

## Grade VII

### Lesson :4 Simple Equations

#### Objective Type Questions

#### I. Multiple choice questions

- If sum of  $p$  and 4 is 15,  $p$  is :  
a) 10                      b) 9                      c) 11                      d) 0
- If  $x - \frac{3}{2} = \frac{1}{2}$  then  
a)  $x = 1$                       b)  $x = -1$                       c)  $x = 2$                       d)  $x = -2$
- Which of the following is the value of 'm' in the equation  $3m - 14 = 4$   
a) 4                      b) 5                      c) 6                      d) 7
- Which of the following is the solution of the equation  $2x - 3y = 1$   
a)  $x = 1, y = 1$                       b)  $x = 1, y = 2$                       c)  $x = 2, y = 1$                       d)  $x = -1, y = 2$
- The sum of three times a number and 11 is 32. Find the number?  
a) 6                      b) 7                      c) 10                      d) 21
- The sum of the ages of three persons is 50 year. What will be the sum of their ages after 5 years?  
a) 65                      b) 55                      c) 150                      d) 21
- Five times of a number minus 4 gives 6. Find which of the following is the number?  
a) 120                      b) 2                      c) 15                      d) 35
- The solution of the equation  $3x + 5 = 0$  is  
a)  $\frac{5}{3}$                       b) -5                      c)  $-\frac{5}{3}$                       d) 5
- 1 is not a solution of the equation [NCERT Exemplar]  
a)  $x + 1 = 0$                       b)  $x - 1 = 2$                       c)  $2y + 3 = 1$                       d)  $2p + 7 = 5$

10. Which of the equations can be formed using expression  $x = 5$

- a)  $2x + 3 = 13$       b)  $3x + 2 = 13$       c)  $x - 5 = 1$       d)  $4x - 9 = 21$

11. The solution of the equation  $ax = b = 0$  is

- a)  $\frac{a}{b}$       b)  $-b$       c)  $\frac{a}{b}$       d)  $\frac{b}{a}$

12. If  $a$  and  $b$  are positive integers, then the solution of the equation  $ax = b$  will always be a

- a) Positive Number      b) Negative number      c) 1      d) 0

13. Which of the following is not allowed in a given equation? [NCERT Exemplar]

- a) Adding the same number to both sides of the equation.  
b) Subtracting the same number from both sides of the equation.  
c) Multiplying the both sides of the equation by the same number  
d) Dividing both sides of the equation by the same number.

14. The solution of which of the following equations is a fraction not an integer?

- a)  $2x + 6 = 0$       b)  $3x - 6 = 0$       c)  $5x - 8 = x + 4$       d)  $4x + 7 = x + 2$

15. The equation which cannot be solved in integers is

- a)  $5y - 3 = -18$       b)  $3x - 9 = 0$       c)  $3z + 8 = 3 + z$       d)  $9y + 8 = 4y - 7$

16. If  $7x + 4 = 25$ , then  $x$  is equal to.

- a)  $\frac{29}{7}$       b)  $\frac{100}{7}$       c) 2      d) 3

17. The solution of the equation  $3x + 7 = -20$  is

- a)  $\frac{17}{7}$       b) -9      c) 9      d)  $\frac{13}{3}$

18. The value of  $y$  for which the expressions  $(y-15)$  and  $(2y+1)$  become equal is

- a) 0      b) 16      c) 8      d) -16

19. If  $k + 7 = 16$  then the value of  $8k - 72$  is

- a) 0      b) 1      c) 112      d) 56

20. If  $43m = 0.086$ , then the value of  $m$  is

- a) 0.002                      b) 0.02                      c) 0.2                      d) 2

21.  $x$  exceeds 3 by 7, can be represented as [NCERT Exemplar]

- a)  $x+3 = 2$                       b)  $x + 7 = 3$                       c)  $x-3 = 7$                       d)  $x - 7 = 3$

22. The equation having 5 as a solution is :

- a)  $4x + 1 = 2$                       b)  $3-x = 8$                       c)  $x - 5 = 3$                       d)  $3 + x = 8$

23. The equation having -3 as a solution is :

- a)  $x + 3 = 1$                       b)  $8 + 2x = 3$                       c)  $10 + 3x = 1$                       d)  $2x + 1 = 3$

24. Which of the following equation can be formed starting with  $x=0$ ?

- a)  $2x + 1 = -1$                       b)  $\frac{x}{2} + 5 = 7$                       c)  $3x-1 = -1$                       d)  $3x-1 = 1$

25. Which of the following equations cannot be formed using the equation  $x = 7$ ?

- a)  $2x + 1 = 15$                       b)  $7x-1 = 50$                       c)  $x - 3 = 4$                       d)  $\frac{x}{7} - 1 = 0$

26. If  $\frac{x}{2} = 3$ , then the value of  $3x + 2$  is

- a) 20                      b) 11                      c)  $\frac{13}{2}$                       d) 8

27. Which of the following numbers satisfy the equation  $-6 + x = 12$ ?

- a) 2                      b) 6                      c) -6                      d) -2

28. Shifting one term from one side of an equation to another side with a change of sign is known as

- a) Commutativity                      b) Transposition                      c) Distributivity                      d) Associativity

- |         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1. (c)  | 2. (c)  | 3. (c)  | 4. (c)  | 5. (b)  | 6. (a)  | 7. (b)  | 8. (c)  | 9. (b)  | 10. (a) |
| 11. (c) | 12. (a) | 13. (d) | 14. (d) | 15. (c) | 16. (d) | 17. (b) | 18. (d) | 19. (a) | 20. (a) |
| 21. (c) | 22. (d) | 23. (c) | 24. (c) | 25. (b) | 26. (a) | 27. (c) | 28. (b) |         |         |

