तत् त्वं पूषन् अपावृणु
केन्द्रीय विद्यालय संगठन

KENDRIYA VIDYALAYA SANGATHAN (KVS)

ZIET CHANDIGARH

SUPPORT MATERIAL

MATHEMATICS

FOR

CLASS VII

(PART II)

$\frac{3}{4} + \frac{1}{8} = \frac{7}{8}$

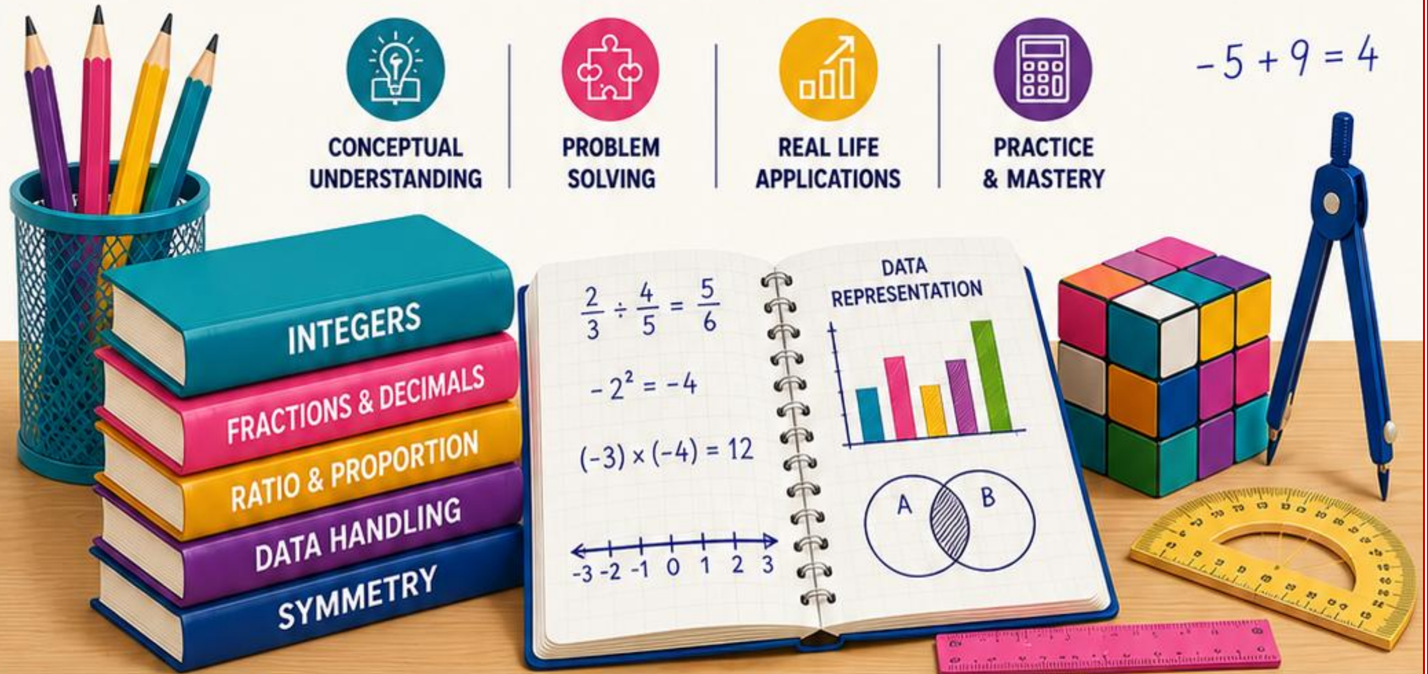
$2x - 3 = 7$

$x + 4 = 9$

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

$-5 + 9 = 4$

CONCEPTUAL UNDERSTANDING | PROBLEM SOLVING | REAL LIFE APPLICATIONS | PRACTICE & MASTERY



LEARN WITH UNDERSTANDING | PRACTICE REGULARLY | THINK LOGICALLY | SUCCEED CONFIDENTLY

संरक्षक

श्री विकास गुप्ता, भा. प्र. से.
आयुक्त
केन्द्रीय विद्यालय संगठन, नई दिल्ली

सुश्री चंदना मंडल
अपर आयुक्त (शैक्षिक)

सुश्री पी. बी. एस. उषा
संयुक्त आयुक्त (प्रशिक्षण)

श्रीमती श्रुति भार्गव
उपायुक्त एवं निदेशक
आंचलिक शिक्षा एवं प्रशिक्षण संस्थान, चंडीगढ़

श्री अजीत कुमार यादव
सह-कोर्स निदेशक
(प्राचार्य पीएम् श्री केंद्रीय विद्यालय -1 अम्बाला कैंट)

श्री असन कुमार
संसाधक
प्रशिक्षित स्नातक शिक्षक (गणित)
पीएम् श्री केंद्रीय विद्यालय -1 अमृतसर कैंट

श्रीमती हर्ष बाला
संसाधक
प्रशिक्षित स्नातक शिक्षक (गणित)
केंद्रीय विद्यालय खानपुर

FOREWORD

It gives me immense pleasure to present the **"Support Material for Class VII Mathematics (Part II) based on the New NCERT Textbook – Ganita Prakash."** This resource has been thoughtfully developed to support teachers in implementing the vision of the **National Education Policy (NEP) 2020**, the National Curriculum Framework for School Education (NCFSE) 2023, and the competency-based approach envisaged by CBSE and Kendriya Vidyalaya Sangathan.

The new NCERT textbook introduces mathematics through meaningful contexts, hands-on learning, logical reasoning, and problem-solving. It encourages students to explore concepts through activities, discussions, and real-life situations rather than relying solely on procedural learning. This support material has been prepared with the objective of assisting teachers in translating these pedagogical principles into effective classroom practices.

The material includes chapter-wise learning objectives, concept summaries, competency-based questions, higher-order thinking tasks. It is designed to strengthen conceptual understanding, promote mathematical thinking, and encourage joyful learning among students.

I appreciate the sincere efforts of the Associate Course Director, Resource Persons and Mathematics teachers who have contributed their expertise and dedication to the preparation of this publication. Their commitment towards enhancing the quality of mathematics education is truly commendable.

I am confident that this support material will serve as a valuable companion for teachers and will contribute significantly to improving students' mathematical understanding, confidence, and achievement.

I extend my best wishes to all teachers and students for a rewarding and enriching learning journey.

Deputy Commissioner & Director
Kendriya Vidyalaya Sangathan
Zonal Institute of Education & Training, Chandigarh

CONTENT PREPARED BY:

<table>
<tr><td>TOPIC</td><td>NAME OF TEACHER (TGT Maths)</td><td>NAME OF KV</td><td>REGION</td></tr>
<tr><td>GEOMETRIC TWINS</td><td>PRACHI MATHUR</td><td>NO.2 SRINAGAR</td><td>JAMMU</td></tr>
<tr><td>OPERATIONS WITH INTEGERS</td><td>VANDANA KUMARI</td><td>SUNJUWAN</td><td>JAMMU</td></tr>
<tr><td>FINDING COMMON GROUND</td><td>RAJVIR SINGH</td><td>PRAGATI VIHAR</td><td>DELHI</td></tr>
<tr><td>ANOTHER PEEK BEYOND THE POINT</td><td>SANJU BALA</td><td>NO.2 DELHI CANTT</td><td>DELHI</td></tr>
<tr><td>CONNECTING THE DOTS…</td><td>VANDANA GAUTAM</td><td>SPG DWARKA</td><td>DELHI</td></tr>
<tr><td>CONSTRUCTIONS AND TILINGS</td><td rowspan="2">VIVEK KUMAR TYAGI</td><td rowspan="2">SECTOR-8 RK PURAM</td><td rowspan="2">DELHI</td></tr>
<tr><td>FINDING THE UNKNOWN</td></tr>
</table>

MODERATED BY:

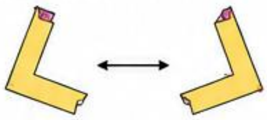
<table>
<tr><td>TOPIC</td><td>NAME OF TEACHER (TGT Maths)</td><td>NAME OF KV</td><td>REGION</td></tr>
<tr><td>GEOMETRIC TWINS</td><td rowspan="2">DEEPAK AGARWAL</td><td rowspan="2">AFS NO. 1 SIRSA</td><td rowspan="2">GURUGRAM</td></tr>
<tr><td>OPERATIONS WITH INTEGERS</td></tr>
<tr><td>FINDING COMMON GROUND</td><td rowspan="4">SUNIL GULERIA</td><td rowspan="4">YOL CANTT.</td><td rowspan="4">GURUGRAM</td></tr>
<tr><td>ANOTHER PEEK BEYOND THE POINT</td></tr>
<tr><td>CONNECTING THE DOTS…</td></tr>
<tr><td>CONSTRUCTIONS AND TILINGS</td></tr>
<tr><td>FINDING THE UNKNOWN</td><td>KALPNA GUPTA</td><td>SUBATHU</td><td>GURUGRAM</td></tr>
</table>

CHAPTER 1 : GEOMETRIC TWINS

SUMMARY OF CONCEPTS

1. CONGRUENCE – BASICS

- Figures that have the same shape and size are called **congruent**.
- Congruent figures can be superimposed exactly one over the other.



These figures are congruent.

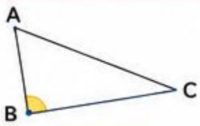
Note: A figure can be rotated or flipped before superimposing.

2. MEASUREMENTS TO RECREATE A FIGURE

- To recreate a figure exactly, we need sufficient measurements.

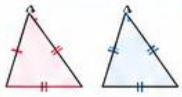
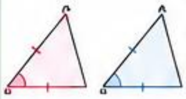
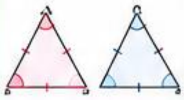
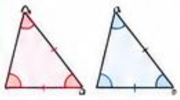
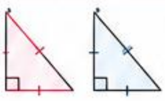
For this open figure:

- Two arm lengths (AB, BC) are not enough.
- Arm lengths AB, BC and the included angle $\angle ABC$ are enough.



3. CONDITIONS FOR CONGRUENCE OF TRIANGLES

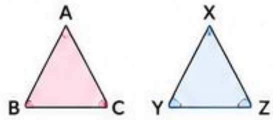
Two triangles are congruent if any one of the following conditions is satisfied.

Condition	What is given	Diagram	Key point
(SSS) Side Side Side	Three sides equal		All three sides equal
(SAS) Side Angle Side	Two sides and included angle equal		Two sides and included angle equal
(ASA) Angle Side Angle	Two angles and included side equal		Two angles and included side equal
(AAS) Angle Angle Side	Two angles and a non-included side equal		Two angles and any other side equal
(RHS) Right Hypotenuse Side	In right triangles: Hypotenuse and one side equal		Right angle, hypotenuse and one side equal

4. CONVENTIONS TO EXPRESS CONGRUENCE

- Write triangles in the same order of corresponding vertices.

Example:



$\triangle ABC \cong \triangle XYZ$ means

$A \leftrightarrow X, \quad B \leftrightarrow Y, \quad C \leftrightarrow Z$

$AB \leftrightarrow XY, \quad BC \leftrightarrow YZ,$

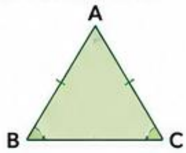
$AC \leftrightarrow XZ$

$\angle A \leftrightarrow \angle X, \quad \angle B \leftrightarrow \angle Y,$

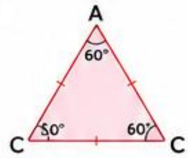
$\angle C \leftrightarrow \angle Z$

5. IN ISOSCELES & EQUILATERAL TRIANGLES

- In an **isosceles triangle**, angles opposite to equal sides are equal.

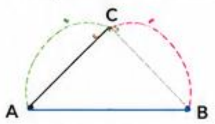


- In an **equilateral triangle**, all angles are 60°.

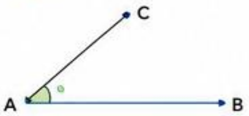


6. CONSTRUCTION OF TRIANGLES

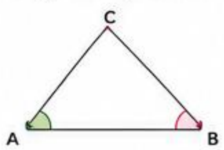
- **Three sides given (SSS):** Draw base, then intersecting arcs from its endpoints with other two lengths.



- **Two sides & included angle (SAS):** Draw base, construct **angle**, mark other side on the arm.

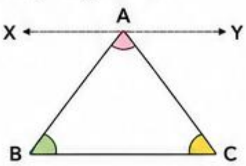


- **Two angles & included side (ASA):** Draw base, construct angles at ends, intersection is third vertex.



7. ANGLE SUM PROPERTY

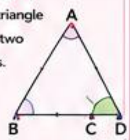
The sum of the interior angles of any triangle is 180°.



- Draw a line XY through A parallel to BC.
- By alternate angles: $\angle XAB = \angle B$ and $\angle YAC = \angle C$
- $\angle XAB + \angle BAC + \angle YAC = 180°$
- Hence, $\angle A + \angle B + \angle C = 180°$.

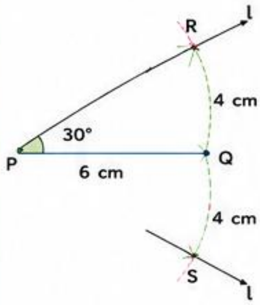
Exterior Angle Property

An exterior angle of a triangle equals the sum of the two opposite interior angles.



8. SPECIAL CASE – SSA

- Two sides and a non-included angle (SSA) do not always guarantee congruence.
- Two different triangles can be formed.
- Only in special cases (e.g., right triangle – RHS) congruence holds.



9. USES OF CONGRUENCE

Helps us prove that:

- equal parts are truly equal
- shapes and sizes are identical
- properties of one figure apply to its congruent counterpart

Used in real life:

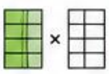
- Architecture (bridges, domes, pyramids)
- Art and designs
- Everyday patterns and structures

10. QUICK REFERENCE – FORMULAS & FACTS

Multiplcation of Fractions

$$\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$$

- Cancel common factors before multiplying.
- When one number is between 0 and 1 → product is less than the other number.
- When one number is greater than 1 → product is greater than the other number.



Division of Fractions

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{a \times d}{b \times c}$$

- Find reciprocal of divisor $\left(\frac{d}{c}\right)$.
- Multiply by the dividend.
- When divisor < 1 → quotient is greater than dividend.
- When divisor > 1 → quotient is less than dividend.

