 2. Mensuration	3(3)	3(3)	1(1)	1(2)	-	8(9)
3	ARITHMATICS	1.Exponents and Powers 2.Direct and Inverse Proportions 3. Playing with Numbers	3(3)	3(3)	3(3)	2(4)	-	11(13)
4	GRAPHS	1.Introduction to Graphs	1(1)	1(1)	-	-	2(6)	4(8)
Total Questions			**10(10)**	**10(10)**	**6(6)**	**4(8)**	**2(6)**	**32(40)**

CLASS: VIII Session: 2021-22

Mathematics Term - II

Time Allowed: 90 minutes **SET-B** *Maximum Marks: 40*

General Instructions:

1. This question paper contains three sections – A, B, C, D and E. Each part is compulsory.

2. Section - A has 10 MCQs, each carry 1 mark.

3. Section - B has 10 Questions, each carry 1 mark.

4. Section - C has 6 Very Short Answer Type Questions, each carry 1 mark.

5. Section - D has 4 Short Answer type Questions, each carry 2 marks.

6. Section - C has 2 Long Answer type/Case Study Questions, each carry 3 mark.

7. All questions are compulsory.

SECTION – A
In this section from Question 1 – 10,
Each Question is of 1 mark weightage.

1. The Euler's formula for polyhedrons is
a) $F - V + E = 2$ b) $F + V + E = 2$ c) $F + V - E = 2$ d) $F - V - E = 2$ 1

2. The value of "A" if $(A + 32) + (21 + A) = 61\ is$
a) 9 b) 0 c) 8 44 1

3. The value of $(7^0 + 8^0 - 9^0)^{-3}\ is$
a) 9 b) 0 c) 1 -1 1

4. The value of $a^2 + b^2 - 2ab\ is\ same\ as$
a) $(a + b)^2$ b) $(a - b)^2$ c) $(a + b)(a - b)$ d) $none\ of\ these$

5. The point (0, -3) lies in
a) I quadrant b) $II\ quadrant$ c) $x - axis$ d) $y - axis$ 1

6. The area of a parallelogram is 60 cm^2 and one of its altitudes is 5 cm. The length of its corresponding side is 1
a) 12 cm b) 5 cm c) 10 cm d) 2 cm

7. 6 pipes are required to fill a tank in 80 minutes. How long will it take if only 5 pipes of the same type are used? 1
a) 96 min b) 69 min c) 36 min d) 80 min

8. The value of $p^3q^3r^2 \div p^2qr\ is$
a) pqr b) pq^2r c) pqr^2 d)qr 1

9. The area of base of cylinder is 12 $cm^2$and its height is 5 cm, the volume of cylinder is
a) 72cm^3 b) 12 cm^3 c) 48cm^3 d) 60cm^3 1

10. The highest common factor in $x^3y^2z\ and\ x^2yz\ is$

a) x^2y b) x^2z c) x^2yz d)xyz 1

SECTION – B
In this section from Question 11 – 20,
Each Question is of 1 mark weightage.

11. Factorise: $p^4 + q^4 - 2p^2q^2$. 1

12. The standard form 2300567000 is…….

13. Find the volume of a cube whose surface area is $96cm^2$. 1

14. Find the value of $-(-x)$ if $x = -13$? 1

15. If 9x06 is divisible by 9 then then value of x is…… 1

16. Can a polyhedron have 10 faces, 20 edges and 12 vertices. 1

17. Find the area of Rhombus whose diagonals are 6 cm and 8 cm? 1

18. "The number of pipes required to fill a tank and the time taken" is an example of …… proportion". 1

19. Simplify: $2x^2 \times (-2xy^2) \times (-2y)$. 1

20. Is the following data representing line graph?

Side of Square(cm)	1	2	3	4
Perimeter (cm)	4	8	12	16

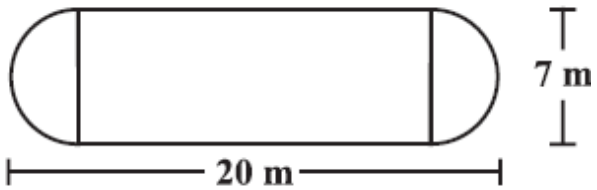
1

SECTION – C
In this section 6 questions from Question 21 – 26,
Each Question is of 1 mark weightage.