## I. Fill in the Blanks

1. If  $Z + 3 = 5$ , then  $Z =$ \_\_\_\_\_.
2. \_\_\_\_\_ is the solution of the equation  $3x - 2 = 7$ .
3. \_\_\_\_\_ is the solution of  $3x + 10 = 7$ .
4. If  $2x + 3 = 5$  then value of  $3x = 2$  is \_\_\_\_\_.
5. In Integers,  $4x - 1 = 8$  has ..... solution.
6. In natural number  $4x + 5 = - 7$  has solution .
7. In natural number,  $x - 5 = -5$  has \_\_\_\_\_ solution.
8. In whole numbers  $x + 8 = 12 - 4$  has \_\_\_\_\_ solution.
9. If 5 is added to three times a number it becomes the same as 7 is subtracted from four times the same number. This fact can be represented as \_\_\_\_\_.
10.  $Cx + 7 = 10$  has the solution \_\_\_\_\_.
11.  $x - 0 =$  \_\_\_\_\_ when  $3x = 12$
12.  $x - 1 =$  \_\_\_\_\_ ; when  $2x = 2$
13.  $x -$  \_\_\_\_\_ = 15 when  $\frac{x}{2} = 6$
14. The solution of the equation  $x + 15 = 19$  is \_\_\_\_\_.
15. Finding the value of a variable in a linear equation that \_\_\_\_\_ the equation is called a \_\_\_\_\_ of the equation.
16. Any term of an equation may be transposed from one side of the equation to the other side of the equation by changing the \_\_\_\_\_ of the term.
17. If  $\frac{9}{5}x = \frac{18}{5}$ , then  $x =$ \_\_\_\_\_.
18. If  $3 - x = - 4$  then  $x =$ \_\_\_\_\_.
19. If  $x - \frac{1}{2} = -\frac{1}{2}$ , then  $x =$ \_\_\_\_\_.

20. If  $\frac{1}{6} - x = -\frac{1}{6}$ , then  $x =$  \_\_\_\_\_.

21. If 10 less than a number is 65. Then the number is \_\_\_\_\_

22. If a number is increased by 20, it becomes 45, Then the number is \_\_\_\_\_.

23. If 84 exceeds another number by 12 the other number is \_\_\_\_\_

24. If  $x - \frac{7}{8} = \frac{7}{8}$  then  $x =$  \_\_\_\_\_ Adderes.

ANSWERS		
1. 2	2. $x = 3$	3. $x = -1$
4. 5	5. No	6. No
7. No.	8. $x = 0$	9. $3x + 5 = -4x - 3$
10. $x = 3$	11. 4	12. 0
13. -3	14. $x = 4$	15. Satisfy, Solution
16. Sign	17. 2	18. 7
19. 0	20. 0	21. 75
22. 25	23. 72	24. $\frac{7}{4}$

### I. True or False

1. 5 is the solution of the equation  $3x + 2 = 17$

2.  $\frac{9}{5}$  is the solution of the equation  $4x - 1 = 8$

3.  $4x - 5 = 7$  does not have an integer as its solution

4. One third of a number added to itself gives 10, can be represented as  $\frac{x}{3} + 10 = x$

5.  $\frac{3}{2}$  is the solution of the equation  $8x - 5 = 7$

6. If  $4x - 7 = 11$  then  $x = 4$

7. If 9 is the solution of available  $x$  in the equation  $\frac{5x-7}{2} = y$  the the value of  $y$  is 28

8. 12 is solution of the equation  $4x - 5 = 3x + 10$

9. A number  $x$  divided by 7 gives 2 can be written as  $\frac{x-1}{7} = 2$

10.  $x + 2 = 5$  and  $3x - 1 = 8$  have the same solution

11. The equation  $3x + 7 = 10$  has a1 as its solution

1. True	2. False	3. False	4. False	5. True	6. False	7. False	8. False
9. False	10. True	11. True					

### III. True or False

1. 6 is the solution of the equation  $4x + 3 = 15$

False, given  $4x + 3 = 15$

$$4x = 15 - 3 \Rightarrow 4x = 12 \Rightarrow x = \frac{12}{4} = 3$$

2.  $\frac{2}{3}$  is the solution of the equation  $8x + 5 = 6$

False, given  $8x + 5 = 6$

$$8x = 6 - 5 \Rightarrow 8x = 1 \Rightarrow x = \frac{1}{8}$$

3. If  $x - \frac{7}{8} = \frac{7}{8}$ , then  $x = \frac{7}{4}$

True  $x - \frac{7}{8} = \frac{7}{8} \Rightarrow \frac{8x-7}{8} = \frac{7}{8} \Rightarrow 8x - 7 = 7$

$$8x = 7 + 7 \Rightarrow 8x = 14 \Rightarrow x = \frac{14}{8} = \frac{7}{4}$$

4. If  $4k + 6 = 4$ , then the value of  $8k + 7$  is 64.

False given  $4k + 6 = 4$

$$4k = 4 - 6 \Rightarrow 4k = -2 \Rightarrow k = \frac{-2}{4} = \frac{-1}{2}$$

$$\text{Then, } 8x \left(\frac{-1}{2}\right) + 7 = 64 \Rightarrow -4 + 7 = 64 \Rightarrow 3 \neq 64$$

5. If  $2(k+1) = 19$  then the value of  $6k - 3$  is 32.

False, given  $2(k+1) = 19$

$$k + 1 = \frac{19}{2} \Rightarrow k = \frac{19}{2} - 1$$

$$\Rightarrow k = \frac{19-2}{2} \Rightarrow k = \frac{17}{2}$$

$$\text{Then } \frac{6 \times 17}{2} - 3 = 33 \times 17 - 3 = 51 - 3 = 48$$

6. One-third of a number when asked to itself gives 10, then it can be represented as

$$\frac{x}{3} + 10 = x.$$

False, let  $x$  be the number

$$\text{So, } \frac{1}{3} \text{ of } x = \frac{1}{2} \times x = \frac{x}{3} \Rightarrow \frac{x}{3} + x = 10$$