Reciprocal of a Fraction

The reciprocal of $\frac{a}{a}$ is $\frac{b}{a}$.

$$\left(\frac{a}{b}\right) \times \left(\frac{b}{a}\right) = 1$$

Angle Sum Property

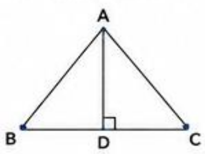
$\angle A + \angle B + \angle C = 180°$.

Equilateral Triangle

All sides equal → each angle = 60°.

Altitude

A perpendicular from a vertex to the opposite side.



REMEMBER! Observe carefully → Measure smartly → Compare → Match Corresponding Parts → Conclude Congruence

GEOMETRIC TWINS

Learning Outcomes:

LO1: Identify congruent figures in everyday life and geometric patterns.

LO2: Compare shapes using size and shape attributes.

LO3: Verify congruence through superposition and measurement.

LO4: Recognize the importance of congruence in design and construction.

LO5: Solve problems involving congruent figures.

Competencies:

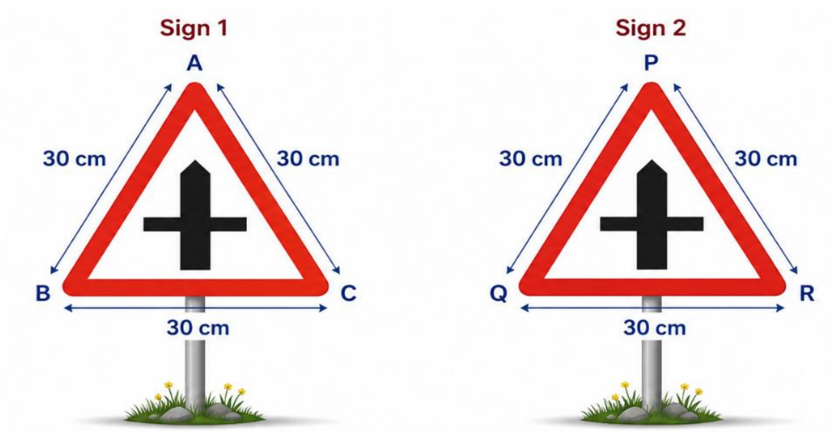
C1: Spatial visualization

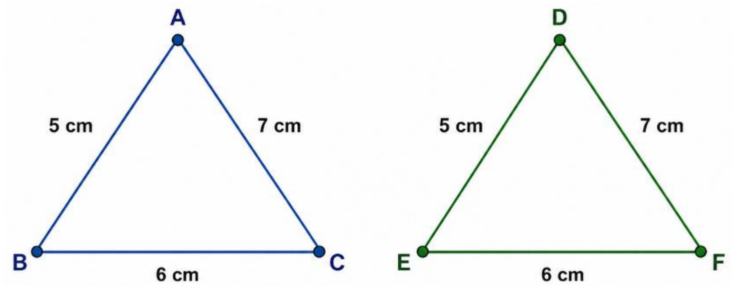
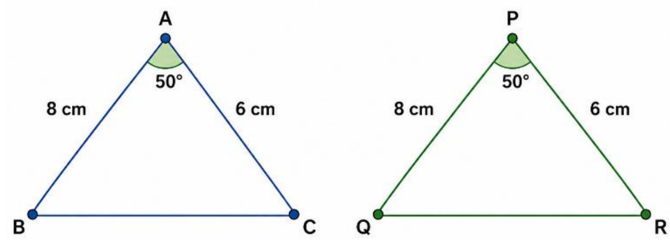
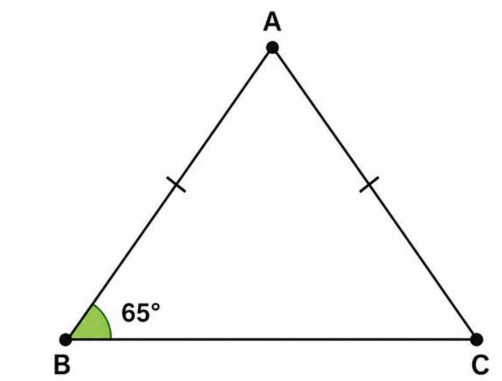
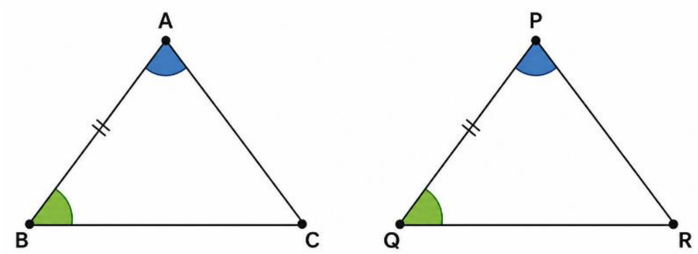
C2: Comparison and classification of shapes

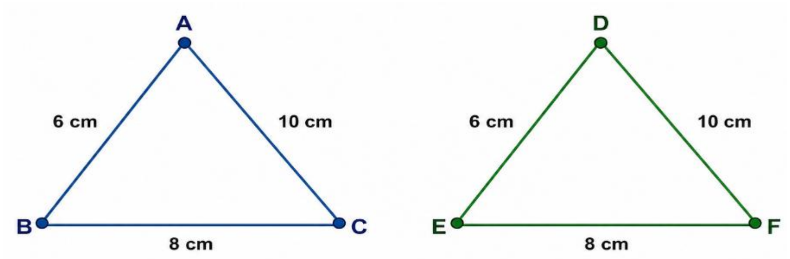
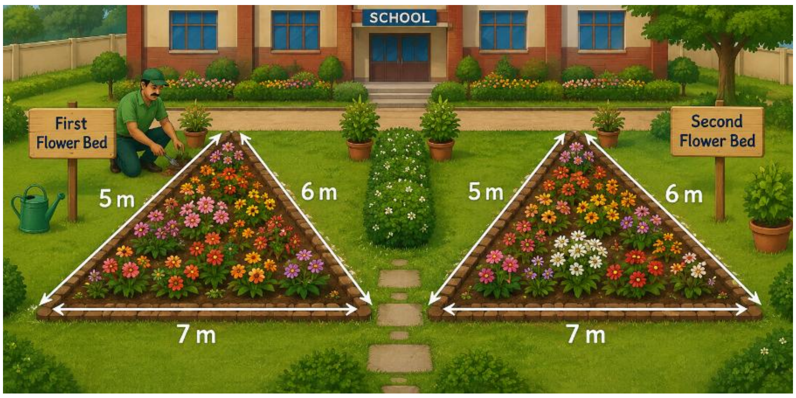
C3: Logical reasoning

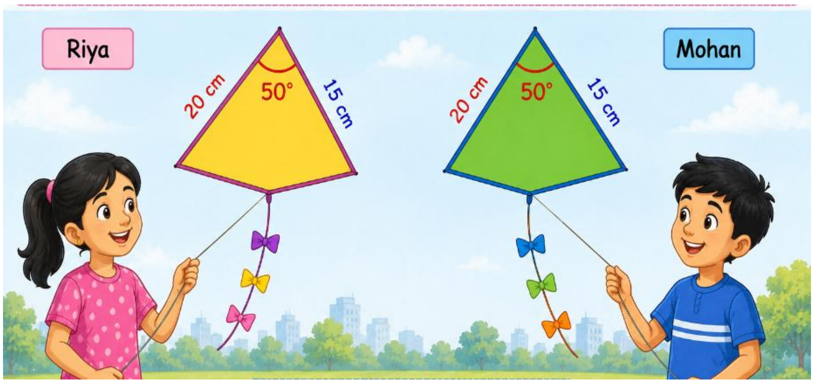
C4: Understanding congruence

Q.No	Question	LO	Competency
MCQs (One Mark Each)			
1	Two figures are congruent if they have: a) Same shape only b) Same size only c) Same shape and same size d) Different shape and size	LO1	C1
2	Which criterion can be used to prove two triangles congruent? a) SSS b) SAS c) ASA d) All of these	LO2	C2
3	In an isosceles triangle, the sides that are equal are called: a) Base sides b) Congruent sides c) Unequal sides d) Vertices	LO1	C2
4	An equilateral triangle has: a) Two equal sides b) Three equal sides c) No equal sides d) Four equal sides	LO1	C2
5	If all three corresponding sides of two triangles are equal, the triangles are congruent by: If all three corresponding sides of two triangles are equal, the triangles are congruent by: a) ASA b) SAS c) SSS d) RHS	LO2	C2
6	The measure of each angle of an equilateral triangle is: a) 45° b) 60° c) 90° d) 120°	LO3	C3
7	Congruent figures always have: a) Equal area only b) Equal perimeter only c) Same shape and size d) Same color	LO3	C3
8	In SAS congruence, we compare a) 3 sides b) 2 sides and included angle c) 2 angles and a side d)1 side and 1 angle	LO2	C2
9	If two sides of a triangle are equal, then the angles opposite them are: a) Unequal b) Equal c) Right angles d) Obtuse angles	LO2	C2
10	Which of the following is always congruent to itself? a) Triangle b) Square c) Circle d) All of these	LO2	C3

Short Answer Type (Two Marks Each)			
11	Explain why two triangles having sides 5 cm, 7 cm and 9 cm and 5 cm, 7 cm and 10 cm cannot be congruent.		
12	Two circles have radii 4.5 cm each.Are the circles congruent? Justify your answer.	LO1	C1
13	A right triangle has hypotenuse 13 cm and one side 5 cm. Another right triangle also has hypotenuse 13 cm and one side 5 cm. Are the two triangles necessarily congruent? State the criterion used.	LO1 LO2	C1 C2 C3
14	A carpenter prepares two triangular wooden frames. One has sides 7 cm, 8 cm and 9 cm. The other has sides 7 cm, 8 cm and an included angle of 55°. Can he conclude that the two frames are congruent? Justify your answer.	LO1 LO2 LO5	C3 C4
15	Two triangles have: • $\angle A = \angle D = 45°$ • $\angle B = \angle E = 65°$ • BC = EF = 8 cm Are these triangles congruent? If yes the which congruence criterion is satisfied?	LO1 LO2	C1 C2 C3
16	A student says: "If two triangles have one equal side and one equal angle, they are always congruent." Is the statement correct? Give a reason.	LO1 LO2	C1 C2 C3
17	The diagonals of a rectangle divide it into two triangles. State one congruence criterion that proves these triangles are congruent.	LO1 LO2	C2 C3
18	Two triangles have: • AB = PQ = 10 cm • BC = QR = 12 cm • $\angle C = \angle R = 40°$ Can you conclude that the triangles are congruent? Why or why not?	LO1 LO2	C1 C2 C3
19	A triangular traffic sign has sides measuring 30 cm each. Another sign also has sides measuring 30 cm each.Can one sign exactly cover the other? Give a reason.  	LO1 LO2 LO5	C3 C4

20	A student claims that two triangles having angles 40°, 60° and 80° must be congruent. Is the statement correct? Give a reason.	LO1 LO2	C1 C2 C3
	Short Answer Type (Three Marks Each)		
21	In ΔABC and ΔDEF, AB = DE = 5 cm, BC = EF = 6 cm, AC = DF = 7 cm. Are the triangles congruent? Give reason. 	LO1 LO2	C1 C2 C3
22	Two triangles have: AB = PQ = 8 cm, AC = PR = 6 cm, ∠A = ∠P = 50°. Are the triangles congruent? If yes Which congruence criterion applies? 	LO1 LO2 LO3	C1 C2 C3
23	In an isosceles triangle ABC, AB = AC. If ∠B = 65°, find ∠C and justify your answer. 	LO1 LO2 LO4	C1 C2 C3
24	The sides of a triangle are 5 cm, 5 cm and 8 cm. Identify the type of triangle and give a reason.	LO1 LO2	C2 C3
25	If two angles and the included side of one triangle are equal to the corresponding parts of another triangle, prove that the triangles are congruent. 	LO1 LO2 LO4	C1 C2 C3

	Long Answer Type (Five Marks Each)		
26	Two triangles ABC and DEF have AB = DE = 6 cm, BC = EF = 8 cm and AC = DF = 10 cm. Prove that the triangles are congruent and write all corresponding equal parts.  	LO1 LO2 LO4	C1 C2 C3
27	An isosceles triangle has equal sides of 7 cm each and base 10 cm. Draw the triangle and explain any four properties of an isosceles triangle.	LO1 LO2	C1 C2 C3
28	A park is designed using congruent triangular flower beds.  Explain how congruence helps in maintaining symmetry and uniformity in the design.	LO1 LO2 LO4 LO5	C2 C3 C4
	Case Study Based		
29	A school gardener makes two triangular flower beds. The first flower bed has sides 5 m, 6 m and 7 m. The second flower bed also has sides 5 m, 6 m and 7 m.  (a) Are the two flower beds congruent? (b) Which congruence criterion is used? (c) Give a reason for your answer. (d) Write one advantage of using congruent flower beds.	LO1 LO2 LO4 LO5	C2 C3 C4

30	Riya and Mohan make two kites. Each kite is shaped like a triangle with two sides measuring 20 cm and 15 cm and the included angle measuring 50°.  (a) Are the two triangular kites congruent? (b) Name the congruence criterion used. (c) Why is the included angle important? (d) State one benefit of making congruent kites.	LO1 LO2 LO4 LO5	C2 C3 C4

Answers:

Q.	1	2	3	4	5	6	7	8
Ans.	c	d	b	b	c	b	c	a
Q.	9	10	11	12	13	14	15	16
Ans.	b	d	SSS not applicable	yes	Yes, RHS	May not be	Yes ASA OR AAS	NO
Q.	17	18	19	20	21	22	23	24
Ans.	SSS OR SAS OR RHS	May not be	Yes, because they are congruent	No	Yes, SSS	Yea, SAS	65^0	Isosceles
Q.	25	26	27	28	29	30		
Ans.	proof	proof	construction	Explanation	Yes, SSS	Yes, SAS		

Challenging Questions (Stage 1)

Q.1. Riya and Siya, the Geometric Twins, are drawing shapes. Riya draws a rectangle whose length is twelve centimeters and breadth is eight centimeters. Siya draws a rectangle whose length is fifteen centimeters and breadth is five centimeters. Find the perimeter of both rectangles and identify which one has the greater perimeter.

Q.2. The Geometric Twins draw a square and a rectangle having the same perimeter. The side of the square is six centimetres. The length of the rectangle is eight centimetres. Find the breadth of the rectangle.

