Introduction to Linear Equation

A. Challenge yourself with these questions:

- 1. Tell which of the following is a linear equation in one variable:
 - (a) $x^2 4x + 3 = 0$
 - (b) 6x 2y = 7
 - (c) 3x 1 = -2x
 - (d) pq 3 = p

B. Mark each sentence with a True (✔) or False (★):

- 1. A term may be transposed from one side of the equation to the other side but its sign will not change.
- 2. We cannot subtract the same number from both sides of an equation.
- 3. x = 1 is the solution of equation 4(x + 5) = 24

C. Fill in the blanks:

- 1. A linear equation in one variable can be written in the form ______.
- 2. The highest power of the variable in a linear equation is always ______.
- 3. In the equation 3x + 5 = 11, the constant term on the left-hand side is
- 4. To solve a linear equation, we perform _____ operations on both sides.
- 5. The graph of a linear equation in one variable is always a _____ line on the number line.

D. Different type questions:

- 1. Solve for x: 5(x 2) = 3(x + 4)
- 2. Find the value of 'k' if $\left(\frac{k}{2}\right) 3 = 7$
- 3. A number is increased by 7 and the result is 3 times the number. Find the number.
- 4. If $(\frac{2}{3})x (\frac{5}{2}) = (\frac{1}{6})x + (\frac{7}{2})$, find x.
- 5. If 3x + 2 = 2x + 9, find the value of 4x 5.

Common Terms

- A. Which of the two rational numbers in each of the following pairs of rational numbers is smaller?
 - (i) $\frac{-4}{3} \operatorname{or} \frac{-8}{7}$ (iv) $\frac{15}{(-5)} - 3$ (ii) $\frac{(-6)}{(-13)} \operatorname{or} \frac{7}{13}$ (v) $\frac{-1}{3} \operatorname{or} \frac{4}{5}$ (iii) $\frac{7}{-9} \operatorname{or} \frac{-5}{8}$ (vi) $\frac{(-4)}{3} \operatorname{or} \frac{8}{(-7)}$

B. Arrange the following rational number ascending order:

(i) $\frac{2}{3'}, \frac{5}{7'}, \frac{(-4)}{(-9)'}, \frac{1}{4}$

(ii)
$$\frac{4}{(-9)}, \frac{(-5)}{12}, \frac{7}{(-18)}, \frac{(-2)}{3}$$

(iii)
$$\frac{3}{5}, \frac{(-17)}{(-30)}, \frac{8}{(-15)}, \frac{(-7)}{10}$$

(iv)
$$\frac{(-3)}{4}, \frac{5}{(-12)}, \frac{(-7)}{16}, \frac{9}{(-24)}$$

C. Arrange the following rational number descending order:

(i)
$$-2 \frac{(-13)}{6} \frac{8}{(-3)} \frac{1}{3}$$

(ii) $\frac{(-3)}{(-5)} \frac{17}{30} \frac{(-8)}{15} \frac{7}{(-10)}$
(iii) $\frac{(-3)}{10} \frac{7}{(-15)} \frac{(-11)}{20} \frac{17}{(-30)}$
(iv) $\frac{7}{8} \frac{64}{16} \frac{36}{(-12)} \frac{5}{(-4)} \frac{140}{28}$

Linear Equation

- A. Figure out the answers to these questions:
 - 1. 2x + 3 = 152x + 3 = 15
 - 2. 4x 5 = 3x + 74x 5 = 3x + 7
 - 3. 12x + 4 = 10
 - 4. 34x 2 = 4
 - 5. 5(x-2) = 3x + 45(x-2) = 3x + 4

B. Challenge yourself with these questions:

- 1. The sum of a number and 8 is 20. Find the number.
- 2. If 4 times a number is increased by 5, the result is 25. Find the number.
- 3. A number divided by 3 gives 7. Find the number.
- 4. The perimeter of a rectangle is 60 cm. If the length is xx and the breadth is x 5x 5, form a linear equation and find the length.
- 5. A shopkeeper sells a pen for ₹(x + 5) and a notebook for ₹(2x 3). If the total cost is ₹42, find the cost of the pen.