### I. Match the columns

Column A	Column B
i) $\frac{1}{2}x + 4 = 2$	a) $x = 26$
ii) $\frac{11}{2}x = \frac{14}{2}$	b) $x = \frac{14}{9}$
iii) $\frac{14}{6} = \frac{3}{2}x$	c) $x = 4$
iv) $2(x + 1) = 54$	d) $x = \frac{14}{11}$

i) c	ii) d	iii) b	iv) a
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## II. Match the columns

Column A	Column B
i) The product of 20 and half a number added to 40 is 60	a) $x = \frac{8}{3}$
ii) One-fourth the sum of a number and 5 is 10.	b) $x = 2$
iii) The root of $6x + 2 = 14$	c) $\frac{1}{2} x \times = 20 + 40 = 60$
iv) The root of $\frac{3x}{4} + 1 = 3$	d) $\frac{1}{4} (x + 5) = 10$

i) c	ii) d	iii) b	iv) a
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## I. Very Short Answer Questions

1. Solve the equations:

$$x = \frac{3}{2}x = 25$$

$$\frac{2x+3x}{2} = 25$$

$$\frac{5x}{2} = 25$$

$$x = \frac{25 \times 2}{5} = 10$$

2. If  $15x = 27 + 6x$ , find  $x$

$$15x - 6x = 27$$

$$9x = 27$$

$$x = \frac{27}{9} = 3$$



3. Solve  $5x = \frac{1}{3} = 2 - 3x$

$$5x + 3x = 2\frac{1}{3}$$

$$8x = \frac{6-1}{3}$$

$$8x = \frac{5}{3}$$

$$x = \frac{5}{3 \times 8} = \frac{5}{24}$$

4. Solve the following equation :

$$0.6x + 0.8 = 0.56x + 2.32$$

$$0.6x - 0.56x = 2.32 - 0.8$$

$$0.04x = 1.52$$

$$= x = \frac{5}{3 \times 8} = \frac{5}{24}$$

## II. Very Short Answer Questions

1. **What is an equation?**

An equation is a mathematical sentence that used an equality sign to show that two expressions have the same value

2. **Express it as an equation:**

A number divided by 2 and then increased by 5 is 9

$$\frac{x}{2} + 5 = 9$$

3. **Find the value of y which satisfies  $3y = 5$**

$$Y = \frac{5}{3}$$

4. **What is solution?**

Any value of the variable which makes both sides of an equation equals, is known as a solution.

5. Correct the incorrect equation in Roman which is given below by moving one tooth pick.

$$V - II = VI$$

By moving one tooth pick from numeral II change the minus sign to plus we get

$$V + I = VI$$

### I. Short Answer Questions

1. Solve

a.  $4q - 12 = 0$

b.  $6s + 24 = 0$

a.  $4q - 12 = 0$

$$4q = 12$$

Thus  $q = 3$

b.  $6s + 24 = 0$

$$6s = -24$$

This  $s = -4$

2. Find the value of  $x$  if.

$$\frac{x}{2} - 1 = \frac{x}{3} + 4$$

$$\frac{x}{2} - 1 = \frac{x}{3} + 4$$

$$\Rightarrow \frac{x}{2} - \frac{x}{3} = 4 + 1$$

[on transposing to LHS and 1 to RHS]

$$\Rightarrow \frac{3x - 2x}{6} = 5$$

$$\Rightarrow 3x - 2x = 5 \times 6$$

$$x = 30.$$

3. If the sum of two consecutive whole numbers is 53. Find the smaller number.

Let consecutive whole numbers be  $x$  and  $x+1$  .

Hence according to question

$$x + x + 1 = 53$$

$$2x + 1 = 53$$

$$2x = 53 - 1$$

[on transporting 1 to RHS]

$$\Rightarrow 2x = 52$$

$$\Rightarrow \frac{2x}{2} = \frac{52}{2}$$

$$\Rightarrow x = 26$$

Smaller number is 26.

4. Solve the following equation

$$6x + 18 = 8x + 12$$

$$6x + 18 = 8x + 12$$

$$\therefore 6x + 18 = 8x + 12$$

[On transposing  $8x$  to LHS]

$$6x - 8x = 12 - 18$$

[On transposing  $18x$  to RHS]

$$-2x = -6$$

$$\frac{-2x}{-2} = \frac{-6}{-2}$$

$$x = 3.$$

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5. Find  $x$  if

a.  $\frac{x}{2} + 5 = 10$

b.  $3x - 5 = 7$

a.  $\frac{x}{2} + 5 = 10$

$$\Rightarrow \frac{x}{2} = 10 - 5$$

[On transposing 5 to RHS]

$$\Rightarrow \frac{x}{2} = 5$$

$$\frac{x}{2} \times 2 = 5 \times 2$$

Multiplying both sides by 2

$$\Rightarrow x = 10$$

b.  $3x - 5 = 7$

$$\Rightarrow 3x - 5 = 7$$

$$3x = 7 + 5$$

[On transposing 5 to RHS]

$$\Rightarrow 3x = 12$$

$$\frac{3x}{3} = \frac{12}{3} \text{ [dividing by 3]}$$

$$\Rightarrow x = 4$$

6. Find the number, if 10 is added to the six times of a number, it becomes 40.

Let the number  $x$

According to questions,

$$\Rightarrow 6x + 10 = 40$$

$$\Rightarrow 6x = 40 - 10$$

[On transposing 10 to RHS]

$$\Rightarrow 6x = 30$$

$$\frac{6x}{6} = \frac{30}{6}$$

Thus  $x = 5$

7. Solve for y:

$$2y + \frac{5}{62} = \frac{37}{2}$$

a)  $2y + \frac{5}{62} = \frac{37}{2}$

b)  $\frac{y}{5} + 3 = 2$

a)  $\Rightarrow 2y = \frac{37}{2} - \frac{5}{62}$

$\Rightarrow 2y = \frac{37-5}{2}$

$\Rightarrow 2y = \frac{37}{2}$

$\Rightarrow 2y = 16$

$\Rightarrow \frac{2y}{2} = \frac{16}{2}$  [ Dividing by 2 ]