21. Multiply $x^2 - 2x + 5$ *by* $x + 6$. 1

22. Find the value of 99^2 using suitable identity. 1

23. Find the perimeter of the garden shown in the figure.



1

24. Find the value of $(4^{-1} \times 2^{-1}) \times \left(\frac{4}{3}\right)^{-1}$ 1

25. A loaded truck travels 14 km in 25 minutes. If the speed remains the same, how far can it travel in 5 hours? 1

26. Find the values of A and B in following expression. 1

$$\begin{array}{r} 2\ A\ B \\ +\ A\ B\ 1 \\ \hline B\ 1\ 8 \\ \hline \end{array}$$

SECTION – D
In this section 4 questions from Question 27 – 30,
Each Question is of 2 marks weightage.

27. Water is pouring into a cuboidal reservoir at the rate of 60 litres per minute. If the volume of reservoir is 108 m^3, $find$ the number of hours it will take to fill the reservoir. 2

28. Find the value of x if $5^x \div 5^{-3} = 5^5$. 2

29. Factorise : $x^2 - x - 6$. 2

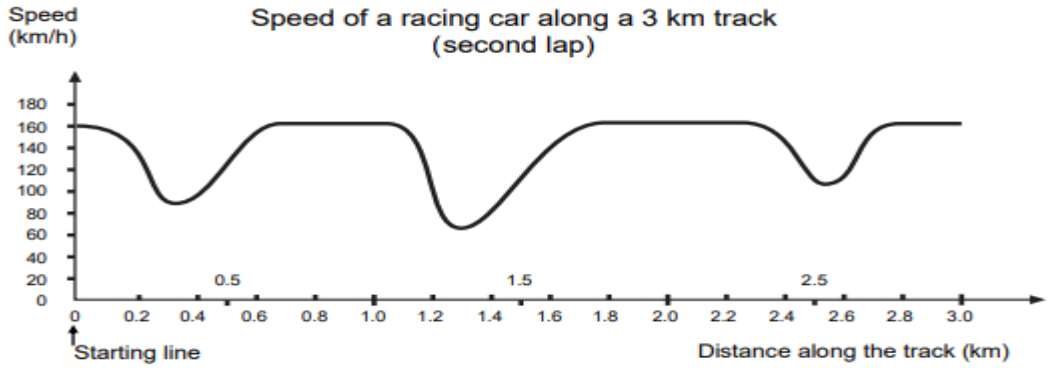
30. If a box of sweets is divided among 24 children, they will get 5 sweets each. How many would each get, if the number of the children is reduced by 4? 2

SECTION – E
In this section 2 questions from Question 31 – 32,
Each Question is of 3 marks weightage.

31. Draw the graph for the interest on deposits for a year. 3

Deposit (in Rs)	1000	2000	3000	4000	5000
Simple Interest (in Rs)	80	160	240	320	400

32. This graph shows how the speed of a racing car varies along a flat 3 kilometer track during its second lap.



Attempt any three

i: What is the approximate distance from the starting line to the beginning of the longest straight section of the track?

a 0.5 km b 1.5 km c2.3 km d 2.6 km

ii: SPEED OF RACING CAR M159Q02 Where was the lowest speed recorded during the second lap?

a.at the starting line. b. at about 0.8 km.