C. Write the Missing Terms to Complete the Sentences:

- 1. A linear equation is said to have common terms if the same expression or variable appears on ______ sides of the equation.
- 2. To simplify an equation with common terms, we usually _____ or _____ the common terms from both sides.
- 3. In the equation x + 4 = x + 9x + 4 = x + 9, the common term is _____.
- Removing the common term from both sides of an equation does not change the ______ of the equation.
- 5. The equation 2x + 3 = 2x + 72x + 3 = 2x + 7 has no solution because the variable terms are the same but the ______ terms are different.
- 6. In the equation 3x 5 = x + 13x 5 = x + 1, subtracting xx from both sides helps eliminate the ______ term.

Solution of a Linear Equation

A. Solve the following equations and check your results.

(i) $3x = 2x + 18$	(ii) 5t – 3 = 3t – 5
(iii) 5x + 9 = 5 + 3x	(iv) 4z + 3 = 6 + 2z
(v) $2x - 1 = 14 - x$	(vi) 8x + 4 = 3 (x − 1) + 7

B. Solve the following equations:

(i) $3x + \frac{1}{2} = \frac{3}{8} + \frac{x}{4}$	(ii) $2x + 3(x - 1) = \frac{7}{2}$
(iii) $\left(\frac{5x}{2}\right) - \left(\frac{3x}{4}\right) = 7$	(iv) $2(x-3) = 4(x+1) - 8$
(v) $(\frac{x}{5}) + 7 = 3$	(vi) $\frac{2x-3}{5} = \frac{x+4}{3}$

C. Fill in the blanks:

- 1. To maintain equality while solving an equation, we add or subtract the ______ value on both sides.
- In a linear equation, if we multiply or divide both sides by the same non-zero number, the ______ remains true.
- 3. The solution of the equation 4x = 20 is x =_____.
- 4. When we transpose a term from one side of the equation to the other, its sign
- 5. An equation has ______ solution when it is a linear equation in one variable.

D. Miscellaneous questions:

- 1. A number exceeds its one-third by 20. Find the number.
- 2. Find x if $\left(\frac{x}{7}\right) + \left(\frac{2}{5}\right) = \left(\frac{4x}{35}\right) + \left(\frac{3}{5}\right)$
- 3. The sum of a number and its half is 36. Find the number.
- 4. Solve: 0.4(x-5) = 0.6(x+2)
- 5. A number when doubled and increased by 5 gives 29. Find the number.
- 6. If $\frac{3}{4}$ of a number is 15, what is the number?

Applications of Linear Equations to Practical Problems

A. Figure out the answers to these questions:

- 1. Saurabh has Rs 34 in form of 50 paise and twenty–five paise coins. If the number of 25–paise coins be twice the number of 50–paise coins, how many coins of each kind does he have?
- 2. Arvind has Piggy bank. It is full of one-rupee and fifty-paise coins. It contains 3 times as many fifty paise coins as one-rupee coins. The total amount of the money in the bank is j- 35. How many coins of each kind are there in the bank?
- 3. Kanwar is three years older than Anima. Six years ago, Kanwar's age was four times Anima's age. Find the ages of Knawar and Anima.
- 4. Hamid has three boxes of different fruits. Box A weighs $2\frac{1}{2}$ kg more than Box B and Box C weighs $10\frac{1}{4}$ kg more than Box B. The total weight of the boxes is $48\frac{3}{4}$ How many kg does Box A weigh?
- 5. The sum of two numbers is 45 and their ratio is 7 : 8. Find the numbers.

B. Challenge yourself with these questions:

- 1. Divide j-1380 among Ahmed, John and Babita so that the amount Ahmed receives is 5 times as much as Babita's share and is 3 times as much as John's share.
- 2. The length of a rectangle exceeds its breadth by 4 cm. If length and breadth are each increased by 3 cm, the area of the new rectangle will be 81 cm2 more than that of the given rectangle. Find the length and breadth of the given rectangle.
- 3. An altitude of a triangle is five-thirds the length of its corresponding base. If the altitude were increased by 4 cm and the base be decreased by 2 cm, the area of the triangle would remain the same. Find the base and the altitude of the triangle.
- 4. The perimeter of a rectangle is 13 cm and its width is $2\frac{3}{4}$ cm. Find its length.
- 5. The present age of Sahil's mother is three times the present age of Sahil. After 5 years their ages will add to 66 years. Find their present ages.