Thus  $y = 8$

b)  $\frac{y}{5} + 3 = 2$

$\Rightarrow \frac{y}{5} = 2 - 3 \Rightarrow \frac{y}{5} = -1$

$\Rightarrow \frac{y}{5} = -1 \times 5$

$y = -5$

8. Thus Solve the given equation

$$5(x-3) = 25$$

$$5(x-3) = 25$$

$$5x - 3 \times 5 = 25$$

$\Rightarrow 5x - 15 = 25$

$\Rightarrow 5x = 25 + 15$

$\Rightarrow 5x = 40$

$\Rightarrow \frac{5x}{5} = \frac{40}{5}$

Thus  $x = 8$

## II. Short Answer Questions

1. (a) Construct 3 equations starting with  $x = 2$

(b) construct 3 equations starting with  $x = -2$

(a).  $x = 2$

Multiplying both sides by 5, we get

$$5x = 10$$

Subtracting 3 from both sides

$$\begin{aligned} 5x - 3 &= 10 - 3 \\ &= 5x - 3 = 7 \end{aligned}$$

Dividing both sides by 2 we get

$$\frac{5x}{2} - \frac{3}{2} = \frac{7}{2}$$

$$\Rightarrow x = -2$$

b. Subtract 2 from both sides,

$$\Rightarrow x - 2 = -2 - 2$$

$$\Rightarrow x - 2 = -4$$

$$\text{Again } x = -2$$

Multiplying by 6,

$$\Rightarrow 6x - 2 = -2 \times 6$$

$$\Rightarrow 6x - 2 = -12$$

Subtract 12 from both sides,

$$\Rightarrow 6x - 12 = -12 - 12$$

$$\Rightarrow 6x - 12 = -24$$

Adding 24 from both sides,

$$\Rightarrow 6x - 12 + 24 = -24 + 24$$

$$\Rightarrow 6x + 12 = 0$$

2. Solve :  $3\left(x + \frac{1}{2}\right) = 18$

$$3\left(x + \frac{1}{2}\right) = 18$$

Since

Dividing both sides by 3 we get

$$x + \frac{1}{2} = \frac{18}{3}$$

$$\Rightarrow x + \frac{1}{2} = 6$$

[On transposing  $\frac{1}{2}$  to RHS]

$$\Rightarrow x = \frac{12-1}{2} = \frac{11}{2}$$

3. If  $\frac{2x-1}{3} = \frac{x-1}{3} + 1$

If  $\frac{2x-1}{3} = \frac{x-1}{3} + 1$ , Find The Value X

[On transposing  $\frac{x-2}{3}$  to LHS]

$$\Rightarrow \frac{2x-1}{3} - \frac{x-2}{3} = 1$$

$$\Rightarrow \frac{(2x-1)-(x-2)}{3} = 1$$

$$\Rightarrow \frac{2x-1-x+2}{3} = 1$$

$$\Rightarrow \frac{x+1}{3} = 1$$

$$\Rightarrow x + 1 = 3 \times 1$$

$$\Rightarrow x + 1 = 3$$

$$\Rightarrow x = 3 - 1$$

Thus  $x = 2$



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4. If  $\frac{2}{3}$  of a number is less than original number by

20 find the number,

Let the number be  $x$

According to question,

$$x - \frac{2}{3}x = 20$$

$$= \frac{3x}{3} - \frac{2}{3}x = 20$$

$$= \frac{3x - 2x}{3} = 20$$

$$x = 60.$$

5. Solve for  $x$ :

$$\frac{2x-1}{3} - \frac{6x-2}{5} = \frac{1}{3}$$

$$\frac{2x-1}{3} - \frac{6x-2}{5} = \frac{1}{3}$$

$$\therefore \frac{5(2x-1)}{3 \times 5} - \frac{3(6x-2)}{3 \times 5} = \frac{1}{3}$$

$$= \frac{10x-5}{15} - \frac{(18x-6)}{15} = \frac{1}{3}$$

$$= \frac{10x-5-18x-6}{15} = \frac{1}{3}$$

$$= \frac{-18x+1}{15} = \frac{1}{3}$$

$$= -18x+1 = \frac{15}{3} = 5$$

$$= -18x = 5 - 1 = 4$$

$$= x = \frac{4}{-18}$$

$$\text{Thus } x = \frac{-2}{9}$$

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### III. Short Answer Questions

1. **A Number Exceeds The Other Number By 12. If Their Sum Is 72. Find the Number**

Let one of the numbers be  $x$ , then as per condition other number exceeds the number by 12.

i.e,  $x + 12$

According to the condition,

$$x + x + 12 = 72$$

$$\Rightarrow 2x + 12 = 72 \Rightarrow 2x = 72 - 12$$

$$\Rightarrow 2x = 60 \Rightarrow x = 30$$

Thus one number is 30, and other would be

$$x + 12 = 30 + 12 = 42$$

Therefore, the numbers are 30, 12.

2. **If 45 is added to half a number, the result is triple the number, find the**

Let the number be  $x$

So, as per given conditions

$$\frac{1}{2}x \times 45 = 3x$$

$$\Rightarrow \frac{x + (45 \times 2)}{2} = 3x \Rightarrow \frac{x + 90}{2} = 3x$$

$$\Rightarrow x + 90 = 6x \Rightarrow 6x - x = 90$$

$$\Rightarrow 5x = 90 \Rightarrow = \frac{90}{5}$$

$$\Rightarrow x = 18$$

Therefore, the required number is 18.