Q.3. The twins use sticks of lengths six centimetres, eight centimetres, and ten centimetres to form a triangle. Can a triangle be formed with these lengths? Also find its perimeter.

Q.4. A rectangular park is twenty metres long and fifteen metres wide. Find the area of the park. How much grass will be required to cover the entire park?

Q.5. The Geometric Twins draw a square of side seven centimetres and a rectangle of length nine centimetres and breadth five centimetres. Find the area of both figures and compare them.

Challenging Questions (Stage 2)

Q.1. The Geometric Twins draw two rectangles having the same area. The first rectangle measures twelve centimetres by eight centimetres. If the second rectangle has a length of sixteen centimetres, find its breadth.

Q.2. A square field has an area of one hundred ninety-six square metres. Find the length of one side of the field and calculate its perimeter.

Q.3. The perimeter of a rectangle is fifty centimetres. If its length is fifteen centimetres, find its breadth and area.

Q.4. The twins create a design using four identical squares, each having a side of five centimetres. Find the total area covered by the design.

Q.5. A triangle has sides measuring nine centimetres, twelve centimetres, and fifteen centimetres. Find its perimeter. If each side is increased by two centimetres, what will be the new perimeter?

Challenging Questions (Stage 3)

Q.1. The length of a rectangular garden is five metres more than its breadth. The perimeter of the garden is fifty metres. Find the length, breadth, and area of the garden.

Q.2. A square and a rectangle have the same area of one hundred forty-four square centimetres. If the length of the rectangle is eighteen centimetres, find its breadth. Also compare the perimeters of the two figures.

Q.3. The Geometric Twins join two identical rectangles, each measuring eight centimetres by four centimetres, to form a larger rectangle. Find the possible dimensions and area of the new rectangle.

Q.4. The area of a rectangle is one hundred eighty square centimetres. Its length is three times its breadth. Find the dimensions and perimeter of the rectangle.

Q.5. A square playground has a side length of twenty metres. A path two metres wide is constructed all around it. Find the area occupied by the path.

Answers (Challenging Questions)

	Q.1	Q.2	Q.3	Q.4	Q.5
Stage 1	Perimeter of Riya's rectangle = 40 cm Perimeter of Siya's rectangle = 40 cm Both rectangles have the same perimeter.	4 cm	Yes, a triangle can be formed. Perimeter = 24 cm	Area of the park = 300 m^2 Grass required = 300 m^2	Area of the square = 49 cm^2 rectangle = 45 cm^2 The square has a greater area by 4 cm^2
Stage 2	6 cm	Side = 14 m Perimeter = 56 m	Breadth = 10 cm Area = 150 cm^2	100 cm^2	Original perimeter = 36 cm New perimeter = 42 cm
Stage 3	L=15cm B=10cm Area=150cm^2	B=8cm Perimeter of rectangle=52cm Square=52cm Rectangle has perimeter 4cm greater than square	Possible dimensions = 16cm×4cm OR 8cm×8cm Area= 64cm^2	B=7.75cm L=23.24cm Perimeter = 62cm	Area= 176cm^2

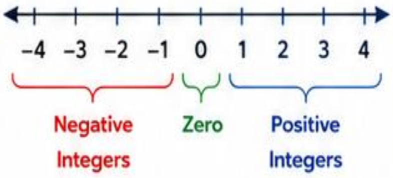
CHAPTER 2 : OPERATIONS WITH INTEGERS

SUMMARY OF CONCEPTS

1. INTEGERS

Integers are the set of positive numbers, negative numbers and zero.

$\mathbb{Z} = \{ ..., -3, -2, -1, 0, 1, 2, 3, ... \}$



Key Idea

Integers can be represented on a number line.

2. ADDITION & SUBTRACTION OF INTEGERS

- Addition of integers follows the same rules as in Grade 6.
- Subtraction of integer *a* by integer *b* is the same as $a + (-b)$.

Using Token Model

Green token (+1)   Red token (−1)

$+1 \quad + (-1) = 0$

Use zero pairs (+1 and −1) to add or remove tokens as needed.

3. MULTIPLICATION OF INTEGERS

Multiplied Numbers	Rule
$(+) \times (+) = +$	Same signs → Positive
$(-) \times (-) = +$	Same signs → Positive
$(+) \times (-) = -$	Different signs → Negative
$(-) \times (+) = -$	Different signs → Negative

Properties

- Commutative Property : $a \times b = b \times a$
- Associative Property : $a \times (b \times c) = (a \times b) \times c$
- Distributive Property : $a \times (b + c) = (a \times b) + (a \times c)$

4. DIVISION OF INTEGERS

Dividend ÷ Divisor	Rule
$(+) \div (+) = +$	Same signs → Positive
$(-) \div (-) = +$	Same signs → Positive
$(+) \div (-) = -$	Different signs → Negative
$(-) \div (+) = -$	Different signs → Negative

Key Rules

- Division by zero is not defined.
- $a \div b = a \times \left(\frac{1}{b}\right)$, where $b \neq 0$

5. TOKEN MODEL FOR MULTIPLICATION

$(+) \times (+) = +$

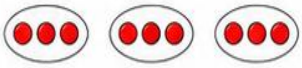
Add positive tokens repeatedly.

$(3 \times 2 = 6)$

$(+) \times (-) = -$

Add negative tokens repeatedly.

$(3 \times (-2) = -6)$



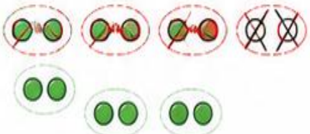
$(-) \times (+) = -$

Add negative tokens repeatedly.

$((-3) \times 2 = -6)$

$(-) \times (-) = +$

Remove negative tokens (using zero pairs). $((-3) \times (-2) = 6)$



Zero pairs: +1 and −1 together make 0 (cancel each other).

6. SPECIAL CASES

- **Multiplication:**

$a \times 1 = a$

$a \times (-1) = -a$

$(-1) \times (-1) = 1$

$a \times 0 = 0$

- **Division:**

$a \div 1 = a$

$a \div (-1) = -a$

$0 \div a = 0 \quad (a \neq 0)$

Remember

- Keep track of the sign.
- Magnitude is the same as for positive numbers.

7. EXPRESSIONS WITH INTEGERS

- Follow **BODMAS** rule.
- Multiplication and division are done from left to right.
- Use brackets to show the order clearly.

Example:

$(-2) \times (3 + (-5)) = (-2) \times (-2) = 4$

8. APPLICATIONS IN REAL LIFE

Temperature

If temperature drops 5°C per hour from 8°C, after 4 hours:

$8 + (4 \times (-5)) = -12°C$

Profit and Loss

Profit = positive

Loss = negative

Total = Profit + Loss

Elevator Movement

Up = positive

Down = negative

Final position = Start + (Speed × Time)

9. IMPORTANT TAKEAWAYS

- Integers include positive numbers, negative numbers and zero.
- Addition and subtraction follow the rules using zero pairs.
- Signs in multiplication and division follow fixed rules.
- Multiplication is commutative, associative and distributive.
- Division by zero is not defined.
- Integers are used in many real-life situations like temperature, money, elevators, games and more.

QUICK REFERENCE

MULTIPLICATION RULE	DIVISION RULE	DISTRIBUTIVE LAW	ASSOCIATIVE LAW	COMMUTATIVE LAW	ZERO PAIR
(+) (+) = + (−) (−) = + (+) (−) = − (−) (+) = −	(+) (+) = + (−) (−) = + (+) (−) = − (−) (+) = −	$a \times (b + c)$ $= a \times b + a \times c$	$a \times (b \times c)$ $= (a \times b) \times c$	$a \times b = b \times a$	+1 and −1 make 0.

Key to Success: Understand → Practice → Observe Patterns → Apply in Real Life

OPERATIONS WITH INTEGERS

Learning Outcomes:

LO1: Represent positive and negative integers on a number line.
LO2: Compare and order integers.
LO3: Perform addition, subtraction, multiplication, and division of integers.
LO4: Interpret integer operations in real-life contexts such as temperature and elevation.
LO5: Solve word problems involving integers.

Competencies:

C1: Number sense
C2: Representation on the number line
C3: Computational fluency
C4: Application of rules

Q.No	Question	LO	Competency
MCQs (One Mark Each)			
1	What is the value of (-15) + 8? A) -7 B) 7 C) -23 D) 23	LO3	C3 C4
2	Which of the following is equal to -12? A) (-3) × 4 B) (-3) × (-4) C) 3 × 4 D) 12 ÷ 1	LO2 LO3	C3 C4
3	The additive inverse of -25 is: A) -25 B) 25 C) 0 D) 50	LO2 LO3	C3 C4
4	(-18) ÷ 6 = ? A) 3 B) -3 C) 12 D) -12	LO2 LO3	C3 C4
5	Which property is illustrated by 8 + (-8) = 0? A) Closure B) Identity C) Inverse D) Commutative	LO2	C1
6	Find: (-9) × (-5) A) -45 B) 45 C) 14 D) -14	LO2 LO3	C3 C4
7	The result of 12 - 20 is: A) 8 B) -8 C) 32 D) -32	LO2 LO3	C3 C4
8	Which expression equals -30? A) 5 × 6 B) (-5) × 6 C) (-5) × (-6) D) 30 ÷ 1	LO2 LO3	C1 C3
9	What is (-11) + (-7)? A) 18 B) -18 C) 4 D) -4	LO2 LO3	C1 C3 C4
10	Multiplicative identity of integers is: A) 0 B) -1 C) 1 D) 10	LO2	C4
Short Answer Type (Two Marks Each)			
11	Evaluate: (-24) + 15.	LO2 LO3	C3 C4
12	Find the value of: 17 + (-25).	LO2 LO3	C3 C4

13	Verify the commutative property for: (-8) + 12.	LO2 LO3	C3 C4
14	Find: (-7) × 9.	LO2 LO3	C3 C4
15	Calculate: (-45) ÷ (-5).	LO2 LO3	C3 C4
16	A submarine is 120 m below sea level. Represent its position using an integer.	LO3 LO5	C2 C1
17	Find the additive inverse of 56 and -56.	LO2 LO3	C3 C4
18	Simplify: 15 - (-8).	LO2 LO3	C3 C4
19	Find: (-14) + 22 - 10.	LO2 LO3	C1 C3 C4
20	A temperature rises from -5°C to 7°C. By how many degrees has it increased?	LO3 LO4	C1 C4
	Short Answer Type (Three Marks Each)		
21	Evaluate: (-15) + 25 - 18 + 9.	LO2 LO3	C3 C4
22	Verify the distributive property for: (-4) × (5 + 3).	LO2 LO3	C3 C4
23	Find the value of: (-12) × (-8) ÷ 4.	LO2 LO3	C3 C4
24	A climber descends 250 m from a height of 800 m. Represent the change using integers and find his new height.	LO4 LO5	C3 C4
25	A bank account has ₹500. A withdrawal of ₹750 is made. Represent the balance using integers.	LO5	C2 C3 C4
	Long Answer Type (Five Marks Each)		
26	Evaluate: (-25) + 36 - 14 + (-18) + 22.	LO2 LO3	C3 C4
27	A city records temperatures of -3°C, -7°C, 4°C, and 8°C on four consecutive days. Find the total change in temperature from Day 1 to Day 4.	LO4 LO5	C1 C3 C4
28	A lift starts at the ground floor (0), goes up 12 floors, down 18 floors, then up 9 floors. At which floor does it stop?	LO4 LO5	C1 C3 C4
	Case Study Based Questions		
29	Riya plays a game where she gains 15 points, loses 25 points, gains 12 points, and then loses 8 points. a) Represent each transaction using integers. b) Find her final score.	LO1 LO3 LO5	C1 C3 C4
30	During winter, the temperature at a hill station was -8°C in the morning. It increased by 11°C in the afternoon and decreased by 6°C at night. a) What was the afternoon temperature? b) What was the night temperature?	LO3 LO4 LO5	C1 C3 C4

Answers:

Q.	1	2	3	4	5	6	7	8
Ans.	-7	(-3)×4	25	-3	INVERSE PROPERTY	45	-8	(-5)×6
Q.	9	10	11	12	13	14	15	16
Ans.	-18	1	-9	-8	4=4	-63	9	-120
Q.	17	18	19	20	21	22	23	24
Ans.	-56, 56	23	-2	12^0C	1	LHS=RHS =-32	24	550m
Q.	25	26	27	28	29	30		
Ans.	-RS250	1	11^0C INCREASE	3^{RD} FLOOR	b)-6 POINTS	a) 3^0C b) -3^0C		

Challenging Questions (Stage 1)

Q.1. Find the value of: (-25) + (-35) + 60
Q.2. Evaluate: (-12) × (-9)
Q.3. Find: 45 ÷ (-5)
Q.4. Simplify: -18 + 25 - 12
Q.5. What integer is 15 less than -10?

Challenging Questions (Stage 2)

Q.1. Evaluate: (-15) × (8 - 12)
Q.2. Find: (-84) ÷ (-7) + (-5)
Q.3. Simplify: -25 + 36 - 48 + 22
Q.4. A diver descends 45 m and then rises 18 m. What is his final position?
Q.5. Verify: (-6) × [3 + (-5)]

Challenging Questions (Stage 3)

Q.1. Evaluate: [(-15) × (-4)] + [(-12) ÷ 3]
Q.2. A company's profit and loss over four months are +₹5000, -₹3000, +₹2500, -₹4500. Find the net result.
Q.3. Simplify: -25 + 18 - (-14) + (-9)
Q.4. Verify distributive property for: (-8) × [6 + (-2)]
Q.5. A lift moves down 12 floors, up 8 floors, down 15 floors, and up 10 floors from the ground floor. Find its final position.

Answers (Challenging Questions)

	Q.1	Q.2	Q.3	Q.4	Q.5
Stage 1/Ans	0	108	-9	-5	-25
Stage 2/Ans	60	7	-15	-27m	-12
Stage 3/Ans	56	RS0	-2	LHS=RHS=-32	-9 FLOORS

CHAPTER 3 : FINDING COMMON GROUND

SUMMARY OF CONCEPTS

1. HIGHEST COMMON FACTOR (HCF / GCD)

- The HCF (or GCD) of two or more numbers is the greatest of their common factors.