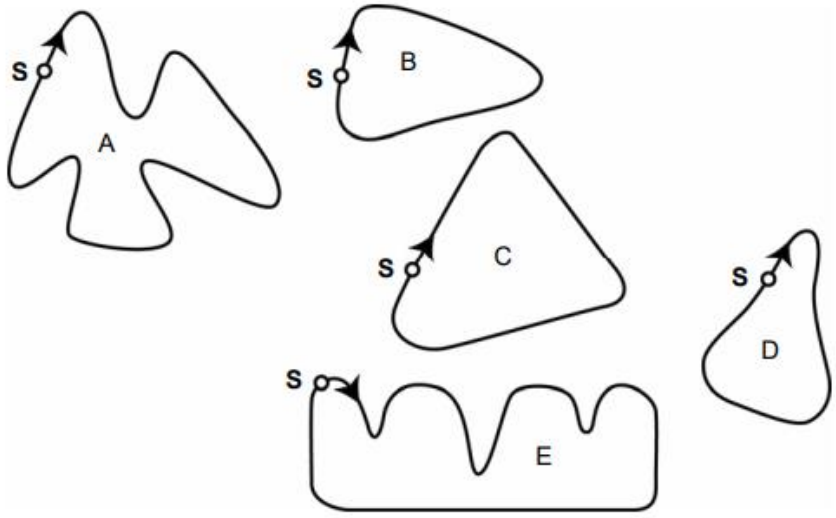
c. at about 1.3 km. d. halfway around the track.

iii: What can you say about the speed of the car between the 2.6 km and 2.8 km marks?

a.The speed of the car remains constant. b. The speed of the car is increasing.

c. The speed of the car is decreasing. d. The speed of the car cannot be determined from the graph.

iv: Here are pictures of five tracks: Along which one of these tracks was the car driven to produce the speed graph shown earlier?



S: Starting point

CLASS: VIII Session: 2021-22
Term - II- MATHEMATICS
(Marking Scheme-SET-B)

Q. No.	CORRECT ANSWER	MP	Q. No.	CORRECT ANSWER	MP
1	(c) F +V - E =2	1	21	$(x^2 - 2x + 5)(x + 6) = x(x^2 - 2x + 5) + 6(x^2 - 2x + 5$ $) = x^3 + 4x^2 - 7x + 30$	1/2 1/2
2	(d) 4	1	22	For using $99^2 = (100 - 1)^2$ $= 10000 + 1 - 200 = 9801$	1/2 1/2
3	(d). -1	1	23	Area of the garden = Area of rectangle part + 2 area of semicircle = $l \times b + 2 \times 1/2 \times \pi r^2$ $= 13 \times 7 + 22/7 \times 7/2 \times 7/2 = 96.5\ m^2$	1/2 1/2
4	(b). $(a - b)^2$	1			
5	(d). y-axis	1	24	$(4^{-1} \times 2^{-1}) \times [\frac{4}{3}]^{-1} = 1/4 \times 1/2 \times 3/4$ $= 3/32$	1/2 1/2
6	(a). 12cm	1	25	Let Train cover p km ,25 minutes = 25/60 = 5/12 h direct proportion $p/5 = \frac{14}{5/12} = 14 \times 12/5$ P = 168km	1/2 1/2
7	(a). 96min	1	26	A = 4 B = 7	1
8	(b). pq^2r	1	27	$1m^3 = 1000L$ so $108m^3 = 108000L$ Time take to full the cuboidal reservoir = 108000÷ 60 =1800minues = 1800/60 = 30 hours	1 1
9	(d). $60cm^3$	1	28	$5 \rightarrow 5^{x-(-3)} = 5^5$ By $^x \div 5^{-3} = 5^5$ comparing x + 3 =5, x = 2	1 1
10	(c). x^2yz	1	29	$x^2 - x - 6 = x^2 - 3x + 2x - 6$ $x(x - 3) + 2(x - 3) = (x - 3)(x + 2)$	1 1
11	$p^4 + q^4 - 2p^2q^2 = (p^2)^2 + (q^2)^2 - 2p^2q^2$ $= (p^2 - q^2)^2$	1/2 1/2	30	Let each child gets sweets = p No.of Children after reducing 4children =20-4 =20 By inverse proportion $p \times 20 = 5 \times 24$ $P = 5 \times 24 / 20 = 6$	1/2 1 1/2
12	$2300567000 = 230056.7 \times 10^4$ $= 2.300567 \times 10^9$	1/2 1/2			
13	$6a^2 = 96$, $a^2 = 96/6 = 16$, $a = 6$ Volume $= a^3 = 6^3 = 6 \times 6 \times 6 = 216cm^3$	1/2	31	Suitable Scale, proper drawing, proper graph	3
14	$-(-(-13)) = -(13)$ $= -13$	1/2 1/2	32(a)	b. 1.5 km	1
15	9 + 3 + 0 + 6 = 18 , 18 is divisible by 9 So x = 3	1	32(b)	b. at about 1.3 km.	1
16	Yes Euler's formula F + V - E = 2 10 +12 - 20 =2	1/2 1/2	32(iii)	b. The speed of the car is increasing.	1
17	Area = 1/2 product of diagonals $= 1/2 \times 6 \times 8 = 24\ cm^2$	1/2 1/2	32(iv)	b	
18	Inverse proportion	1			
19	$2x^2 \times (-2xy^2) \times (-2y)$ $= 8x^3y^3$	1			
20	yes. Its y = 4x form	1			