3. The sum two consecutive multiples of 2 is 18. Find the numbers.

$$\text{Then, } 2x + 2(x + 1) = 18$$

$$\Rightarrow 2x + 2x + 2 = 18$$

$$\Rightarrow 4x = 18 - 2 \quad \Rightarrow 4x = 16$$

$$\Rightarrow x = \frac{16}{4} \quad \Rightarrow x = 4$$

Hence, the required multiples of 2 are  $2 \times 4$  and  $2 \times 5$ , 8 and 10.

4. A man sold an article for Rs.495 and gained 10% on it. Find the cost price of the article.

Sol. Let the cost price of article be  $x$

$$\text{Profit} = 10\%$$

$$\text{Selling Price} = \text{Rs.} \frac{110}{100} x$$

$$\text{Now, } \frac{110}{100} x = 495$$

$$\Rightarrow x = \left( 495 \times \frac{100}{110} \right) \Rightarrow x = 450$$

Hence cost price of article is Rs.450.

5. A girl is 28 years younger than her father. The sum of their ages is 50 years. Find the ages of the girl and her father

Let the father's age =  $x$

$$\text{Then, the girl's age} = x - 28$$

$$\text{Sum of their ages} = 50 \text{ years}$$

$$x + x - 28 = 50$$

$$2x - 28 = 50 \quad \Rightarrow \quad 2x = 50 + 28$$

$$2x = 78 \quad \Rightarrow \quad x = \frac{78}{2}$$

$$\Rightarrow x = 39$$

$\therefore$  Father's age = 39 years

Girl's age =  $(39 - 28) = 11$  years.

**6. Solve the equation:**

$$3(x + 2) = 15$$

Sol. We have

$$\begin{aligned} 3(x + 2) &= 15 && \Rightarrow 3x + 6 = 15 \\ \Rightarrow 3x + 6 - 6 &= 15 - 6 && \text{[subtracting 6 from both sides]} \\ \Rightarrow 3x &= 9 && \Rightarrow x = \frac{9}{3} \\ \Rightarrow x &= 3 \end{aligned}$$

Check : substituting  $x = 3$  in given equations, we get

$$\text{LHS} = 3(3 + 2) = 3 \times 5 = 15 = \text{RHS}$$

Thus, for  $x = 3$ , we have LHS = RHS.

**7. The length of a rectangle is two times its width. The perimeter of the rectangle is 180cm. Find the dimensions of the rectangle.**

Let the width of rectangle be  $x$  then

$$\text{Length of rectangle} = 2x$$

$$\begin{aligned} \text{Now, perimeter of rectangle} &= 2(\text{length} + \text{width}) \\ &= 2(x + 2x) = 2(3x) \end{aligned}$$

$$\text{Perimeter} = 6x$$

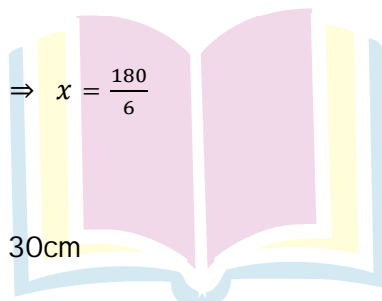
And Perimeter = 180

$$180 = 6x \quad \Rightarrow x = \frac{180}{6}$$

$$\Rightarrow x = 30$$

So, width of rectangle = 30cm

$$\text{Length of rectangle} = 2(30) = 60\text{cm}$$



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## Long Answer Questions I

1. In an isosceles triangle, the base angles are equal. The vertex angle is 48. What are the base angles of the triangles?

Let the value of the base angle be  $x^\circ$   
Vertex angle =  $48^\circ$   
 $\therefore$  Sum of all angles of triangle = 180

$$\therefore x + x + 48^\circ = 180^\circ$$

$$2x + 48^\circ = 180^\circ$$

$$2x = 180^\circ - 48^\circ$$

$$= 2x = 132^\circ$$

$$= x = \frac{132}{2}$$

$$x = 66$$

$\therefore$  The value of the base angles of the triangle is 66.

2. Ram's father is 49 years old. He is 4 years older than three times Ram's age. What is Rams' age.

Age of Ram's father = 49 years.

Let the age of Ram be  $x$  years

$$\therefore 3x + 4 = 49$$

$$= 3x = 49 - 4$$

$$= 3x = 45$$

$$= \frac{45}{3}$$

$$x = 15$$

= Ram's age = 15 years.



# Next Generation School

3. Solve for  $x$ :

$$\frac{3}{4}(7x-1) - \left[2x - \frac{1-x}{2}\right] = x + \frac{3}{2}$$

$$\text{Sol: } \frac{21x}{4} - \frac{3}{4} - 2x + \frac{1-x}{2} = x + \frac{3}{2}$$

$$\Rightarrow \frac{21x}{4} - 2x + \frac{1}{2} - \frac{x}{2} = x + \frac{3}{2} + \frac{3}{4}$$

$$\Rightarrow \frac{21x}{4} - 2x + \frac{1}{2} - \frac{x}{2} = x + \frac{3}{2} + \frac{3}{4}$$

$$\Rightarrow \frac{21x}{4} - 2x - \frac{x}{2} - x = \frac{3}{2} + \frac{3}{4} - \frac{1}{2}$$

$$\Rightarrow \frac{21x}{4} - 3x - \frac{x}{2} = \frac{3}{2} + \frac{3}{4} - \frac{1}{2}$$