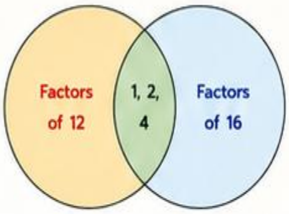
Example: HCF of 12 and 16

Factors of 12 : 1, 2, 3, 4, 6, 12

Factors of 16 : 1, 2, 4, 8, 16

Common factors: 1, 2, 4

HCF = 4



Finding HCF using Prime Factorisation

Steps:

1. Find prime factorisation of the numbers.
2. Take the common prime factors.
3. Take the smallest power of each common prime.

Example:

$12 = 2^2 \times 3$ | $16 = 2^4$

Common prime: 2

Smallest power: 2^2

$HCF = 2^2 = 4$

2. LOWEST COMMON MULTIPLE (LCM)

- The LCM of two or more numbers is the least (smallest) of their common multiples.

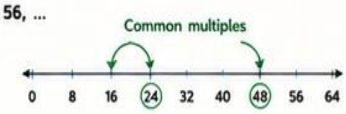
Example: LCM of 6 and 8

Multiples of 6 : 6, 12, 18, 24, 30, 36, 42, 48, ...

Multiples of 8 : 8, 16, 24, 32, 40, 48, 56, ...

Common multiples: 24, 48, 72, ...

LCM = 24



Finding LCM using Prime Factorisation

Steps:

1. Find prime factorisation of the numbers.
2. Take all prime factors (common and non-common).
3. Take the greatest power of each prime.

Example:

$6 = 2 \times 3$ | $8 = 2^3$

All primes: 2, 3

Greatest powers: 2^3, 3^1

$LCM = 2^3 \times 3 = 24$

3. RELATION BETWEEN HCF AND LCM

For any two positive integers a and b:

$$\boxed{HCF(a, b) \times LCM(a, b) = a \times b}$$

Example: For 12 and 18

HCF = 6, LCM = 36

$6 \times 36 = 216 = 12 \times 18$ ✓

4. QUICK PROCEDURE (COMMON DIVISION METHOD)

Divide both numbers by common factors successively.

To find HCF → Multiply the common factors only.	To find LCM → Multiply the common factors and the last remaining numbers.

Example: 84 and 180

2	84	180
2	42	90
3	21	45
	7	15

$HCF = 2 \times 2 \times 3 = 12$

$LCM = 2 \times 2 \times 3 \times 7 \times 15 = 1260$

5. SPECIAL CASES & PATTERNS

- If one number is a factor (or multiple) of the other, HCF is the smaller number.
- Consecutive numbers → HCF = 1
- Co-prime numbers → HCF = 1
- If both numbers are doubled, HCF also doubles.
- LCM of co-prime numbers = product of the numbers.
- In general:
  - Multiples of a number share that number as a common factor.
  - Common multiples are multiples of the LCM.

6. MULTIPLICATION OF INTEGERS

Signs of Numbers	Product	Rule
+ × +	+	Same signs → Positive
− × −	+	Same signs → Positive
+ × −	−	Different signs → Negative
− × +	−	Different signs → Negative

Properties

- Commutative : $a \times b = b \times a$
- Associative : $a \times (b \times c) = (a \times b) \times c$
- Distributive : $a \times (b + c) = a \times b + a \times c$
- Identity : $a \times 1 = a$, $a \times (-1) = -a$
- Zero : $a \times 0 = 0$

7. DIVISION OF INTEGERS

Signs of Numbers	Quotient	Rule
+ ÷ +	+	Same signs → Positive
− ÷ −	+	Same signs → Positive
+ ÷ −	−	Different signs → Negative
− ÷ +	−	Different signs → Negative

Key Points

- Division by zero is not defined.
- $a \div b = a \times \left(\frac{1}{b}\right)$, $b \neq 0$
- $a \div 1 = a$, $a \div (-1) = -a$
- $0 \div a = 0$ $(a \neq 0)$

8. REAL-LIFE APPLICATIONS

Tiling / Packing	Packing / Grouping	Meeting / Events	Games / Patterns
Largest square tile or pack size = HCF (e.g., room 12 ft × 16 ft → HCF = 4 ft tiles)	Equal weight bags with least number = HCF (e.g., 84 kg & 108 kg → HCF = 12 kg)	Events repeat together after = LCM (e.g., every 7 & 10 days → LCM = 70 days)	Common step/jump size or pattern repeat = LCM (e.g., Jump Jackpot game)

9. QUICK REFERENCE

Prime Factorisation Steps

1. Divide the number by the smallest prime factor.
2. Divide the quotient again by a prime factor.
3. Continue till the quotient is 1.
4. Multiply all the prime factors.

To Find HCF & LCM (Using Prime Factors)

- HCF → Multiply common primes with their smallest powers.
- LCM → Multiply all primes with their greatest powers.

KEY TAKEAWAY

- Use HCF for largest size or least number of groups.
- Use LCM for repeating events or common cycles.
- Follow sign rules in multiplication and division.
- HCF × LCM = Product of the numbers.
- Prime factorisation is the key to quick and easy solutions!

Finding Common Ground

Learning Outcomes

LO1: Find factors and multiples of numbers.

LO2: Determine Highest Common Factor (HCF) and Least Common Multiple (LCM).

LO3: Use prime factorization to solve numerical problems.

LO4: Apply HCF and LCM in practical situations.

LO5: Explain methods used to obtain HCF and LCM.

Competencies:

C1: Factorization and divisibility

C2: Analytical reasoning

C3: Problem solving

Q.No	Question	LO	Competency
MCQs (One Mark Each)			
1	The prime factorisation of 90 is: a) $2 \times 3 \times 3 \times 5$ b) $2 \times 5 \times 9$ c) $2 \times 3^2 \times 5$ d) Both (a) and (c)		
2	Which of the following is NOT a common factor of 24 and 36? a) 2 b) 6 c) 8 d) 12		
3	The HCF of two co-prime numbers is always: a) 0 b) 1 c) The product of the numbers d) The larger number		
4	The LCM of 8 and 12 is: a) 24 b) 48 c) 4 d) 96		
5	In the prime factorisation $2^3 \times 3^2$, the exponent of 3 is: a) 2 b) 3 c) 8 d) 9		
6	If $A = 2^2 \times 3^5 \times 7$ and $B = 2^4 \times 3^2 \times 11$, the minimum power of 3 that should be taken for the HCF of A and B is: a) 2 b) 5 c) 7 d) 35		

7	The HCF of 28 and 42 is 14. Which of the following is a common multiple of 28 and 42? a) 14 b) 7 c) 84 d) 2		
8	Three consecutive numbers are given: 7, 8, 9. Their LCM is: a) 502 b) 72 c) 1 d) $7 \times 8 \times 9$		
9	For two numbers, HCF × LCM = 180. If one number is 15, the other number is: a) 6 b) 12 c) 180 d) Cannot be determined		
10	The number of factors of 36 (using prime factorisation $2^2 \times 3^2$) is: a) 4 b) 6 c) 9 d) 12		
Short Answer Type (Two Marks Each)			
11	Find the prime factorisation of 84 by the division method.		
12	List all the factors of 48 using its prime factorisation.		
13	Find the HCF of 30 and 45 using prime factorisation		
14	Find the LCM of 18 and 24 using prime factorisation		
15	Two numbers are $2^2 \times 3^3 \times 5$ and $2^3 \times 3^2 \times 5^2$. Write their HCF		
16	The HCF of two numbers is 9 and their LCM is 108. If one number is 27, find the other number.		
17	State whether 17 and 19 are co-prime. Find their HCF and LCM.		
18	Using prime factorisation, find the smallest number that is a multiple of both 15 and 25.		
19	Find the greatest number that exactly divides 40, 60, and 80.		
20	The prime factorisation of a number is $2^3 \times 3^2 \times 5$. Is this number divisible by 15?		
Short Answer Type (Three Marks Each)			
21	Using the common division method , find the HCF and LCM of 48, 72, and 108 at the same time.		
22	Find the HCF and LCM of 36 and 60. Verify that HCF × LCM = Product of the two numbers.		
23	A gardener plants trees in rows. He has 42 mango saplings and 56 guava saplings. What is the greatest number of saplings he can plant in each row so that all rows have the same number and only one type of sapling?		
24	Three traffic lights change at intervals of 48 seconds, 72 seconds, and 108 seconds. If they all change together at 8:00:00 AM, after how many seconds will they next change together?		
25	Observe the pattern for the LCM of pairs of consecutive even numbers: (2,4), (4,6), (6,8). Form a conjecture about the relationship between the LCM and the product of two consecutive even numbers.		

Long Answer Type (Five Marks Each)			
26	Prime Factorisation and Number of Factors: a) Find the prime factorisation of 216. b) Express it in exponential form. c) Use the prime factorisation to list all the factors of 216.		
27	Application of HCF and LCM: A rectangular courtyard is 18 m 72 cm long and 13 m 20 cm wide. It is to be paved with square tiles of the same size. a) Convert the dimensions into centimeters. b) Find the minimum number of such tiles required. (Hint: Find the side of the largest possible tile first) c) What is the measure of the side of the largest possible square tile? d) How many such tiles will be needed to pave the whole courtyard?		
28	Number Games and Properties: Consider the numbers 36 and 54. a) Write their prime factorisations. b) Find their HCF. c) Find their LCM. d) Prove that the product of the HCF and LCM is equal to the product of 36 and 54.		
Case Study Based Questions			
29	The Case of the Missing Number: Sara is trying to find two numbers, A and B. She knows that: HCF(A, B) = 12 , LCM(A, B) = 240, One of the numbers, A, is 60. a) Using the relationship between HCF, LCM, and the numbers, what is the product of A and B? b) Calculate the value of the second number, B. c) Write the prime factorisation of B. d) Verify that 12 is indeed a common factor of 60 and the number B you found.		
30	Organising a Math Fair: Students of Class VII are making identical gift packets for a math fair. They have 70 pencils, 105 erasers, and 175 chocolates. a) What is the maximum number of identical packets they can make? b) Find the prime factorisation of 70. c) How many chocolates will be there in each packet? d) Using the prime factorisation of 105 and 175, find their HCF.		

ANSWERS

Q.	1	2	3	4	5	6	7	8
Ans.								
Q.	9	10	11	12	13	14	15	16
Ans.								
Q.	17	18	19	20	21	22	23	24
Ans.								
Q.	25	26	27	28	29	30		
Ans.								

CHALLENGING QUESTIONS STAGE -1

1. The LCM of two numbers is 120. The numbers are in the ratio 3 : 4. Find the sum of the numbers.

2. Find the smallest number that, when divided by 15, 20, 36, and 48, leaves a remainder of 7 in each case.

3. The HCF of two numbers is 15 and their product is 6300. How many such pairs of numbers are possible?

4. Can the HCF and LCM of two numbers be 18 and 380 respectively? Justify your answer.

5. Three numbers are in the ratio 2 : 3 : 5. If their LCM is 240, find the numbers.

CHALLENGING QUESTIONS STAGE -2

1. A number N when factorised is of the form $2^a \times 3^b \times 5^c$, and the total number of factors of N is 24. If a, b, and c are all at least 1, find one possible set of values for a, b, and c.

2. The HCF and LCM of three numbers are 6 and 1260 respectively. If two of the numbers are 18 and 84, find the third number.

3. A long corridor has 100 doors. 100 people walk through. The first person opens every door. The second person closes every second door (2, 4, 6...). The third person toggles every third door (opens if closed, closes if open). This continues for all 100 people. Will door number 36 be open or closed at the end? (Hint: Think of the factors of 36)

4. Prove that for any two positive integers a and b, HCF(a,b) × LCM(a,b) = a × b.

5. The product of two numbers is 2560. Their LCM is 320. Find the HCF. If the numbers are greater than their HCF, find the numbers.

CHALLENGING QUESTIONS STAGE -3

1. Find the LCM of first 10 natural numbers.

2. Let a and b be two numbers such that $a = 2^2 \times 3 \times 5^3$ and $b = 2^2 \times 3^2 \times 5 \times 7$. Find the sum of the exponents of the prime factors in the LCM of a and b.

3. A generalisation was observed in class: For two numbers a and b, HCF(a,b) × LCM(a,b) = a × b. Does a similar generalisation hold for three numbers? Verify using the numbers 6, 8, and 10.

4. The number 2025 is a perfect square. Express it as a product of prime factors. Hence, find the smallest number by which 2025 must be divided so that the quotient is a perfect cube.

5. How many rectangular plots of integer dimensions (length and width) can be made with an area of 144 square meters? (Hint: Find the number of factor pairs)

Answers (Challenging Questions)

	Q.1	Q.2	Q.3	Q.4	Q.5
Stage 1	70	727	02 pair (15,420), (60,105)	No	16, 24, 40
Stage 2	a=1, b=2, c=3	90	open	ab	HCF=8 Numbers=40, 64
Stage 3	2520	8	No	$3^4 \times 5^2$ 75	8 rectangular plots (1,144), (2,72), (3,48), (4,36), (6,24), (8,18), (9,16), (12,12)

CHAPTER 4 : ANOTHER PEEK BEYOND THE POINT

SUMMARY OF CONCEPTS

1. DECIMALS – A QUICK RECAP

Decimals are an extension of our place value system to represent decimal fractions like $\frac{1}{10}, \frac{1}{100}, \frac{1}{1000}, \ldots$

Example: 27.53

Tens	Ones		Tenths	Hundredths
2	7	.	5	3

27.53 = 2 Tens + 7 Ones + 5 Tenths + 3 Hundredths

Fractions with denominators 10, 100, 1000,... can be written as decimals.

Examples:

$\frac{254}{1000} = 0.254$ $\quad \frac{847}{10000} = 0.0847$ $\quad \frac{173}{100} = 1.73$

2. MULTIPLICATION OF DECIMALS

- Multiply the numbers as whole numbers.
- In the product, place the decimal point so that the number of digits after decimal = sum of digits after decimal in multiplier and multiplicand.

Example:

5.8 × 1.24 (1 digit after decimal; 2 digits after decimal)

```
    58
 × 124
   232
   580
   696
  7192
 7.192
```

232, 580, 696: Product as whole numbers

7192: Total decimal digits = 3

7.192

Product Comparison

- Both > 1 → Product > both numbers
- Both between 0 and 1 → Product < both numbers
- One > 1 and other between 0 and 1 → Product is between the two numbers

3. DIVISION BY 10, 100, 1000, ...

Move the decimal point to the LEFT by as many places as there are zeroes in the divisor.