KENDRIYA VIDYALAYA SANGATHAN
TERM-2 SESSION 2021-22
BLUE PRINT (MATHEMATICS)
SET – C
CLASS VIII

S. No.	UNIT/CHAPTER	Name of Chapter	Type 1 (1 marks each (MCQ)	Type 2 (1 marks each)	Type 3 (1marks each)	Type 4 (2marks each)	LA/ Case Study (3 marks each)	Total
1	ALGEBRA	1.Algebraic Expressions and Identities 2. Factorisation	3(3)	3(3)	2(2)	1(2)	-	9(10)
2	MENSURATION	1.Visualising solid shapes 2. Mensuration	3(3)	3(3)	1(1)	1(2)	1(3)	9(12)
3	ARITHMATICS	1.Exponents and Powers 2.Direct and Inverse Proportions 3. Playing with Numbers	3(3)	3(3)	3(3)	2(4)	-	11(13)
4	GRAPHS	1.Introduction to Graphs	1(1)	1(1)	-	-	1(3)	3(5)
Total Questions			**10(10)**	**10(10)**	**6(6)**	**4(8)**	**2(6)**	**32(40)**

CLASS: VIII Session: 2021-22

Mathematics Term - II

Time Allowed: 90 minutes ***SET-C***

Maximum Marks: 40

General Instructions:

1. This question paper contains three sections – A, B, C, D and E. Each part is compulsory.

2. Section - A has 10 MCQs, each carry 1 mark.

3. Section - B has 10 Questions, each carry 1 mark.

4. Section - C has 6 Very Short Answer Type Questions, each carry 1 mark.

5. Section - D has 4 Short Answer type Questions, each carry 2 marks.

6. Section - C has 2 Long Answer type/Case Study Questions, each carry 3 mark.

7. All questions are compulsory.

SECTION – A
In this section Question 1 – 10,
Each Question is of 1 mark weightage.

1. If number of the faces and vertices in a polyhedron are 5 and 5 respectively, then the number of edges is 1

a)10 b) 8 c) 5 d) 2

2. The point (-7, 0) lies in 1

a) I quadrant b) $II\ quadrant$ c) $x-axis$ d) $y-axis$

3. The value of a^2+b^2+2ab $is\ same\ as$ 1

a) $(a+b)^2$ b) $(a-b)^2$ c) $(a+b)(a-b)$ d) $none\ of\ these$

4. The value of $(2^0+3^0+4^0)^0$ is 1

a)9 b)0 c)1 d)-1

5. The value of $(p^2q^2r^2+pqr)\div pqr\ is$ 1

a) $pqr+1$ b) pq^2r+1 c) pqr^2+pqr d)pqr

6. The value of "B" if $(B-32)+(21+B)=1\ is$ 1

a) 9 b) 0 c) 8 d) 6

7. The area of a Rhombus is 72 cm^2 and one of its diagonals is 9 cm. The length of its another diagonal is 1

a) 12 cm b) 16 cm c) 9 cm d) 4 cm

8. A machine in a soft drink factory fills 840 bottles in six hours. How many bottles will it fill in five hours? 1

a) 960 b) 700 c) 740 d) 800

9. The area of base of cylinder is 12 $cm^2$and its height is 5 cm, the volume of cylinder is 1

a) $72cm^3$ b) 12 cm^3 c) $48cm^3$ d) $60cm^3$

10. The highest common factor in $x^3y^2z \; and \; (x^2yz + xyz) \; is$
a) x^2y b) x^2z c) x^2yz d)xyz 1

SECTION – B
In this section Question 11 – 20,
Each Question is of 1 mark weightage.