$$\Rightarrow \frac{21x - 4x - 2x}{4} = \frac{3x + 3 - 1 \times 2}{4}$$

$$\Rightarrow \frac{7x}{4} = \frac{7}{4}$$

$$\Rightarrow 7x = 7$$

$$\Rightarrow x = 1$$

4. If  $\frac{2x-3}{5} + \frac{x+3}{4} = \frac{4x+1}{7}$  find the value of  $x$

$$\text{Sol. } \frac{2x-3}{5} + \frac{x+3}{4} = \frac{4x+1}{7}$$

$$\Rightarrow \frac{4(2x-3)}{5 \times 4} + \frac{5(x+3)}{5 \times 4} = \frac{4x+1}{7}$$

$$\Rightarrow \frac{8x-12}{20} + \frac{5x+15}{20} = \frac{4x+1}{7}$$

$$\Rightarrow \frac{8x-12+5x+15}{20} = \frac{4x+1}{7}$$

$$\Rightarrow \frac{13x+3}{20} = \frac{4x+1}{7}$$

$$\Rightarrow 7(13x+3) = 20(4x+1)$$

$$\Rightarrow 91x+21 = 80x+20$$

$$\Rightarrow 91x-80x = 20-21$$

$$\Rightarrow 11x = -1$$

$$\text{Thus } x = \frac{-1}{11}$$

**4. How much pure alcohol must be added to 400ml of a 15% solution to make its strength 32%**

Quantity of pure alcohol in 400ml of 15%

$$= 400 \times \frac{15}{100}$$

$$= 60\text{ml}$$

Now we add  $x$  ml of pure alcohol to the sample,

so total pure alcohol =  $(60 + x)$ ml

but volume of new sample =  $(400 + x)$ ml

percentage of pure alcohol in new sample

$$= \frac{(60 + x)}{(400 + x)} \times 100$$

Which is equal to 32%

$$\Rightarrow \frac{(60 + x)}{(400 + x)} \times 100 = 32$$

$$\Rightarrow \frac{(60 + x)}{(400 + x)} = \frac{32}{100}$$

$$\Rightarrow 100(60 + x) = 32(400 + x)$$

$$\Rightarrow 100x + 6000 = 32x + 12800$$

$$\Rightarrow 100 - 32x = 12800 - 6000$$

$$\Rightarrow 68x = 6800$$

$$\Rightarrow x = \frac{6800}{68} = 100\text{ml}$$

**6 Divide 184 into two parts such that one third of one part may exceed one seventh of other part by 8.**

Sol. Let one part of 184 be  $x$

$\therefore$  other part be  $(184 - x)$

Now, according to question

$$\Rightarrow \frac{1}{3}x = \frac{1}{7}(184 - x) + 8$$

$$\Rightarrow \frac{7x + 3x}{21} = 8 + \frac{184}{7}$$

$$\Rightarrow \frac{10x}{21} = \frac{56 + 184}{7}$$

$$\Rightarrow \frac{10x}{21} = \frac{240}{7}$$

$$\Rightarrow x = \frac{21 \times 240}{7 \times 10}$$

$$= 72$$

Hence parts are 72 and  $184 - 72 = 112$ .

### Long Answer Questions II

1. Set up an equation in the following cases:

Irfan says that he has 7 marbles more than five times the marbles permit has. Irfan has 37 marbles. [take m to be the number of permit's marbles]

Laxmi's father is 49 years old. He is 4 years older than three times Laxmi's age. [ take laxmi;s age to be y years]

The teacher tells the class that the highest marks obtained by a student in her class is twice the lowest marks plus 7. The highest score is 87. [ take the lowest score to be l.]

In an isosceles triangle. The vertex angle is twice of either base angle [ Let the base angle be b in degrees. Remember that the sum of angles of a triangle is 180 degrees.]

Sol. i. let m be the number of Parmit's marbles. Five times the marbles permit has will be 5 m. Irfan has 7 marbles more than permit i.e.  $5m+7$ . It's also given Irfan has 37 marbles

$$\text{Therefore, } 5m+7=37$$

ii. Let laxmi's age be y years. Three times Laxmi's age will be 3y. Laxmi's father is 4 years older than three times Laxmi's age i.e.  $3y+4$ , also father's age is 49 years

$$\text{Therefore, } 3y+4=49$$

iii. Let the lowest score be  $l$ . Twice the lowest marks will be  $2l$ . highest marks obtained by a student is 7 more than twice the lowest marks i.e.

$$\text{Therefore, } 2l+7=87$$

iv. Let the base angle be  $b$ . Vertex angle is twice of either base angle and sum of angles in triangle is  $180^\circ$

$$\text{Therefore, } 4b = 180^\circ.$$

2. Give the steps you will use to separate the variable and then solve the equations

i.  $3n - 2 = 46$

ii.  $5m + 7=17$

iii.  $\frac{20p}{3} = 40$

iv.  $\frac{3p}{10} = 6$

Sol. i. We have,  $3n-2=46$

Step: 1 : Add 2 to both sides of equations.

$$3n - 2 + 2 = 46 + 2$$

Step: 2 Divide both sides by 3

$$\frac{3n}{3} = \frac{48}{3} \Rightarrow n = 16$$

ii. We have,  $5m+7=17$

Step: 1: subtract 7 from both sides.

$$5m + 7 - 7 = 17 - 7 = ?$$

$$5m = 10$$

Step: 2 Divide both sides by 5

$$\frac{5m}{5} = \frac{10}{5} \Rightarrow m = 2$$

iii. We have  $\frac{20p}{3} = 40$

Step: 1: multiply both sides by 3.

$$\frac{20p}{3} \times 3 = 40 \times 3$$

$$20p = 120$$

Step: 2 Divide both sides by 20



$$\frac{20p}{20} = \frac{120}{20} \implies p = 6$$

iv. We have  $\frac{3p}{10} = 6$

Step: 1: multiply both sides by 10.

