



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)

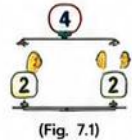
- Solving an equation means finding the value(s) of the unknown (letter-number) that make LHS = RHS true.

Examples of Equations

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

2. UNKNOWN WEIGHTS (BALANCED SCALE)

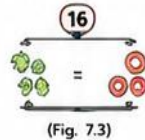
- The scale shows equal weights on both plates.
- Removing or adding equal weights on both plates keeps it balanced.



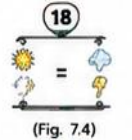
(Fig. 7.1)



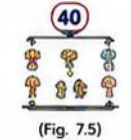
(Fig. 7.2)



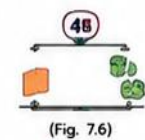
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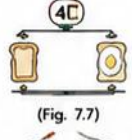
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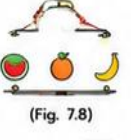
(Fig. 7.5)



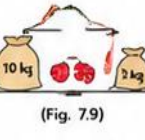
(Fig. 7.6)



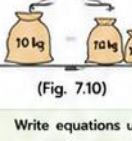
(Fig. 7.7)



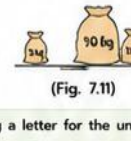
(Fig. 7.8)



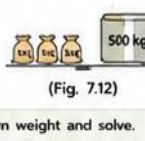
(Fig. 7.9)



(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.

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 $\div$ n (this is the mean).

7. SOLVING EQUATIONS – BASIC STEPS

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



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 $\div$ Number of values.
- Perpendicular Bisector:** A line that divides a segment into two equal parts at right angles.

10. TOOLS FOR CONSTRUCTIONS

- Unmarked Ruler
- 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

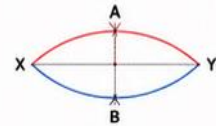
Excel in Maths!



3. GEOMETRIC CONSTRUCTIONS

A. EYES CONSTRUCTION (RECAP)

- Draw a line XY (supporting line).
- From X and Y, draw arcs above and below XY with the same radius.
- Mark the intersection points as A (above) and B (below).
- 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

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

6. PROPERTIES OF EQUALITY

- If the same number or expression is added, subtracted, multiplied 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.

8. LEAP YEAR & GREGORIAN CALENDAR

Earth takes 365.2422 days to go around the Sun.

Our calendar uses 365 or 366 days.



Gregorian Calendar Rules

- If year is divisible by 400 $\rightarrow$ Leap year (366 days)
- Else if divisible by 100 $\rightarrow$ Common year (365 days)
- Else if divisible by 4 $\rightarrow$ Leap year (366 days)
- Otherwise $\rightarrow$ Common year



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

MCQs (Part-2)(10 × 1 = 10 marks)

11. If $x - 7 = 12$, what is the value of x ?

- A) 5 B) 19 C) 14 D) -5

12. Which value of y satisfies the equation $4y = 28$?

- A) 6 B) 8 C) 7 D) 9

13. The algebraic statement for "3 more than twice a number p is 15" is:

- A) $3p + 2 = 15$ B) $2p + 3 = 15$ C) $2p - 3 = 15$ D) $3 + p = 15$

14. If $\frac{m}{5} = -3$, then the value of m is:

- A) -15 B) 15 C) -8 D) 2

15. The solution to the equation $2x + 5 = 5$ is:

- A) 5 B) 1 C) 0 D)

16. The sum of a number and **18** is **45**. Which equation correctly represents the situation?

- (a) $x - 18 = 45$ (b) $18 - x = 45$ (c) $x + 18 = 45$ (d) $18x = 45$

17. The length of a rectangle is **4 cm more than** its width. If the width is **w cm**, which expression represents the perimeter of the rectangle?

- (a) $2w + 4$ (b) $4w + 4$ (c) $2(w + w + 4)$ (d) $w + 4$

18. Which value of x satisfies the equation: $5x - 8 = 27$?

- (a) 5 (b) 6 (c) 7 (d) 8

19. A shopkeeper sells a notebook for **₹15 more** than a pencil. If the notebook costs **₹55**, what is the cost of the pencil?