11. Can a polyhedron have 10 faces, 20 edges and 12 vertices. 1

12. General form of 3.7×10^{-5} is……

13. Find the value of $-(-x)$ if $x = -13$? 1

14. If 9x06 is divisible by 4 then then value/values of x is…… 1

15. Find the Surface area of a cube whose Volume is $64cm^3$. 1

16. Find the area of Rhombus whose diagonals are 6 cm and 8 cm? 1

17. "The population of a country and the area of land per person." is an example of …… proportion". 1

18. Simplify: $2x^2 \times (-2xy^2) \times (-2y)$. 1

19. Is the following data representing line graph?

Deposit (in Rs)	1000	2000	3000	4000	5000
Simple Interest (in Rs)	80	160	240	320	400

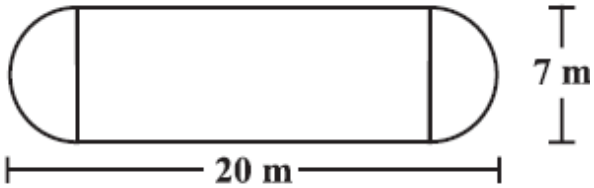
1

20. farmer has enough food to feed 20 animals in his cattle for 6 days. How long would the food last if there were 10 more animals in his cattle? 1

SECTION – C
In this section 6 questions from Question 21 – 26,
each question is of 1 mark weightage.

21. Factorise : $p^2 - 3p - 10$. 1

22. Find the value of 101^2 using identity. 1
Find the perimeter of the garden shown in the figure. 1



23. Find the value of $(4^{-1} \times 2^{-1}) \times \left(\frac{4}{3}\right)^{-1}$ 1

24. Multiply $3x^2 + 7x + 5 \; by \; x - 2$. 1

25. Find the values of A , B and C in following expression. 1

$$\begin{array}{r} A\ \ B \\ \times\ \ 3 \\ \hline C\ A\ \ B \\ \hline \end{array}$$

.

SECTION – D

In this section 4 questions from Question 27 - 30, each question is of 2 marks weightage.

26. A milk tank is in the form of cylinder whose radius is 1.5 m and length are 7 m. Find the quantity of milk in litres that can be stored in the tank? 2

27. Factorise:$z^2 - 4z - 12$. 2

28. Find the value of x if $5^x \div 5^{-3} = 5^5$. 2

29. A 5 m 60 cm high vertical pole casts a shadow 3 m 20 cm long. Find at the same time the length of the shadow cast by another pole 10 m 50 cm high. 2

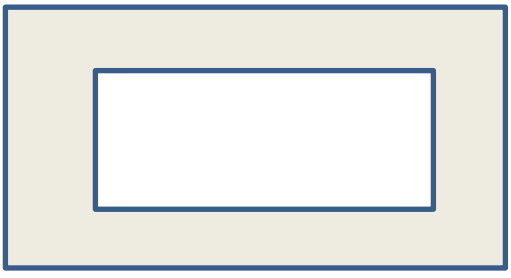
SECTION – E

In this section 2 questions from Question 31 – 32, each question is of 3 marks weightage.