$$\frac{3p}{10} \times 10 = 6 \times 10 \implies 3p = 60$$

Step: 2 Divide both sides by 3

$$\frac{3p}{3} = \frac{60}{3} \implies p = 20$$

### 3. Solve the following equations:

i.  $10p = 100$

ii.  $10p + 10 = 100$

iii.  $\frac{3p}{4} = 6$

iv.  $3x + 12 = 0$

v.  $2q + 6 = 12$

i. We have

$$10p = 100$$

Step: 1 Dividing both sides by 10 we get

$$\frac{10p}{10} = \frac{100}{10} \implies p = 10$$

ii. We have

Step: 2:

$$10p + 10 = 100$$

$$\implies 10p + 10 - 10 = 100 - 10 \quad \text{[subtracting 10 from both sides]}$$

$$\implies 10p = 90$$

$$\implies \frac{10}{10}p = \frac{90}{10} \implies p = 9 \quad \text{[Dividing both sides by 10]}$$

i. We have

$$\frac{3p}{4} = 6 \implies \frac{3p}{4} = 6 \times 4 = 6 \times 4 \quad \text{[Multiply both sides by 4]}$$

$$\implies 3p = 24 \implies \frac{3p}{3} = \frac{24}{3} \quad \text{[Dividing both sides by 3]}$$

$$\implies p = 8$$

i. We have

$$3x + 12 = 0$$

$$\Rightarrow 3x + 12 - 12 = 0 - 12 \quad \text{[Subtrating 12 from both sides]}$$

$$\Rightarrow 3x = -12 \quad \Rightarrow \frac{3x}{3} = \frac{-12}{3} \quad \text{[Dividing both sides by 3]}$$

$$\Rightarrow x = -4$$

i. We have

$$2q + 6 = 12$$

$$\Rightarrow 2q + 6 - 6 = 12 - 6 \quad \text{[Subtrating 6 from both sides]}$$

$$\Rightarrow 2q = 6 \quad \Rightarrow \frac{2q}{2} = \frac{6}{2} \quad \text{[Dividing both sides by 2]}$$

$$\Rightarrow q = 3$$

**4. Solve the following equations:**

i.  $2y + \frac{5}{2} = \frac{37}{2}$     ii.  $\frac{a}{5} + 3 = 2$     iii.  $\frac{5}{2}x = -10$     iv.  $\frac{5}{2}x = \frac{25}{4}$     v.  $7m + \frac{19}{2} = 13$

Sol. i. We have

$$2y + \frac{5}{2} = \frac{37}{2}$$

$$\Rightarrow 2y + \frac{5}{2} - \frac{5}{2} = \frac{37}{2} - \frac{5}{2} \quad \text{[subtracting } \frac{5}{2} \text{ from both sides]}$$

$$\Rightarrow 2y = \frac{32}{2} \quad \Rightarrow 2y = 16$$

$$\Rightarrow \frac{2}{2}y = \frac{16}{2} \quad \Rightarrow y = 8 \quad \text{[Dividing both sides by 2]}$$

ii. We have

$$\frac{a}{5} + 3 = 2$$

$$\Rightarrow \frac{a}{5} + 3 - 3 = 2 - 3 \quad \text{[subtracting 3 from both sides]}$$

$$\Rightarrow \frac{a}{5} = -1, \quad \Rightarrow \frac{a}{5} \times 5 = -1 \times 5 \quad \text{[Multiplying both sides 5]}$$

$$\Rightarrow a = -5,$$

iii. We have

$$\frac{5}{2}x = -10$$

$$\Rightarrow \frac{5}{2}x \times 2 = -10 \times 2 \quad \text{[Multiplying both sides 2]}$$

$$\Rightarrow 5x = -20 \quad \Rightarrow \frac{5}{5}x = \frac{-20}{5} \quad \text{[Dividing both sides by 5]}$$

$$\Rightarrow x = -4$$

iv . We have

$$\begin{aligned} \frac{5}{2}x &= \frac{25}{4} \\ \Rightarrow \frac{5}{2}x \times 2 &= \frac{25}{4} \times 2 && \text{[Multiplying both sides 2]} \\ \Rightarrow 5x &= \frac{25}{2} \Rightarrow \frac{5}{5}x = \frac{25}{2} \times \frac{1}{5} && \text{[Dividing both sides by 5]} \\ \Rightarrow x &= \frac{5}{2} \end{aligned}$$

v. We have

$$\begin{aligned} 7m + \frac{19}{2} &= 13 \\ \Rightarrow 7m + \frac{19}{2} - \frac{19}{2} &= 13 - \frac{19}{2} && \text{[Subtracting } \frac{19}{2} \text{ both sides 2]} \\ \Rightarrow 7m + \frac{26 - 19}{2} &\Rightarrow 7m = \frac{7}{2} \\ \Rightarrow \frac{7}{7}m &= \frac{7}{2} \times \frac{1}{7} \Rightarrow m = \frac{1}{2} && \text{[Dividing both sides by 7]} \end{aligned}$$

**5. Solve the following equations:**

i.  $4 = 5(p - 2)$     ii.  $-4 = 5(p - 2)$     iii.  $16 = 4 + 3(t + 2)$     iv.  $4 + 5(p - 1) = 34$

v.  $0 = 16 + 4(m - 6)$

Sol. i. We have  $4 = 5(p - 2)$

Let us divide both sides by 5. We get

$$\frac{4}{5} = \frac{5}{5}(p - 2) \Rightarrow \frac{4}{5} = p - 2$$

or  $\frac{4}{5} + 2 = p$     [Transporting 2 to LHS]

$$\frac{4 + 10}{5} = p \Rightarrow p = \frac{14}{5}$$

Check. RHS =  $5\left(\frac{14}{5} - 2\right) = 5\left(\frac{14 - 10}{5}\right) = 4 = \text{LHS}$