Number	÷ 10	÷ 100	÷ 1000
18.7	1.87	0.187	0.0187
21.1	2.11	0.211	0.0211
2.146	0.2146	0.02146	0.002146
0.306	0.0306	0.00306	0.000306

4. DIVISION USING PLACE VALUE (LONG DIVISION)

- Same method as for whole numbers.
- After Ones, regroup to Tenths, Hundredths, Thousandths, ...
- Place the decimal point in the quotient when we start dividing the Tenths.

Example: 1325 ÷ 4 = 331.25

```
4 ) 1325 ( 331.25
   -12        → Hundreds
    -12       → Tens
     -12      → Ones
       05
      - 4
        10    → Tenths
       - 8
         20   → Hundredths
        -20
          0
```

5. DIVISION WITH DECIMAL DIVISOR

- Make the divisor a whole number by multiplying both dividend and divisor by 10, 100, 1000, ...
- Then divide using place value method.

Example: 4.68 ÷ 0.13

$= \frac{4.68}{0.13} = \frac{4.68 \times 100}{0.13 \times 100} = \frac{468}{13}$

= 36 (remainder 0) = **36**

6. RECURRING (NEVER ENDING) DECIMALS

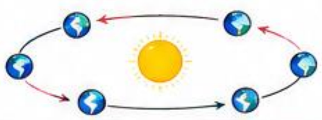
- Some divisions do not end. The remainders repeat in a cycle.
- **Example:** $\frac{10}{3} = 3.33333\ldots$
- $\frac{1}{7} = 0.142857142857\ldots$ (block 142857 repeats)

1 → 3 → 2 → 6 → 4 → 5
5 ← 4 ← 6 ← 2 ← 3 ← 1

Remainders repeat in a cycle.

7. LEAP YEAR & GREGORIAN CALENDAR

The Earth takes 365.2422 days to go around the Sun.
We consider 365 days in a calendar year.
Extra each year = 0.2422 days.



Rules for Leap Year (Gregorian Calendar)

A year is a leap year if:

1. It is divisible by 400 → Leap year (366 days)
2. OR divisible by 4 but NOT by 100 → Leap year
3. Otherwise → Common year (365 days)

FEBRUARY 29

Why these rules?

- Add 1 day every 4 years.
- Don't add in every 100th year.
- Again add in every 400th year.
- This keeps our calendar in sync with the Earth's revolution.

8. IMPORTANT PATTERNS & PROPERTIES

HCF (Highest Common Factor)

- Highest among common factors.
- Using prime factors → take the MINIMUM power of each prime.
- If one number is a factor (or multiple) of the other → HCF is the smaller number.

LCM (Lowest Common Multiple)

- Lowest among common multiples.
- Using prime factors → take the MAXIMUM power of each prime.
- If one number is a multiple of the other → LCM is the larger number.

Relationship between HCF and LCM (for two numbers a and b)

$$\text{HCF}(a, b) \times \text{LCM}(a, b) = a \times b$$

Example: For 12 and 18

$12 = 2^2 \times 3$ $\quad 18 = 2 \times 3^2$

$\text{HCF} = 2 \times 3 = 6$ $\quad \text{LCM} = 2^2 \times 3^2 = 36$

6 × 36 = 216 = 12 × 18 ✓

If both numbers are multiplied by the same number k:
HCF → multiplied by k
LCM → multiplied by k

9. QUICK REFERENCE – FORMULAS

Decimal multiplication:
Multiply as whole numbers. Decimal places in product = sum of decimal places in the numbers.

Division by 10, 100, 1000, ...:
Move decimal point LEFT by number of zeroes.

Division by a decimal divisor:
Make divisor whole by multiplying both numbers by the same power of 10.

Fraction to decimal:
Make denominator 10, 100, 1000, ... and convert.

Fraction division:
$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$

Recurring decimal detection:
Look for repeating remainders.

10. UNIT CONVERSIONS (QUICK GUIDE)

- 1 m = 100 cm = 1000 mm
- 1 kg = 1000 g = 1000 mg
- 1 l = 1000 ml
- 1 km = 1000 m

km, cm, mm, cm

11. REAL-LIFE APPLICATIONS

Shopping & Money	Travel	Sharing & Packing	Measurements	Calendars
Cost, profit, total amount	Distance, speed, fuel usage	Equal sharing, packing items	Length, weight, capacity	Leap years & time

12. KEY TAKEAWAYS

- ✅ Decimals extend our place value system.
- ✅ Understand place value → do the operations with ease.
- ✅ Rules for decimals are natural extensions of whole number rules.
- ✅ Practice, observe patterns, and check your answers!

REMEMBER! Understand → Practice → Observe patterns → Apply in real life → Excel in Maths!

Another Peek Beyond The Point

Learning Outcomes:

LO1: Conceptual Understanding and Recapitulation
LO2: Multiplying Decimal and Developing a clear understanding of dividing a decimal.
LO3: Utilizing the Place Value / Long Division Method to find quotients with decimal values by systematically
LO4: Handling Decimal Divisors by converting them into counting numbers
LO5: Develop curiosity and mathematical thinking.

Competencies:

C1: Operational Competencies
C2: Exposure to Mathematical Conjectures.
C3: Critical Thinking and Mathematical Inquiry
C4: Real-World Application Fluency

Q.No	Question	LO	Competency
	MCQs (One Mark Each)		
1	In the decimal number 27.53, what mathematical place value does the digit 3 represent? A. Thousandths B Tenths C. Hundredths D. Tens	LO1	C1 C2
2	Jonali buys 25 g of Cardamom. How is this quantity expressed in kilograms as a decimal? A. 0.0025 kg B. 0.025kg C. 0.25 kg D. 2.5 kg	LO1 LO4	C1 C4
3	When multiplying a counting number by a decimal strictly between 0 and 1 (such as 0.4), what happens to the product compared to the original counting number? A.The product is always smaller than the counting number. B.The product remains exactly equal to the counting number. C.The product becomes negative. D.The product is always greater than the counting number.	LO2 LO5	C1 C2 C3
4	What is the correct value of the multiplication expression: 0.3×0.04? A 1.2 B. 0.12 C. 0.012 D. 0.0012	LO2 LO4	C2 C3
5	If you divide a decimal number by 100, what is the procedural rule for moving the decimal point A Shift the decimal point one place to the left. B. Shift the decimal point two places to the right. C. The decimal point remains in the same position. D. Shift the decimal point two places to the left.	LO3 LO4	C1 C3
6	Solve the division problem: $31.5\div1000$. A. 3.15 B. 0.0315 C. 31500 D. 0.315	LO3	C1 C2
7	When dividing a decimal using the Place Value / Long Division Method, what trigger indicates it is time to place a decimal point in the quotient? A. When the entire division process is complete. B. When you bring down the first non-zero digit. C. When you regroup the remaining Ones into Tenths. D. Whenever a remainder of 0 is reached	LO3 LO4	C1 C3

8	What is the primary first step recommended when solving a division problem with a decimal divisor, such as 7.2÷0.12? A. Subtract the divisor from the dividend repeatedly. B.Ignore the decimals and perform regular division, adding the decimal point back randomly. C.Round both numbers to the nearest whole integer before dividing. D. Convert the divisor into a counting (whole) number by multiplying both the dividend and divisor by an appropriate power of 10.	LO3 LO4	C1 C2
9	Which of the following fractions results in a non-terminating, recurring decimal quotient where the division process never ends? A .1/4 B. 10/3 C. 1/2 D. 1/5	LO3 LO4	C2 C3
10	The fraction 1/7 produces a famous cyclic recurring decimal string. Which 6-digit 'magic number' pattern repeats infinitely in its quotient? A. 142857 B. 123456 C. 111111 D. 999999	LO3 LO4	C1 C3
Short Answer Type (Two Marks Each)			
11	Find the product of 4.23 × 3.7	LO2	C1
12	The cost of 1 kg of oranges is ₹56.50. Find the price of 2.25 kg of oranges.	LO2	C2
13	Find the quotient: 2.46 ÷ 1.5	LO3 LO4	C1 C2
14	Given that 18 ×12 = 216, write down the answers for: (a) 0.18 ×1.2 (b) 0.018 × 0.012	LO3	C2
15	Find the quotient of 0.06 ÷ 5 using the place value long division method.	LO4	C1
16	Anuja has a ribbon of length 3.9 m. She cuts it into 10 equal pieces. What is the length of each piece?	LO2	C4
17	Thejus needs 1.65 m of cloth for a single shirt. How many metres of cloth will he need to make 3 such shirts?	LO2	C4
18	Meenu bought 4 notebooks at ₹15.50 each and 3 erasers at ₹2.75 each. How much did she spend in all?	LO5	C4
19	Solve 1325÷ 4 using the place value long division method.	LO3	C2
20	Fill in the missing answers by applying the decimal shift rules for multiplication: (a) 23.02 × 100 (b) 0.306 × 1000	LO2	C3
Short Answer Type (Three Marks Each)			
21	A car travels 12.5 km per litre of petrol. Find the total distance covered by the car if it consumes 7.5 litres of petrol.	LO5	C4
22	If you are given that 596 ×248 = 147808, explain the rule used to find the product of 5.96 ×24.8 and state the final decimal product	LO2	C2
23	The thickness of a single rupee coin is 1.45 mm What will be the total height of a cylinder formed by stacking 36 such rupee coins one over the other? Express your final answer in centimeters.	LO3	C4
24	Dwarakanath purchases notebooks at a wholesale price of ₹23.6 per piece and sells each of them for ₹30. Calculate the total profit he generates if he manages to sell 50 notebooks in a week.	LO5	C4

25	Meenu goes to a shop and buys 4 notebooks along with 3 erasers. If every notebook costs ₹15.50 and each eraser costs ₹2.75, calculate the net amount of money she spent.	LO3	C3
Long Answer Type (Five Marks Each)			
26	Using the long division place value method, divide 17 by 8 (17 ÷ 8). Write a step-by-step explanation showing how remainders are regrouped into Tenths, Hundredths, and Thousandths until the division terminates.	LO4	C2
27	A heavy-duty factory machine requires 0.35 litres of lubricant oil to run smoothly for exactly 1 hour. The factory supervisor orders a large container holding 14 litres of lubricant oil.	LO5	C4
28	A school playground is in the shape of a rectangle with a length of 35.4 m and a width of 12.5 m. The school management wants to cover the entire playground with artificial grass turf. If the turf costs ₹120.50 per square metre, calculate: • The total surface area of the playground. • The total cost required to turf the entire ground.	LO5	C4
Case Study Based Questions			
29	Jonali's Spice Market Purchases Context: Jonali goes to the local market to buy essential spices for a family gathering. She carefully weighs and purchases four items: 50 g of Cinnamon, 100 g of Cumin seeds, 25g of Cardamom, and 250g of Pepper. Her friend Pallabi challenges her to mathematically analyze her shopping bag using decimal kilograms. 1.Express the quantity of Cardamom that Jonali bought in terms of regular fractions as well as decimal kilograms (kg). 2. What is the total combined mass of Cinnamon and Cumin seeds in decimals (kg)? 3.If the market vendor sells Pepper at a fixed price of ₹320 per kilogram, calculate the exact amount of money Jonali spent on Pepper alone.	LO1 LO5	C1 C2 C4
30	Ajay's Weekly Walk Routine Context: The strict distance between Ajay's residential home and his school campus measures exactly 827 m. To maintain good health and save energy, he walks to school every single morning and returns home on foot in the evening. He follows this discipline 6 days a week (Monday through Saturday). Questions: 1.Convert the single-way distance from Ajay's home to his school from metres directly into kilometres (km). 2.Calculate the total net distance in kilometres that Ajay covers on foot in a single day. 3.Suppose a special school assembly requires him to make an extra round trip on Sunday. Calculate his total new weekly walking distance.	LO1 LO2 LO5	C1 C3 C4

Answers:

Q.	1	2	3	4	5	6	7	8
Ans.	C	B	A	B	D	B	C	D
Q.	9	10	11	12	13	14	15	16
Ans.	B	A	15.651	127.125	1.64	0.216 0.000216	0.012	0.39m
Q.	17	18	19	20	21	22	23	24
Ans.	4.95m	70.25	331.25	a 2302 b 306	93.75	147.808	5.22 cm	320
Q.	25	26	27	28	29	30		
Ans.	53.75	2.125	40	a 442.5 b 53,321.25	1)0.025g 2) 0.15kg 3)80 rs.	1)0.827km. 2) 1.654km. 3) 11.578km.		

Challenging Questions (Stage 1)

Without doing any long-form calculation, analyze the following pairs of numbers. State whether their product will be greater than both numbers, less than both numbers, or lying strictly between them.

Q.1. 0.4×0.7

Q.2. 5.2×3.6

Q.3. 0.6×8.5

Q.4. 1.5×0.5

Q.5. 2.5×0.3

Challenging Questions (Stage 2)

You are given a known factual product: 596 X248 = 147,808. Using only this fact, mentally calculate the answers to the following variations. Show your decimal place-value tracking.

Q.1. 5.96×24.8

Q.2. 0.0596×2.48

Q.3. $147.808 \div 0.248$

Q.4. $147.808 \div 0.596$

Q.5. 5.96×0.0248

Challenging Questions (Stage 3)

Q.1.Convert the fractional summation $0.2 + 0.05 + 0.004$ into a single combined standard decimal.

Q.2. If $596 \times 248 = 147808$, determine the exact product of 5.96×24.8 directly by using the decimal placement rule.

Q.3.Calculate the exact value of 12.345×1000 by applying the decimal shift technique.

Q.4.Find the decimal quotient of $1325 \div 4$ using place-value regrouping.

Q.5.Evaluate $4.68 \div 0.13$ by transforming the decimal divisor into a whole counting number.

Answers (Challenging Questions)

	Q.1	Q.2	Q.3	Q.4	Q.5
Stage 1/Ans	Less than the product	Less than the product	Lying between them	Lying between them	Lying between them
Stage 2/Ans	147.808	0.147808	596	248	0.147808
Stage 3/Ans	0.254	147.808	12345	331.25	36

5 CONNECTING THE DOTS...

Statistics helps us understand data and make sensible conclusions.

In this chapter

Math Talk

Discuss, think, and share your ideas using data around you!

Scan to Learn More!

1. STATISTICAL QUESTIONS & STATEMENTS

A **statistical statement** is a claim or summary about some phenomenon, expressed in terms of numbers, proportions, probabilities or predictions.

A **statistical question** is a question that can be answered by collecting and analysing data.

Examples of Statistical Statements

- Jemimah's batting has been very consistent over the past year.
- I take about 15 minutes to cycle from school to home.
- The population of their village has reduced by about 100 in the last decade.
- Since I started to eat fruits & vegetables more frequently, I can run 2 km more each day.
- David spends about 7 hours daily in the school.

