NOTES

CLASS 8
MATHS

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LINEAR EQUATION IN ONE VARIABLES

Important Concepts/ Result

The linear equations in one variable is an equation which is expressed in the form of ax+b = 0, where a and b are two integers, and x is a variable and has only one solution.

For example, 2 x + 3 = 8 is a linear equation having a single variable in it. Therefore, this equation has only one solution, which is $x = \frac{5}{2}$.

Some illustrations/Examples (with solution)

Equation A statement of equality which contains one or more unknown quantity or variable (literals) is called an equation.

Example

3x + 7 = 12, and $\frac{x}{3} + 5 = \frac{x}{2} - 3$ are equations in one variable x.

Rules for Solving Linear Equations in One Variable

We learnt the rules for solving an equation in one variable. Let us recall them. They are :

Rule 1 : Same quantity (number) can be added to both sides of an equation without changing the equality.

Rule 2 : Same quantity can be subtracted from both sides of an equation without changing the equality.

Rule 3 : Both sides of an equation may be multiplied by the same non-zero number without changing the equality.

Rule 4 : Both sides of an equation may be divided by the same non-zero number without changing the equality. It should be noted that some complicated equations can be solved by using two or more of these rules together.

i) MCQs

1. Find the solution of 2x – 5 = 10

(a) $\frac{15}{2}$ **(b)** $\frac{7}{2}$ **(c)** $\frac{5}{2}$ **(d)** $\frac{9}{2}$

2. Solve $8x - \frac{5}{2}x = 2$

(a) $x = \frac{4}{11}$ **(b)** $x = \frac{7}{2}$ **(c)** $x = \frac{3}{4}$ **(d)** $x = \frac{5}{12}$

3. Solve 2x – 3 = x + 2

(a) x = 4 **(b) x** = 3 **(c) x** = 7 **(d) x** = 5

4. 4z + 2 = 6 + 2z

(a) z = 4 **(b) z** = 3 **(c) z**= 2 **(d) z** = 5

ANSWER:- 1. **(a)** 2. **(a)** 3. **(d)** 4. **(c)**

ii) Case based study question

A home-owner is installing a fence around the square garden. The garden has a perimeter of 6480 cm. Write and solve the equation to find the garden's dimensions.



(a) Find out the side of garden.

(b) Why garden is important for us?

ANSWER (a) 1620 cm (b) Think And write yourself

iii)Short answer type question

Fill in the blanks to make each statement true.

1. In a linear equation, the _____ power of the variable appearing in

   the equation is one.

2. The solution of the equation $3x - 4 = 1 - 2x$ is _____.
3. The solution of the equation $2y = 5y - \frac{18}{5}$ is _____.
4. Any value of the variable which makes both sides of an equation equal is known as a _____ of the equation.

Answer :- 1. Highest 2. 1 3. $\frac{6}{5}$

4. Solution

iv) Long answer type questions:

Solve the equation

1. $0.25(4x - 5) = 0.75x + 8$

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

Answer :- 1. X = 37 2. $\frac{-3}{17}$

III. Questions for Practice

Q1.A linear equation in one variable has

(a) Only one solution (b) Two solutions (c) More than two solutions (d) No solution

Q2. What is the length of the rectangle whose breadth is 10 cm & perimeter 60 cm.

(a) 15cm (b) 16cm (c) 20cm (d) 25cm

Q3.What should be added to $\frac{-3}{5}$ to get $\frac{-7}{5}$.

(a) $\frac{4}{5}$ (b) 1 (c) $\frac{-4}{5}$ (d) 2

Q4.If x % of 50 is 10 , then the value of 'x' is

(a) 30 (b) 15 (c) 10 (d) 20

Q5.Two numbers are in the ratio 3: 5. If their sum is 64 , then the numbers are

(a) 24 & 40 (2) 15&24 (c) 10& 24 (d) 20& 24

Q6.The sum of the ages of three persons is 100 years. What will be the sum of their ages after 5 years.

(a) 100yrs. (b) 115yrs. (c) 300 yrs. (iv) 305yrs.

Q7.The sum of three consecutive multiples of '5' is 45.Which is the smallest of the three multiples.