30. Draw the graph for the interest on deposits for a year. 3

Deposit (in Rs)	1000	2000	3000	4000	5000
Simple Interest (in Rs)	80	160	240	320	400

31. Rashid has decided to build a swimming pool as shown in the figure on an empty plot 25 metres long and 15 metres wide. He is discussing with his son Majid about his plan to build the pool $15m \times 5m \times 6m$ in length, breadth and depth, put tiles on the bottom of the pool and other requirements of the pool. Help Majid to answer the questions asked by his father in their discussion.



a. What is the Surface area of the pool? **1**

a) 390 m^2 b) 300 m^2 c) 290 m^2 d) 315 m^2

b. What will be the cost of tiling the floor and four walls of the pool at the rate of $Rs.20\ per\ m^2$. **1**

a) $Rs.6300$ b) $Rs.6000$ c) $Rs.6000$ d) Rs. 3600

c. How many litres of water the pool can hold?

a) $450\ l$ b) $450000l$ c) $4500l$ d) $45000\ l$ **1**

……. **END**……

CLASS: VIII Session: 2021-22
Term - I1 Mathematics)
Marking Scheme-SET-C

Q. No.	Ans (SET-C)	MP	Q. No.	Ans (SET-C)	MP
1	(b) 8	1	21	$P^2 - 3p - 10 = P^2 - 5p + 2p - 10$ $p(p - 5) + 2(p - 5) = (p - 5)(p + 2)$	1/2 1/2
2	(b). II quadrant	1	22	$101^2 = (100 + 1)^2 = 100^2 + 1^2 + 2.100.1$ $= 10000 + 1 + 200 = 10201$	1/2 1/2
3	(a). $(a + b)^2$	1	23	Area of the garden = Area of rectangle part + 2 area of semicircle = $l \times b + 2 \times 1/2 \times \pi r^2$	1/2
4	(c). 1	1		$= 13 \times 7 + 22/7 \times 7/2 \times 7/2 = 96.5\ m^2$	1/2
5	(a). pqr + 1	1	24	$(4^{-1} \times 2^{-1}) \times [\frac{4}{3}]^{-1} = 1/4 \times 1/2 \times 3/4$ $= 3/32$	1/2 1/2
6	(d). 6	1	25	$(3x^2 + 7x + 5)(x - 2) = x(3x^2 + 7x + 5) - 2(3x^2 + 7x + 5)$ $3x^3 + 7x^2 + 5x - 6x^2 - 14x - 10 = 3x^3 + x^2 - 9x - 10$	1/2 1/2
7	(b). 16	1	26	A = 5, B = 0 , C = 1	1
8	(b). 700	1	27	r = 1.5 m , h = 7 m, $V = \pi r^2 h = 22/7 \times 1.5 \times 1.5 \times 7 = 49.5\ m^3$ $1\ m^3 = 1000L$, $49.5\ m^3 = 49.5 \times 1000 = 49500L$	1 1
9	(d). 60 cm^3	1	28	$Z^2 - 4z - 12 = z^2 - 6z + 2z - 12$ $z(z - 6) + 2(z - 6) = (z - 6)(z + 2)$	1 1
10	(d). xyz	1	29	$5 \rightarrow 5^{x-(-3)} = 5^5$ By $^x \div 5^{-3} = 5^5$ comparing x + 3 =5, x = 2	1 1
11	Yes F + V - E =2, 10 + 12 -20 =2	1/2 1/2	30	By direct proportion $\frac{x}{10.50} = \frac{3.20}{5.60}$ X = 6m	1 1
12	$3.7 \times 10^{-5} = 0.000037$	1	31	Suitable Scale, proper drawing, proper graph	3
13	$-(-(-13)) = -(13)$ $= -13$	1/2 1/2	32(a)	(d) $315m^2$ Surface area of the pool = lb + 2bh +2hl =315	1
14	Not divisible	1	32(b)	(a). 6300 Rupees Cost of tilling in pool = 315 × 20 = 6300	1
15	$a^3 = 64$, a = 4 Surface area = $6a^2 = 6 \times 6^2$ $= 64cm^2$	1/2 1/2	32(c)	(b)450000 L Volume of pool =Water in pool =$15 \times 5 \times 6 = 450m^3$ $= 450 \times 1000 = 450000L$	1
16	Area = 1/2 product of diagonals $= 1/2 \times 6 \times 8 = 24\ cm^2$	1/2 1/2			
17	Inverse proportion	1			
18	$2x^2 \times (-2xy^2) \times (-2y) = 8x^3y^3$	1			
19	yes	1			