ii. We have  $-4 = 5(p - 2)$

Let us divide both, sides by 5, we get

$$\frac{-4}{5} = \frac{5}{5}(p - 2) \Rightarrow \frac{-4}{5} = p - 2$$

or  $\frac{-4}{5} + 2 = p$     [Transporting 2 LHS]

$$\frac{-4 + 10}{5} = p \Rightarrow \frac{6}{5} = p$$

OR  $p = \frac{6}{5}$

Check: RHS =  $5\left(\frac{6}{5} - 2\right) = 5\left(\frac{6 - 10}{5}\right) = -4$

iii. We have  $16 = 4 + 3(t + 2)$

Let us subtract 4 from both, sides, we get

$$16 - 4 = 4 - 4 + 3(t-2)$$

$$12 = 3(t-2)$$

Let us subtract both sides by 3, we get

$$\frac{12}{3} = \frac{3}{3}(t + 2) \Rightarrow 4 = (t + 2)$$

$$\text{Or } 4 - 2 = t \quad [\text{Transporting 2 to LHS}]$$

$$2 = t \quad \text{or} \quad t = 2$$

Check: RHS =  $4 + 3(2 + 2)$

$$= 4 + 3(4) = 4 + 12 = 16 = \text{LHS}$$

iv. We have  $4 + 5(p - 1) = 34$

Let us subtract 4 from both, sides, we get

$$4 - 4 + 5(p - 1) = 34 - 4$$

$$5(p-1) = 30$$

Now let us divide both sides by 5 we get

$$\frac{5}{5}(p - 1) = \frac{30}{5} \Rightarrow p - 1 = 6$$

$$\text{or } p = 6 + 1 \quad [\text{Transporting 1 to RHS}]$$

$$p = 7$$

Check: LHS =  $4 + 5(7-1)$

$$= 4 + 5(6) = 4 + 30 = 34 \text{ RHS}$$

v. We have  $4 + 5(p - 1) = 34$

Let us subtract 4 from both, sides, we get

$$0 = 16 + 4(m - 6)$$

Now let us subtract 16 from both sides, we get

$$0-16 = 16-16 + 4(M - 6)$$

$$-16 = 4(M - 6)$$

Now let us divide both sides by 4, we get

$$\frac{-16}{4} = \frac{4}{4}(m - 6) \Rightarrow -4 = m - 6$$

$$\text{or } -4 + 6 = m \quad [\text{Transporting 6 to LHS}]$$

$$2 = m \text{ or } m = 2$$

$$\text{Check: RHS} = 16 + 4(2 - 6)$$

$$= 16 + 4(-4) = 16 - 16 = 0 = \text{LHS}$$

6. Set up equations and solve them to find the unknown numbers in the following cases:

i. Add 4 to eight times a number ; you get 60.

ii. If I take three-fourths of a number and add 3 to it, I get 21.

iii. Munna subtracts thrice the number of notebooks he has from 50 he finds the result to be 8.

iv. Ibenhal thinks of a number, if she adds 19 to it and divides the sum by 5, she will get 8.

v. Answer thinks of a number, if he takes away 7 from  $\frac{5}{2}$  of the number, the result is 23.

i. Let the number be  $x$ . then eight times the number will be  $8x$

Adding 4 to it. We get 60, i.e.,

$$8x + 4 = 60$$

$$\Rightarrow 8x + 4 - 4 = 60 - 4 \quad \text{[subtracting 4 from both side]}$$

$$\Rightarrow 8x = 56$$

$$\Rightarrow x = \frac{56}{8} \Rightarrow x = 7 \quad \text{[Dividing both sides by 8]}$$

ii. Let the number be  $x$ . then three - fourth of a number will be  $\frac{3}{4}x$  if we add e to it we get 21

$$\text{Therefore, } \frac{3}{4}x + 3 = 21$$

$$\Rightarrow \frac{3}{4}x + 3 - 3 = 21 - 3 \quad \text{[subtracting 3 from both side]}$$

$$\Rightarrow \frac{3}{4}x = 18$$

$$\Rightarrow \frac{3}{4}x \times 4 = 18 \times 4 \quad \text{[Multiply both sides by 4]}$$

$$\Rightarrow 3x = 72 \Rightarrow x = \frac{72}{3} \quad \text{[Dividing both sides by 3]}$$

$$\Rightarrow x = 24$$

iii. Let number of notebooks be  $x$ . Munna subtracts thrice the number of notebooks from 50 i.e  $50 - 3x$  it gives result as 8

Therefore,  $50 - 3x = 8$

$\Rightarrow 50 - 3x - 50 = 8 - 50$  [subtracting 50 from both side]

$\Rightarrow -3x = -42$

$\Rightarrow x = \frac{42}{3} \Rightarrow = 14$  [Dividing both sides by 3]

iv. Let number be  $x$  ibenhal adds 19 to the number and divides the sum by 5, i.e.  $\frac{x+19}{5}$  get's 8

Therefore,  $\frac{x+19}{5} = 8$

$\frac{x+19}{5} \times 5 = 8 \times 5$  [Multiply both sides by 5]

$x + 19 = 40$

$x + 19 - 19 = 40 - 19$  [subtracting 19 from both side]

$x = 21$

v. Let number be  $x$  then.  $\frac{5}{2}$  of the number will be  $\frac{5}{2}x$ . if anwar subtracts 7 from it he gets 23.

Therefore,  $\frac{5}{2}x - 7 = 23$

$\Rightarrow \frac{5}{2}x - 7 + 7 = 23 + 7$  [add 7 to both side]

$\Rightarrow \frac{5}{2}x = 30$

$\Rightarrow \frac{5}{2}x \times 2 = 30 \times 2$  [Multiply both sides by 2]

$\Rightarrow 5x = 60$

$\Rightarrow x = \frac{60}{5} \Rightarrow x = 12$  [Divide both sides by 5]