Examples of Statistical Questions

- How tall are Grade 7 students in our school?
- Typically, are onions costlier in Yahapur or Wahapur?
- How old are the dogs that live on this street?
- What fraction of students in your class like walking up a hill?
- What was the rainfall pattern in Barmer last year?

2. REPRESENTATIVE VALUES – THE MEAN (AVERAGE)

To compare a group of numbers, we can use one number that represents the group. The most commonly used representative value is the **AVERAGE** or **ARITHMETIC MEAN (A.M.)**.

Formula

$$\text{Mean} = \frac{\text{Sum of all the values in the data}}{\text{Number of values in the data}}$$

It balances out high and low values and shows the typical or fair-share value.

Example:

Runs scored in a cricket series

Player	M1	M2	M3	M4	M5	Total	Matches	Mean (Avg. runs)
Shubman	23	07	10	52	18	110	5	$110 \div 5 = 21$
Yashasvi	26	53	02	–	15	96	4	$96 \div 4 = 24$

Conclusion: Yashasvi performed better in this series (average runs 24 > 21).

Average as Fair-Share

Shreyas' friends collected: 3, 8, 10, 5, 4 (Total = 30) → Mean = $30 \div 5 = 6$

Parag's friends collected: 5, 7, 9, 3, 6, 10 (Total = 40) → Mean = $40 \div 6 \approx 6.67$

On average, each of Parag's friends collected more guavas.

3. COLLECTING & ORGANISING DATA

Ways to Collect Data

- Surveys, interviews
- Observation
- Questionnaires
- Experiments
- Records

Types of Data

1. **Qualitative (Categorical):** Based on qualities or categories. Example: Favourite fruit (mango, banana, apple)
2. **Quantitative (Numerical):** Based on numbers. Example: Height, marks, number of books

Organising Data

- **Tally Marks:** |||| = 5 (helps in counting)
- **Frequency Table:** Shows how many times each value occurs.

Example: Favourite Colour of Students

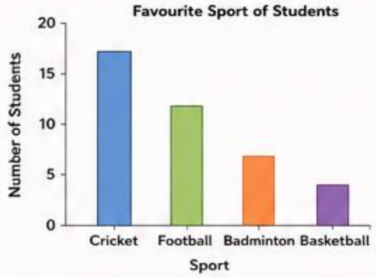
Colour	Tally Marks	Frequency
Blue	~~||||~~ |||	8
Green	~~||||~~ ||	7
Red	||||	4
Yellow	||	2
Total	~~||||~~ ~~||||~~ ||	21

Always write labels, titles, units and source of data.

4. BAR GRAPHS

- Used to compare quantities using rectangular bars.
- Bars can be vertical or horizontal.
- Bars are of equal width and have gaps between them.

Example: Favourite Sport



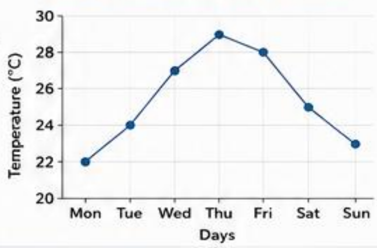
How to Read?

- More height → more quantity.
- Read the scale before comparing.

5. LINE GRAPHS

- Used to show how a quantity changes over time.
- Points are plotted and joined by straight lines.
- Useful for showing trends.

Example: Temperature of a City ina Week



How to Read?

- Each point shows value at a time.
- Upward line → increase.
- Downward line → decrease.
- Flat line → no change.

6. INTERPRETING GRAPHS & DATA

Steps to Interpret

1. Read the title of the graph.
2. Check the labels and units.
3. Understand the scale.
4. Compare values carefully.
5. Draw conclusions or predictions.

Example 1: Bar Graph

From the Favourite Sport graph:

- Most students like Cricket.
- Least students like Basketball.
- Football is more popular than Badminton.

Example 2: Line Graph

From the Temperature graph:

- Temperature increases till Thursday.
- Highest on Thursday (29°C).
- Then it decreases till Sunday.

Real-Life Use

- Weather forecasting
- Sports performance
- Population & census
- Business & sales trends
- Health & fitness tracking

KEY DEFINITIONS

- **Statistical Statement:** A claim or summary about data.
- **Statistical Question:** A question that can be answered using data.
- **Mean (Average):** Sum of all values ÷ Number of values.
- **Qualitative Data:** Based on qualities or categories.
- **Quantitative Data:** Based on numerical values.

IMPORTANT FORMULAS

- **Mean (Average):**

$$\text{Mean} = \frac{\text{Sum of all values in data}}{\text{Number of values in data}}$$

- **Total (Sum):** Add all the values.
- **Frequency:** Number of times a value occurs.
- **Range:** Highest value − Lowest value.

KEY TAKEAWAYS

- ✓ Statistics helps us make sense of data.
- ✓ Average (Mean) gives a fair picture.
- ✓ Organise data using tables for clarity.
- ✓ Bar graphs compare quantities.
- ✓ Line graphs show changes over time.
- ✓ Always read graphs carefully before drawing conclusions.

THINK & DISCUSS

- Find data around you (e.g., heights, marks, time taken).
- Organise it in a table.
- Find the mean.
- Draw bar or line graph.
- What patterns do you observe?

CONNECTING THE DOTS

Learning Outcomes:

LO1: Organize and interpret data.

LO2: Read and create graphical representations.

LO3: Identify relationships and patterns from data.

LO4: Plot and interpret points on simple coordinate grids.

LO5: Draw conclusions based on observations.

Competencies:

C1: Data interpretation and representation

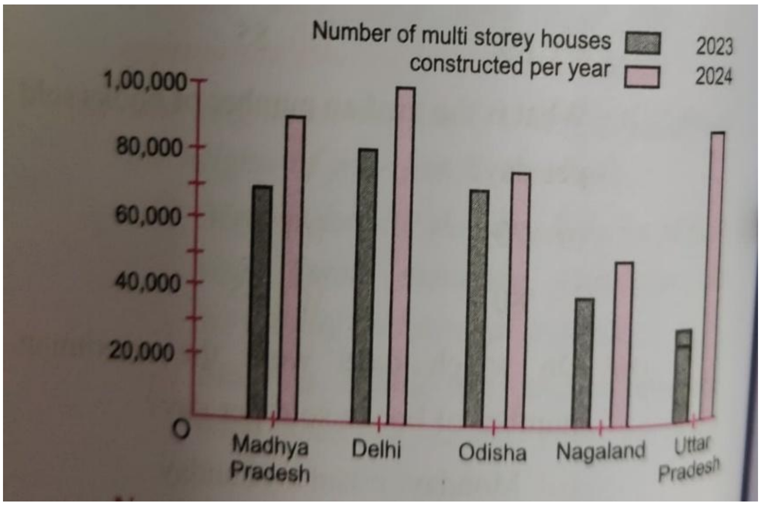
C2: Pattern recognition

C3: Logical reasoning

C4: Coordinate understanding

Q.No	Question	LO	Competency
	MCQs (One Mark Each)		
1	The mean of 4,6 and 8 is a)5 b) 6 c) 7 d) 8		
2	The median of 3, 5, 7, 9 and 11 is a)5 b) 7 c) 9 d) 11		
3	The mean of 5, 5, 5, 5 is a)0 b) 5 c) 10 d) 20		
4	Before finding the median, the data should be arranged a)Randomly b) In ascending or descending order c)In a circle d) In pairs only		
5	To find the the mean of a set of numbers, we a)Multiply all numbers b) Add all numbers and divide by the number of observations c) Find the middle number d) Find the largest number		
6	A data shows : 1,2,3,4,10. Which statement is correct ? a)Mean=Median b) Mean >Median c) Mean =10 d) Mean <Median		
7	A dot plot is used to : a)Draw maps b) Show data using dots c) Measure angles d) Find area		
8	If three dots are stacked above the number 8, it means a)8 occurs once b) 8 occurs twice c) 8 occurs three times d) 8 occurs eight times		

9	Which of the following is easiest to identify from a dot plot? a)Frequency of values b) Area of figure c) Volume of cube d) Perimeter of a rectangle		
10	The value that appears most often in a dot plot is called the a)Range b) Mode c) Mean d) Median		
Short Answer Type (Two Marks Each)			
	MONTH JAN FEB MAR APR BOYS 20 30 25 40 GIRLS 25 20 35 30 Use the above data and answer the following questions		
11	In which month did girls score the highest?		
12	In which month did boys score the highest?		
13	What is the difference between boys' and girls' scores in January?		
14	In which month did boys score more than girls by the greatest amount?		
15	What is the total score of boys in all four months?		
16	What is the total score of girls in all four months?		
17	In which month is the difference between boys' and girls' scores the greatest?		
18	A double bar graph is used to: A) Show only one set of data B) Compare two sets of data C) Find averages D) Draw circles		
19	How many bars are drawn for each category in a double bar graph?		
20	In March, by how much did girls score more than boys?		
Short Answer Type (Three Marks Each)			
	SPORT CRICKET FOOTBALL BADMINTON BASKETBALL BOYS 30 25 20 15 GIRLS 20 15 35 25		
21	If 5 more girls join Football, what will be the new number of girls who prefer Football		
22	If 10 boys shift from Cricket to Basketball, which sport will become most popular among boys?		
23	Which sport shows the greatest gender preference difference? Explain.		
24	If one student is selected at random from the students who prefer Basketball, is it more likely to be a boy or a girl?		
25	Suggest one reason why a double bar graph is more useful than a single bar graph for this data		

	Long Answer Type (Five Marks Each)		
26	The number of vegetables in some baskets are 15, 15, 18, 14,22,18,15, 19,17.Mark the data, the mean and the median on the dot plot.		
27	The weights (in kg) of 7 students in a class are 42,45,38,49,52,40,44 .Find the mean and median of these weights.		
28	The weights of some sumo wrestlers and ballet dancers are Sumo wrestlers:290 kg, 250kg,234.2kg, 220.3kg,200.6kg. ballet dancers:40.1kg, 38.6kg,32.5kg,42.8kg,48.5kg,45.6kg Approximately how many times heavier is a sumo wrestler compared to a ballet dancer?		
	Case Study Based Questions		
29	A teacher recorded the number of story books read by 10 students during a month .The data are shown in the dot plot below. Number of Books 1 2 3 4 5 Dot Plot . .. …. .. . This represent the data 1,2,2,3,3,3,3,4,4,5 i)How many students are represented in the dot plot ? ii)How many students read three books? iii)Which number of books was read by the greatest number of students? iv)Find the mode of the data ?		
30	The following bar graph shows the number of multi storey houses constructed in some states every year from 2023 to 2024  i)Approximately how many more new construction did Odisha get in 2024 as compared to 2023. ii)How many times more did the construction in Uttar Pradesh increase from 2023 to 2024? iii) How much more did the construction in Delhi increase from 2023 to 2024?		

ANSWERS

Q.	1	2	3	4	5	6	7	8
Ans.	b	b	b	b	b	b	b	c
Q.	9	10	11	12	13	14	15	16
Ans.	a	b	March	April	Five	Feb, Apr	115	110
Q.	17	18	19	20	21	22	23	24
Ans.	Feb, Mar, Apr	b	Two	10	20	Football &Basketball	Badminton	Girl
Q.	25	26	27	28	29	30		
Ans.					10, 4, 3, 3	500, 3, 20000		

CHALLENGING QUESTIONS

1.If every value in a data set is increased by 5 how will mean and median change

2.A dot plot shows that most values are clustered around 20, but one value is 100.Which measure (mean or median) better represent the data ? Why ?

3.A double bar graph shows that more students watch cricket than play cricket .Can we conclude that cricket is the most popular sport? Justify your answer

Answers Challenging Questions

Question	Answer
1	New Mean = Old Mean + 5 New Median = Old Median + 5
2	he median is the better measure because it is less affected by the outlier (100) and better represents the typical value of the data
3	No. The graph only compares the number of students who watch and play cricket. It does not compare cricket with other sports, so we cannot conclude that cricket is the most popular sport.

6 CHAPTER 6 : CONSTRUCTIONS AND TILINGS

SUMMARY OF CONCEPTS

1. STATISTICAL QUESTIONS & STATEMENTS

- A statistical statement is a claim/summary about some phenomenon, expressed in numbers (values, proportions, probabilities, or predictions).
- A statistical question is a question whose answer can be found by collecting data.

Examples

Statistical Statements

- Jemimah's batting has been consistent.
- I take about 15 minutes to cycle home.
- The population of their village has reduced by about 100 in a decade.
- I eat fruits & vegetables more frequently, so I can run 2 km more each day.
- David spends about 7 hours daily in school.

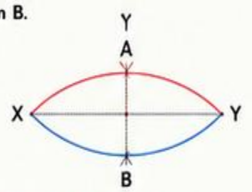
Statistical Questions

- How tall are Grade 7 students in our school?
- Are onions costlier in Yahapur or Wahapur?
- What fraction of students like walking up a hill?
- What was the rainfall pattern in Barmer last year?

2. GEOMETRIC CONSTRUCTIONS

(A) Eyes Construction (Grade 6 Recall)

- Draw a line XY (supporting line).
- From X and Y, draw arcs (same radius) above and below XY.
- Points of intersection of arcs give centres A (above) and B (below).
- Draw upper arc from A and lower arc from B.



(B) Perpendicular Bisector

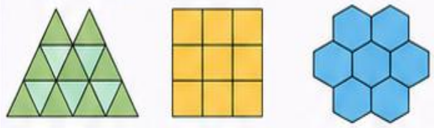
- Set of all points equidistant from X and Y lies on the perpendicular bisector of XY.
- Steps to construct:
  1. From X and Y, draw arcs above XY.
  2. From X and Y, draw arcs below XY (with same radius).
  3. Join the two intersection points (A and B). AB is the perpendicular bisector of XY.

3. TILINGS

- A tiling (or tessellation) is a pattern that covers a plane completely without any gaps or overlaps.
- Regular tilings use one kind of regular polygon.
- Semi-regular (Archimedean) tilings use two or more kinds of regular polygons.

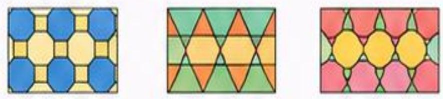
Examples

Regular Tilings



Equilateral Triangles (3.6.3.6) | Squares (4.4.4.4) | Regular Hexagons (6.6.6)

Semi-regular Tilings



(4.8.4.8) | (3.6.3.6) | (3.4.6.4)

(a.b.c.d) shows polygons around a vertex.