- (a) ₹35 (b) ₹40 (c) ₹45 (d) ₹50

20. The sum of two consecutive integers is **51**. What is the smaller integer?

- (a) 24 (b) 25 (c) 26 (d) 27

WORKSHEET-2

Section B: Short Answer ($10 \times 2 = 20$ marks)

1. Solve the linear equation: $4x - 7 = 13$.

2. Find the unknown value z : $\frac{z}{3} + 2 = 7$.

3. Convert this word problem into an equation and solve: "Subtracting 8 from twice a number yields 14."

4. Check if $x = 3$ is the correct solution for the equation $5x - 2 = 13$.

5. Solve for the unknown variable: $2(x + 4) = 18$.

6. Find k if the algebraic expression $3k + 1.5 = 7.5$.

7. The width of a rectangle is w cm. Its length is 5 cm more than its width. Write an expression for the perimeter.

8. Solve for p : $-4p + 9 = -11$.

9. A notebook costs ₹25 more than a pen. If their total cost is ₹65, find the cost of the pen.

10. Solve the expression for y : $2y/5 = -6$.

Section C: Short Answer ($6 \times 3 = 18$ marks)

11. Solve the equation by isolating the variable step-by-step: $\frac{3n - 2}{5} = 5$.

12. The base angles of an isosceles triangle are equal. The vertical angle is 40° . Find the unknown base angles.

13. Raju's father's age is 5 years more than three times Raju's age. Find Raju's age if his father is 44 years old.

14. Solve for x: $3(2x - 1) + 4 = 25$.

15. Sum of two numbers is 95. If one exceeds the other by 15, find both the unknown numbers.

16. Solve the following equation: $0.5x + 1.2 = 3.7$.

Section D: Long Answer ($4 \times 5 = 20$ marks)

17. Solve the complex equation for the unknown variable x : $4(2x - 3) - 3(x + 5) = 8$

18. Shikha has some 2-rupee coins and 5-rupee coins in her bag. The number of 5-rupee coins is three times the number of 2-rupee coins. If the total money in her bag is ₹170, find the unknown number of coins of each type.

19. The length of a rectangular park is 7 metres less than twice its width. If the total perimeter of the park is 148 metres, find the unknown length and width of the park.

20. In a class of 42 students, the number of girls is $\frac{2}{5}$ of the number of boys. Find the unknown number of boys and girls in the class.

Case Study Based Questions ($2 \times 4 = 8$ marks)

21. The School Book Stall

To encourage reading, a school library sets a fixed charge for the first three days of borrowing a book, and an additional charge for each day thereafter. Aarav paid ₹27 for a book kept for seven days, while Anand paid ₹21 for a book kept for five days.

Let the fixed charge for the first 3 days be ₹ x and the additional charge per day be ₹ y .

1. Write down the linear equation representing Aarav's situation.
2. Write down the linear equation representing Anand's situation.
3. Find the unknown daily additional charge (y).
4. Find the unknown fixed charge (x).

22. Planting Trees for Environment Day

For World Environment Day, students of Class 7 decided to plant saplings around the school boundary. Section A planted a certain number of trees. Section B planted 12 more trees than Section A. Section C planted twice the number of trees planted by Section A. Together, all three sections planted a total of 112 trees.

Let the number of trees planted by Section A be the unknown variable t .

- Q1.** Write an algebraic expression for the trees planted by Section B and Section C in terms of t .
- Q2.** Formulate a complete equation representing the total trees planted.
- Q3.** Solve the equation to find how many trees Section A planted.
- Q4.** Determine how many trees were planted by Section B and Section C respectively.

Self Assessment:

I understood all concepts:

☐ Yes

☐ No

I need more practice

☐ Yes

☐ No

Name of Concepts having doubts/Not Cleared: _____

Parent's Assessment:

My ward understood the all the concepts

☐ Yes

☐ No

He/She need more practice

☐ Yes

☐ No

Name of Concepts having doubts/Not Cleared: _____

Signature of Parent:

Teacher's Assessment

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Answers of Worksheet-1:

Q.No.	1	2	3	4	5	6	7	8	9	10
Ans	b	a	c	d	b	b	c	b	a	c
Q.No.	11	12	13	14	15	16	17	18	19	20
Ans	b	c	b	a	c	c	c	c	b	c

Answers of Worksheet-2:

Q.No.	1	2	3	4	5	6	7	8
Ans	5	15	11	$X=3$	5	2	$4w+10$	5
Q.No.	9	10	11	12	13	14	15	16
Ans	20	-15	9	70^0	13yrs	$X=4$	$40\&55$	$X=5$
Q.No.	17	18	19	20	21		22	
Ans	$x=7$	10&30	$W=27, l=47$		$x+4y=27$ $x+2y=21$ $y=3$ $x=15$		$B:t+12, C:2t$ $T+(t+12)+2t=112$ $T=25$ $B:37, C:50$	