(a) 10 (b) 15 (c) 20 (d) 25

Q8.If $\frac{z}{z+5} = \frac{4}{9}$, then the value of 'z' is

(a) 5 (b) 4 (c) 7 (d) 8

Q9. Sum of two numbers is 95.If one exceeds the other by 15 , then the numbers are

(a) 25 & 40 (b) 50 & 65 (c)30 & 45 (d) 40& 55

Q10. If 2x + 1 = 15 then the value of 'x' is

(a) 5 (b)—8 (c) 7 (d) 3

ii) Short answer type question:

Solve the equations

1. $\frac{x}{2}-\frac{1}{5}=\frac{x}{3}+\frac{1}{4}$
2. $\frac{x-5}{5}=\frac{x-3}{3}$
3. $\frac{6x+1}{3}+1=\frac{x-3}{6}$
4. $5x+\frac{7}{2}=\frac{3x}{2}+14$
5. $3x = 2x + 18$ **6.** $5t – 3 = 3t – 5$ **7.** $5x + 9 = 5 + 3x$
8. $4z + 3 = 6 + 2z$ **9.** $2x – 1 = 14 – x$ **10.** $8x + 4 = 3 (x – 1) + 7$

iii) Long answer type questions:

Solve the equations

1. $3(t – 3) = 5(2t + 1)$ **2.** $15(y – 4) –2(y – 9) + 5(y + 6) = 0$

3. $3(5z – 7) – 2(9z – 11) = 4(8z – 13) – 17$ **4.** $0.25(4f – 3) = 0.05(10f – 9)$

5. The sum of three consecutive even natural numbers is 48. Find the greatest of these numbers.

6. Divide 54 into two parts such that one part is $\frac{2}{7}$ of the other.

iv) Case based study 01:

Two sisters Riya and Tanu went to a mela organized in their society on the occasion of New Year. Their mother gave them Rs. 200. They bought some toys for them.Tanu spent Rs. 20 more than Riya. When they returned home from the mela, they had Rs. 20 left with them.



1. Find the amount spent by Riya.
2. Find the amount spent by Tanu.
3. Determine the ratio of amount spent by Tanu to that of Riya.
4. What type of motion is exhibited by Giant-wheel?

Case based study 02:

Anima left one-half of her property to her daughter, one-third to her son and donated the rest to an educational institute. If the donation was worth Rs. 1,00,000.

(a) How much money did Anima have?
(b) How much money educational institute have?
(c) How much money did Anima's son and daughter have?

ANSWER :- MCQs : 1. (a) 2. (c) 3. (c) 4. (d) 5. (a) 6. (a) 7. (a) 8. (a) 9. (d) 10. (c)

Short answer type question: **ANSWER :-** 1.X = $\frac{27}{10}$ 2. X=0 3. X= -1 4. X= 3 5. X= 18 6. t = -1

7. X= -2 8. Z = $\frac{3}{2}$ 9. X = 5 10. X= 0

Long answer type questions::- . 1. t = -2 2. y = $\frac{2}{3}$ 3. z = 2 4. f = $\frac{3}{5}$ 5. 18 6. 42, 12

Case based study: 01 1. Riva Rs. 80 2. Tanu Rs. 100 3. 4:5 4. Circular Motion
Case based study: 02 (a) .Rs.3,00,000 (b) Rs.1,00,000 (c) Son Rs. 50,000 Daughter Rs. 1,50,000

Chapter Test (One 20 mark)

SECTION A (2 MARKS FOR EACH QUESTION)

1. Find the solution of the equation $3x - 4 = 1 - 2x$.
2. Find solution of the equation $2y = 5y - \frac{18}{5}$.

Solve the equation

3. $\frac{6x+1}{3} + 1 = \frac{x-3}{6}$
4. $5x + \frac{7}{2} = \frac{3x}{2} + 14$
5. $3x = 2x + 18$
6. $5t - 3 = 3t - 5$

SECTION A (4 MARKS FOR EACH QUESTION)

7. The sum of three consecutive even natural numbers is 48. Find the greatest of these numbers.
8. Divide 54 into two parts such that one part is $\frac{2}{7}$ of the other.

Chapter Test (One 30 mark)

SECTION A (2 MARKS FOR EACH QUESTION)

1. $3x = 2x + 18$
2. $5t - 3 = 3t - 5$
3. $5x + 9 = 5 + 3x$
4. $4z + 3 = 6 + 2z$
5. $2x - 1 = 14 - x$
6. $8x + 4 = 3(x - 1) + 7$

SECTION B (3 MARKS FOR EACH QUESTION)

7. $\frac{x}{2} + \frac{x}{4} + \frac{x}{5} + 10000 = x$
8. Arpita's present age is thrice of Shilpa. If Shilpa's age three years ago was x. Find Arpita's present age.

SECTION C (4 MARKS FOR EACH QUESTION)

9. Distance between two stations A and B is 690 km. Two cars start simultaneously from A and B towards each other, and the distance between them after 6 hours is 30 km. If the speed of one car is less than the other by 10 km/hr, find the speed of each car.
10. Solve the equation $0.25(4x - 5) = 0.75x + 8$
11. The sum of three consecutive even natural numbers is 48. Find the greatest of these numbers.

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