4. MULTIPLICATION OF DECIMALS

- Multiply as whole numbers.
- In the product, place the decimal point so that the number of decimal places = sum of decimal places in multiplier and multiplicand.

Example:

2.35 × 4.6

2.35 → 2 decimal places

× 4.6 → 1 decimal place

```
   235
 ×  46
  1410
  940
 10810
```

2 + 1 = 3 decimal places

10.810 → 10.81

Product Comparison

- Both > 1 → Product > both
- Both between 0 and 1 → Product < both
- One > 1 and other between 0 and 1 → Product is between the two

5. DIVISION BY 10, 100, 1000, ...

- Move the decimal point to the LEFT as many places as there are zeroes in the divisor.

÷ 10	÷ 100	÷ 1000
18.7	1.87	0.187
21.1	0.211	0.0211
2.146	0.02146	0.002146
0.306	0.0306	0.000306

6. DIVISION USING PLACE VALUE (LONG DIVISION)

- Same method as for whole numbers.
- After Ones, regroup to Tenths, Hundredths, Thousandths, ...
- Place the decimal point in the quotient when we start dividing the Tenths.
- Continue till remainder is 0 or desired accuracy.

1325 ÷ 4 = 331.25

```
4 ) 1325 (331.25
   -12        → Hundreds
    -12       → Tens
    -12       → Ones
     05
     -4
      10
      -8      → Tenths
       20
      -20     → Hundredths
        0
```

7. DIVISION WITH DECIMAL DIVISOR

- Make divisor a whole number by multiplying dividend and divisor by the same power of 10.
- Then divide using long division.

Example: 4.68 ÷ 0.13

$= 4.68 \div 0.13 \times \frac{100}{100} = \frac{468}{13}$

```
13 ) 468 (36
    -39
     78
    -78
      0
```

Rule

Multiply both dividend and divisor by the same power of 10 so that the divisor becomes a whole number.

8. RECURRING (NEVER ENDING) DECIMALS

- Some divisions never end.
- The remainders repeat in a cycle.
- The decimal digits also repeat in the same cycle.

10 ÷ 3 = 3.3333 ... (3 repeats)

1 ÷ 7 = 0.142857142857 ... (block 142857 repeats)

1 → 3 → 2 → 6 → 4 → 5 →

5 ← 4 ← 6 ← 2 ← 3 ← 1

9. LEAP YEAR (GREGORIAN CALENDAR)

- Earth takes 365.2422 days to go around the Sun.
- To keep the calendar in sync, we add extra days.

Year is:	Type of Year	Days
Divisible by 400	Leap year	366
Divisible by 100 but not by 400	Common year	365
Divisible by 4 but not by 100	Leap year	366
Otherwise	Common year	365

FEB 29

✓ This keeps our calendar in close sync with Earth's revolution.

10. KEY TAKEAWAYS

- Decimals extend our place value system.
- Multiplication & division of decimals follow simple rules based on place value.
- Division by 10, 100, 1000, ... → move decimal left.
- Long division works for decimals with regrouping.
- Some decimal divisions never end (recurring).
- Geometric constructions create accurate figures using compass & ruler.
- Tilings cover a plane without gaps or overlaps.
- Statistics helps us make sense of data around us.

REMEMBER! Understand the idea → Practice regularly → Observe patterns → Apply in real life → Excel in Maths!

CONSTRUCTIONS AND TILINGS

Learning Outcomes:

LO1: Use ruler, compass, and protractor accurately.

LO2: Construct basic geometric figures.

LO3: Use of mathematical instruments.

LO4: Geometric construction

Competencies:

C1: Explore tessellations in art and architecture.

C2: Visualization and design

C3: Creativity

Q.No	Question	LO	Competency
MCQs (One Mark Each)			
1	A point that is at equal distances from the two endpoints of a line segment always lies on its: (A) Angle bisector (B) Median (C) Perpendicular bisector (D) Transversal	LO2	C2
2	Which geometric construction can be used first to obtain a 45° angle using only a ruler and compass? (A) 30° (B) 60° (C) 90° (D) 120°	LO4	C2
3	A regular hexagon can be divided into: (A) 4 congruent equilateral triangles (B) 5 congruent equilateral triangles (C) 6 congruent equilateral triangles (D) 8 congruent equilateral triangles	LO2	C2
4	Covering a surface completely using shapes without gaps or overlaps is called: (A) Reflection (B) Tessellation (Tiling) (C) Rotation (D) Translation	LO4	C1
5	Which congruence criterion is mainly used in copying an angle using a ruler and compass? (A) RHS (B) SAS (C) SSS (D) ASA	LO2	C2
6	A student constructs a perpendicular bisector of a line segment. Another student marks a point on this bisector. Which statement must always be true? (A) The point is the midpoint of the segment. (B) The point is equidistant from both endpoints. (C) The point forms a right angle with one endpoint only. (D) The point lies on the original line segment.	LO4	C2
7	A floor measuring 8×9 unit squares is to be covered completely with 2×1 tiles. Which statement is correct? (A) It cannot be tiled because one dimension is odd. (B) It can be tiled because the total number of unit squares is even. (C) It cannot be tiled because 8 and 9 are consecutive numbers. (D) It can be tiled only if all tiles are placed vertically.	LO4	C1

8	A designer wants to create a flower pattern by drawing eight equal petals around a point. What should be the angle between two consecutive supporting lines? (A) 30° (B) 40° (C) 45° (D) 60°	LO4	C1 C2
9	Which of the following is the best reason for using a compass instead of a ruler while copying an angle? (A) It measures angles directly. (B) It helps preserve equal distances needed for congruent constructions. (C) It can draw only circles. (D) It replaces the need for straight lines.	LO1 LO2	C2
10	A honeycomb is made of hexagonal cells because hexagons: (A) have the greatest number of sides. (B) tile the plane efficiently without gaps and use space effectively. (C) are easier to draw than squares. (D) always have right angles.	LO4	C1 C2
Short Answer Type (Two Marks Each)			
11	Explain why any point that is equidistant from the endpoints of a line segment must lie on its perpendicular bisector. Give a suitable reason.	LO2	C2
12	Describe the steps to construct a 90° angle at a given point on a line using only a ruler and a compass.	LO2	C2
13	Explain how a 45° angle can be constructed using only a ruler and a compass.	LO2	C2
14	Why can a regular hexagon be divided into six congruent equilateral triangles? Explain using the angles around the centre.	LO1 LO2	C2
15	A 5×7 rectangular grid is to be tiled using 2×1 dominoes. Explain why it is not possible.	LO1 LO2	C2 C3
16	A student constructs the perpendicular bisector of a line segment AB. He marks three different points P, Q, and R on the bisector. What common property do these three points have with respect to A and B? Explain.	LO1 LO2	C2 C3
17	A square park has side 12 m. An architect wants to draw the two diagonals and construct the perpendicular bisector of one side. Which geometric tools are sufficient for the construction, and what geometric property will the bisector satisfy?	LO1 LO2	C2 C3
18	A floor measuring 8×10 unit squares has to be covered completely with 2×1 tiles. Explain whether the floor can always be tiled. Give one possible strategy.	LO1 LO2	C2 C3
19	A designer wants to create a decorative pattern with 16 identical petals around a centre. What should be the angle between two adjacent supporting lines? Explain how this angle can be obtained using angle bisection.	LO1 LO2 LO4	C2 C3
20	Honeycombs are made of hexagonal cells rather than square or pentagonal cells. Using the idea of tiling, explain one mathematical reason why hexagons are suitable for this purpose.	LO1 LO2 LO4	C2 C3
Short Answer Type (Three Marks Each)			
21	Draw a line segment AB = 8 cm. Construct its perpendicular bisector using a ruler and a compass. State two properties of the perpendicular bisector obtained.	LO1 LO2 LO4	C2
22	Construct a regular hexagon of side 4 cm using a ruler and a compass. Explain why each interior angle of the hexagon is 120°.	LO1 LO2	C2 C3
23	A school wants to make a hexagonal flower bed with each side measuring 3 m. Explain how the gardener can construct the boundary	LO1 LO2	C2 C3

	using only a rope (or compass) and a ruler. Why is a regular hexagon suitable for this design?	LO4	
24	A rectangular hall is represented by an 8 × 9 grid. It has to be covered completely using 2 × 1 tiles. 1. Is complete tiling possible? Give a reason. 2. Suggest one general strategy for tiling if it is possible.	LO1 LO2 LO4	C2 C3
25	A designer wishes to create a decorative floor pattern consisting of 16 identical petals arranged equally around a centre. 1. Find the angle between two consecutive petals. 2. Explain how this angle can be constructed using repeated angle bisection starting from a right angle.	LO1 LO2 LO4	C2 C3
	Long Answer Type (Five Marks Each)		
26	Draw a line segment AB = 8 cm.Using only a ruler and a compass: 1. Construct the perpendicular bisector of AB. 2. Mark the point where it intersects AB as O. 3. Explain why O is the midpoint of AB. 4. State two properties of the perpendicular bisector.	LO1 LO2 LO3	C2
27	A school is designing a logo in the shape of a regular hexagon with each side measuring 4 cm. Answer the following: 1. Describe the construction of the regular hexagon using only a ruler and a compass. 2. Explain why the interior angle of each vertex is 120°. 3. If the logo is divided by joining the centre to all six vertices, how many congruent triangles are formed? Name the type of these triangles.	LO1 LO2 LO4	C2 C3
28	A community hall has a floor represented by an 8 × 11 rectangular grid. The floor is to be covered completely using 2 × 1 rectangular tiles. Answer the following: 1. Is it possible to tile the floor completely? Give a mathematical reason. 2. Suggest one suitable tiling strategy. 3. If one corner square is removed before tiling begins, will complete tiling still be possible? Justify your answer.	LO1 LO2 LO4	C2 C3
	Case Study Based Questions		
29	Designing a Community Park A town planner is designing a community park. A straight pathway AB is 16 m long. A fountain is to be placed at a point that is equidistant from both ends of the pathway. Another decorative pathway is to be built perpendicular to AB through the fountain. Around the fountain, six identical triangular flower beds are arranged to form a regular hexagonal garden. Answer the following questions: (i) Which geometric construction will help locate the position of the fountain accurately? (ii) Why is every point on the constructed line equidistant from A and B? (iii) What will be the angle between the decorative pathway and AB? (iv) If six congruent equilateral triangles are arranged around the fountain, what figure is formed?	LO1 LO2 LO3 LO4	C1 C2 C3
30	Tiling a School Activity Hall A school is renovating its activity hall. The floor measures 8 m × 9 m and is to be covered using 1 m × 2 m rectangular tiles. During renovation, one 1 m × 1 m square at a corner is reserved for a decorative plant and cannot be tiled.	LO1 LO2 LO3 LO4	C1 C2 C3

	Answer the following questions: (i) How many unit squares are there on the floor before removing the corner square? (ii) After removing one square, can the remaining region always be tiled completely with 2 × 1 tiles? Give a reason. (iii) Why must every 2 × 1 tile cover one black and one white square in a checkerboard colouring? (iv) State one condition under which a rectangular grid can always be tiled using 2 × 1 tiles.		

Answers:

Q.	1	2	3	4	5	6	7	8	9	10
Ans.	C	C	C	B	C	B	B	C	B	B

Q	Ans/Hint	Q	Ans/Hint
11	Every point on the perpendicular bisector is equidistant from the endpoints.	12	Mark equal distances on both sides of the point and construct the perpendicular bisector.
13	Construct a 90° angle first and then bisect it.	14	Six angles of 60° around the centre add up to 360°, forming six equilateral triangles.
15	The grid has 35 unit squares (odd), whereas each domino covers 2 squares.	16	PA=PB, QA=QB, RA=RB
17	Ruler and compass are sufficient; every point on the bisector is equidistant from the endpoints of the side.	18	Yes. Since 80 is even, cover each pair of rows or columns systematically with dominoes.
19	360°÷16=22.5°, Construct 90°, bisect to 45°, then bisect again to obtain 22.5°.	20	Hexagons tile the plane without gaps or overlaps while efficiently covering space, making them ideal for honeycombs.
21	Construction	22	Construction
23	Construction A regular hexagon provides symmetry and can be easily constructed using equal radii	24	Total squares = 8 × 9 = 72 (even). Tiling is possible because each domino covers two squares. One strategy: cover each column with vertical dominoes (or each row with horizontal dominoes)
25	Angle between petals = 360° ÷ 16 = 22.5°. Construct a 90° angle, bisect it to get 45°, then bisect 45° to obtain 22.5°.	29	i) perpendicular bisector of AB ii) By the property of the perpendicular bisector, every point on it is at the same distance from the two endpoints of the line segment. iii) 90° iv) regular hexagon
30	i)72 ii)71 is an odd number and each tile covers 2 squares, the remaining region cannot be tiled completely. iii)Adjacent squares in a checkerboard have opposite colours. Since a 2 × 1 tile always covers two adjacent squares, it must cover one black square and one white square. A rectangular grid can always be tiled using 2 × 1 tiles if it contains an even number of unit squares		

Challenging Questions (Stage 1)

1. A line segment **PQ** is 10 cm long. Without measuring its midpoint using a ruler, explain how you can locate the midpoint using only a ruler and a compass.

2. A point **R** is 6 cm from A and 6 cm from B. What can you conclude about the position of R?

3. You have constructed a **90° angle**. Which geometric construction will help you obtain a **45° angle**?

4. How many **60° angles** meet at the centre of a regular hexagon? What is their total measure?

5. an a **6 × 7** rectangular grid be completely tiled using **2 × 1** tiles? Give a reason.

Challenging Questions (Stage 2)

1. Without using a protractor, construct a **30° angle** using only a ruler and a compass. Name the constructions involved.

2. wo students construct perpendicular bisectors of the same line segment using different compass radii. Will they obtain different perpendicular bisectors? Justify.

3. A square floor has side 12 m. A designer wants to create an eight-petal pattern by drawing equal angles at the centre. Find the angle between two adjacent petals.

4. Can a **9 × 9** grid be tiled completely using **2 × 1** dominoes? Explain.

5. A regular hexagon has side length 5 cm. Without measuring any interior angle, determine its interior angle.

Challenging Questions (Stage 3)

1. A point **P** is equidistant from the three vertices of an equilateral triangle. Where is P located? Explain.

2. Can a **5 × 8** grid with one corner square removed always be tiled completely using **2 × 1** tiles? Justify.

3. A designer wants to divide a full circle into **24 equal sectors** using only repeated angle bisection after constructing a 90° angle. Is it possible? Explain.

4. A regular hexagon is divided by joining its centre to all six vertices. If each triangle has an area of **12 cm²**, find the area of the hexagon.

5. A floor is tiled using only **regular polygons**. Which of the following can tile the plane by themselves?

a) Regular Pentagon b) Regular Hexagon c) Equilateral Triangle d) Square . Explain your answer.

Answers (Challenging Questions)

Satge-1	
1	Construct the perpendicular bisector of PQ. The point where it intersects PQ is the midpoint.
2	R lies on the perpendicular bisector of AB.
3	construct the angle bisector of the 90° angle.
4	Six angles. $6 \times 60^\circ = 360^\circ$
5	Total squares=$6 \times 7 = 42$ Since 42 is even, complete tiling is possible.
Satge-2	
1	Construct a 60° angle (using an equilateral triangle), then bisect it to obtain 30°.
2	No. The perpendicular bisector of a line segment is unique. Changing the radius only changes the positions of the arc intersections, not the perpendicular bisector.
3	45^0
4	Total squares= $9 \times 9 = 81$ 81 is odd, whereas every domino covers 2 squares.Therefore, tiling is impossible.
5	Six equilateral triangles meet at the centre. Exterior angle= $360^\circ \div 6 = 60^\circ$, Interior angle=$180^\circ - 60^\circ = 120^\circ$
Satge-3	
1	P is the centre of the equilateral triangle (circumcentre, which also coincides with the centroid and incentre).
2	No. Originally $5 \times 8 = 40$, After removing one square, $40 - 1 = 39$ 39 is odd. Since each domino covers two squares, complete tiling is impossible.
3	Construction
4	72
5	The polygons that can tile the plane by themselves are: Square, Equilateral Triangle, Regular Hexagon A regular pentagon cannot tile the plane by itself

7 CHAPTER 7 : FINDING THE UNKNOWN

SUMMARY OF CONCEPTS

1. EQUATIONS – AN INTRODUCTION

- An equation is a statement of equality between two algebraic expressions.
- It has two sides:

Left Hand Side (LHS) = Right Hand Side (RHS)

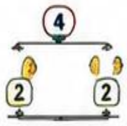
- Solving an equation means finding the value(s) of the unknown (letter-number) that make LHS = RHS true.

Examples of Equations

$3x + 4 = 7$ $20 = y - 3$ $\frac{a}{3} = 50$ $2z + 4 = 5z - 14$

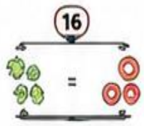
2. UNKNOWN WEIGHTS (BALANCED SCALE)

- The scale shows equal weights on both plates.
- Removing or adding equal weights on both plates keeps it balanced.



(Fig. 7.1)

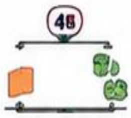
(Fig. 7.2)



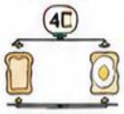
(Fig. 7.3)

(Fig. 7.4)

(Fig. 7.5)



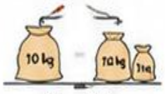
(Fig. 7.6)



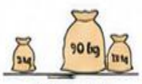
(Fig. 7.7)


(Fig. 7.8)

(Fig. 7.9)



(Fig. 7.10)



(Fig. 7.11)

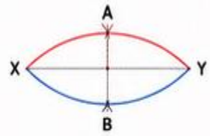
(Fig. 7.12)

Write equations using a letter for the unknown weight and solve.
Hint: Remove the same weight from both sides to isolate the unknown.

3. GEOMETRIC CONSTRUCTIONS

A. EYES CONSTRUCTION (RECAP)

1. Draw a line XY (supporting line).
2. From X and Y, draw arcs above and below XY with the same radius.
3. Mark the intersection points as A (above) and B (below).
4. Draw arcs from A (upper) and B (lower) to meet at X and Y.



B. PERPENDICULAR BISECTOR

- AB is the perpendicular bisector of XY.
- Any point equidistant from X and Y lies on the perpendicular bisector of XY.

Construction Steps

1. From X and Y, draw arcs above XY.
2. From X and Y, draw arcs below XY (same radius).
3. Join the intersection points A and B. AB is the perpendicular bisector.

4. REPRESENTATIVE VALUE – AVERAGE (MEAN)

- A single number that represents a collection of data is called a representative value.
- The most common representative value is the Average (Arithmetic Mean).

Formula

$$\text{Mean} = \frac{\text{Sum of all the values}}{\text{Number of values}}$$

Example (Runs scored in a series)

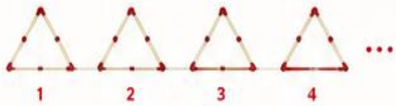
Player	M1	M2	M3	M4	M5	Total	Matches	Mean
Shubman	23	7	10	52	18	110	5	21
Yashasvi	26	53	2	-	15	96	4	24

Yashasvi's average (24) is higher than Shubman's (21).

Average as Fair-Share

When a total is shared equally among n people, each share = Total ÷ n (this is the mean).

5. MATCHSTICK PATTERN & EQUATIONS



- Number of matchsticks in position $n = 2n + 1$
- To find the position with 99 matchsticks:

$2n + 1 = 99 \rightarrow 2n = 98 \rightarrow n = 49$

Position number = 49

Key Idea

Use an equation with an unknown (letter) to represent the situation and solve for it.

6. PROPERTIES OF EQUALITY

- If the same number or expression is added, subtracted, multipiled or divided on both sides of an equation, the equality remains true.

Operation on Both Sides	Example
Add	$15 + 8 = 23 \rightarrow 15 + 8 + 10 = 23 + 10$
Subtract	$15 + 8 = 23 \rightarrow 15 + 8 - 5 = 23 - 5$
Multiply	$15 + 8 = 23 \rightarrow (15 + 8) \times 2 = 23 \times 2$
Divide	$15 + 8 = 23 \rightarrow (15 + 8) \div 5 = 23 \div 5$

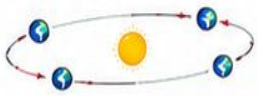
Use this idea to solve equations systematically.

7. SOLVING EQUATIONS – BASIC STEPS

1. Simplify both sides of the equation.
2. Use properties of equality to isolate the unknown.
3. Perform operations step by step on both sides.
4. Check the solution by substituting it in the equation.

8. LEAP YEAR & GREGORIAN CALENDAR

Earth takes 365.2422 days to go around the Sun. Our calendar uses 365 or 366 days.



Gregerian Calendar Rules

1. If year is divisible by 400 → Leap year (366 days)
2. Else if divisible by 100 → Common year (365 days)
3. Else if divisible by 4 → Leap year (366 days)
4. Otherwise → Common year

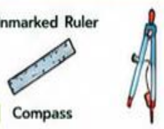
These rules keep our calendar in sync with Earth's revolution around the Sun.

9. KEY DEFINITIONS

- **Equation:** An equality of two expressions.
- **Solution:** Value(s) that make LHS = RHS true.
- **Variable:** A letter used to denote an unknown.
- **Mean (Average):** Sum of values ÷ Number of values.
- **Perpendicular Bisector:** A line that divides a segment into two equal parts at right angles.

10. TOOLS FOR CONSTRUCTIONS

1. Unmarked Ruler
2. Compass



11. REAL LIFE APPLICATIONS

Balancing & Sharing | Patterns & Sequences | Planning Calendars | Data Analysis

12. KEY TAKEAWAYS

- Equations help us find unknown values.
- Properties of equality make solving easy.
- Average gives a fair comparison.
- Constructions use logic and tools.
- Maths connects with real life!

REMEMBER! Understand → Practice → Observe Patterns → Apply in Real Life → Excel in Maths!

FINDING THE UNKNOWN

Learning Outcomes:

LO1: Equation formulation

LO2: understanding Equality

LO3: Systematic problem solving

LO4: Analytical and logical thinking

LO5: Verification

Competencies:

C1: Variable recognition

C2: Balance method

C3: Inverse operation

C4: Transposition method

Q.No	Question	LO	Competency
MCQs (One Mark Each)			
1	The value of x in 5 x=20 is (a) 2 (b) 3 (c) 4 (d) 5	LO3 LO2	C4 C3
2	If $x/3$ +2=5, then x=……….. (a) 6 (b) 8 (c) 9 (d) 12	LO3 LO4	C3 C4
3	If 3 x-7=11, then x=…………… (a) 4 (b) 5 (c) 6 (d) 7	LO3 LO4	C3 C4
4	The solution of 2 x+9=19 is x=……….. (a) 3 (b) 4 (c) 5 (d) 6	LO3 LO4	C3 C4
5	The solution of 7 x-4=24 is x=……….. (a) 2 (b) 3 (c) 4 (d) 5	LO3 LO4	C3 C4
6	If 4 x-10=14, then x=………. (a) 4 (b) 5 (c) 6 (d) 7	LO3 LO4	C3 C4
7	The equation having x=9 as its solution is………. (a) 2 x+3=18 (b) 3 x=27 (c) x-4=3 (d) x+2=10	LO2	C3
8	If 3 x+5=2 x+11, then x=…………. (a) 4 (b) 5 (c) 6 (d) 7	LO2	C3 C4

9	Assertion (A): In the equation 6(p+3)=18 dividing both sides by 6 gives p+3=3. Reason (R): When a variable term is multiplied by a constant, we can divide both sides by that constant to isolate the variable.	LO2	C3 C4
10	Assertion (A): The solution of 8-4 x=2(x-3)-(x-5) is x=3. Reason (R): When we move a variable term from one side of an equation to the other, its sign changes.	LO2	C3 C4
Short Answer Type (Two Marks Each)			
11	A pen costs ₹ 15 more than a pencil. If 3 pens and 2 pencils cost ₹ 150, find the cost of each.	LO1 LO4	C1 C2
12	A father is 5 times as old as his son. After 18 years, he will be twice as old as his son. Find their present ages.	LO1 LO4	C1 C2
13	Solve the following equation: 6 y+7=4 y+21.	LO2,	C2 C2 C4
14	The sum of a number and its double is 72. Find the number.	LO1	C1 C2
15	The difference between two numbers is 25. If the larger number is twice the smaller, find both numbers.	LO1	C1 C2
16	In the “think-a-number” trick (subtract 3, multiply by 4, add 8) problem from the chapter, if the final revealed answer is 32 , what was the original number?	LO1 LO2	C1 C3
17	Why is it valid to subtract (or remove) equal weights (or objects) from both sides of a balanced scale when trying to find an unknown?	LO2	C2
18	If you have the equation 7 x+28=175, find the value of x. Show the key steps.	LO2 LO3	C3 C4 C2
19	On the left plate there are 2 identical sacks and 3 kg weight; on the right plate, there are 1 sack and a 5 kg weight. If the scale balances, find the weight of one sack. Then interpret this result as if the sacks contained grains – what does your answer mean?	LO1 LO3	C2 C3
20	A pen costs ₹ 3 more than a pencil. Together, they cost ₹ 15. Find the cost of each.	LO1 LO3	C2 C3

	Short Answer Type (Three Marks Each)		
21	Ranju is a daily wage labourer. She earns ₹ 750 a day. Her employer pays her in 50 and 100-rupee notes. If Ranju gets an equal number of 50 and 100 rupee notes, how many notes of each does she have?	LO1 LO3	C2 C3
22	A taxi driver charges a fixed fee of ₹ 800 per day plus ₹ 20 for each kilometer traveled. If the total cost for a taxi ride is ₹ 2200, determine the number of kilometres traveled.	LO1 LO3	C2 C3
23	The sum of two numbers is 76. One number is three times the other number. What are the numbers?	LO1 LO3	C2 C3
24	The weight of a brick is 1kg more than half its weight. What is the weight of the brick?	LO1 LO3	C2 C3
25	The height of a giraffe is two and a half metres more than half its height. How tall is the giraffe?	LO1 LO3	C2 C3
	Long Answer Type (Five Marks Each)		
26	Leela is Radha's younger sister. Leela is 4 years younger than Radha. Can you write Leela's age in terms of Radha's age? Take Radha's age to be x year.	LO1 LO2	C1 C2
27	The sum of three number is 15. If the second number is subtracted from the sum of first and third number then we get 5 an if twice of first number is added to second and if the third number is subtracted from the sum we get 4.	LO1 LO2	C2 C1
28	The sum of the digits of a 2-digit number is 8. When 18 is added to the number, its digits are reversed. Find the number.	LO1 LO3	C2 C3
	Case Study Based Questions		
29	In the given picture, each black blob hides an equal number of blue dots. If there are 25 dots in total,  (a)how many dots are covered by one blob? (b)Write an equation to describe problem.	LO1 LO2 LO3 LO4 LO5	C2 C3

30	A class 7 math group is designing a rectangular vegetable garden for their school's environment club. The length of the garden is planned to be 3 meters more than twice its width. To prevent animals from entering, the club has exactly 46 meters of fencing available, which will be used to enclose the entire perimeter of the garden.  a)If the width of the garden is denoted by the variable x, write an equation for the length of the garden. b)Solve the equation to find the exact width and length of the garden.	LO1 LO2 LO3 LO4 LO5	C1 C3

ANSWERS

Q.	1	2	3	4	5	6	7	8
Ans.	c	c	c	c	c	c	b	c
Q.	9	10	11	12	13	14	15	16
Ans.	A	D	Pencil =₹ 21, Pen =₹ 36	Son's age =6 years and father's age =30 years	7	24	Smaller number =25, Larger number =50	9
Q.	17	18	19	20	21	22	23	24
Ans.		21	2	Pen =₹ 9 and pencil =₹ 6	5,5	80km	19,57	2kg
Q.	25	26	27	28	29	30		
Ans.	5m	X=4	A=3,b=5 ,c=7	35				

Challenging questions

1. In a restaurant, a fruit juice costs ₹ 15 less than a chocolate milkshake. If 4 fruit juices and 7 chocolate milkshakes cost ₹ 600, find the cost of the fruit juice and milkshake.
2. A rectangle has a length that is 3 meters longer than its width. If the perimeter is 30 meters, what are the dimensions (width and length) of the rectangle?
3. One quarter of a number increased by 9 gives the same number. What is the number?

Answer of Challenging Questions

Q	1	2	3
Ans	45,60	L=9,b=6	12