# CHAPTER 14 – LINEAR EQUATIONS IN ONE VARIABLE

**Solve the following equations:**

**Question 1**

20 = 6+2x

**Solution:**

Simplifying we get 20 = 6 + 2x
20 - 6 = 2x
14 = 2x
7 = x
x = 7

**Question 2**

15 + x = 5x + 3

**Solution:**

Simplifying we get 15 - 3 = 5x – x 12 = 4x
3=x
x=3

**Question 3**

$\frac{3x+2}{x-6} = -7$

**Solution:**

By cross multiplying 3x + 2 = - 7(x-6)
3x + 2 = -7x + 42
3x + 7x = 42 – 2
10x = 40
x = 4

**Question 4**

3a - = 2 (4 - a)

**Solution:**

3a – 4 = 8 – 2a
3a + 2a = 8 + 4
5a = 12
a = 2.4

**Question 5**

3(b - 4) = 2 (4 - b)

**Solution:**

$3b - 12 = 8 - 2b$
$3b + 2b = 8 + 12$
$5b = 20$
$b = \frac{20}{5}$
$b = 4$

**Question 6**

$\frac{x+2}{9} = \frac{x+4}{11}$

**Solution:**

By cross multiplying $11(x + 2) = 9(x + 4)$
$11x + 22 = 9x + 36$
$11x - 9x = 36 - 22$
$2x = 14$
$x = \frac{14}{2}$
$\Rightarrow x = 7$

**Question 7**

$\frac{x-8}{5} = \frac{x-12}{9}$

**Solution:**

By cross multiplying $9(x - 8) = x(x - 12)$
$9x - 72 = 5x - 60$
$9x - 5 = -60 + 72$
$4x = 12$
$x = \frac{12}{4}$
$x = 3$

**Question 8**

5(8x + 3) = 9(4x + 7)

**Solution:**

$40x + 15 = 36x + 63$
$40x - 36x = 63 - 15$
$4x = 48$

$x = \frac{48}{4}$
$x = 12$

**Question 9**

3(x + 1) = 12 + 4 (x - 1)

**Solution:**

$3(x + 1) = 12 + 4(x - 1)$
$3x + 3 = 12 + 4x - 4$
$3x - 4x = 12 - 4 - 3$
$-x = 5 \Rightarrow x = -5$

**Question 10**

$\frac{3x}{4} - \frac{1}{4}(x - 20) = \frac{x}{4} + 32$

**Solution:**

$\frac{3x}{4} - \frac{x}{4} + 5 = \frac{x}{4} + 32$
$\frac{3x}{4} - \frac{x}{4} - \frac{x}{4} = 32 - 5$
$\frac{3x-x-x}{4} = 27$
$\frac{x}{4} = 27$
$x = 27 \times 4$
$x = 108$

**Question 11.**

$3a - \frac{1}{5} = \frac{a}{5} + 5\frac{2}{5}$

**Solution:**

$3a - \frac{a}{5} = 5\frac{2}{5} + \frac{1}{5}$
$3a - \frac{a}{5} = \frac{27}{5} + \frac{1}{5}$
(Multiplying each term by 5) $\Rightarrow 3a \times 5 - \frac{a}{5} \times 5 = \frac{27}{5} \times 5 + \frac{1}{5} \times 5$
$15a - a = 27 + 1$
$14a = 28$
$a = \frac{28}{14}$
$a = 2$

**Question 12.**

$\frac{x}{3} - 2\frac{1}{2} = \frac{4x}{9} - \frac{2x}{3}$

**Solution:**

$\frac{x}{3}-\frac{5}{2}=\frac{4x}{9}-\frac{2x}{3}$

Since, L.C.M. of denominators 3, 2, 9 and 3=18

[Multiplying each term by 18] $\Rightarrow \frac{x}{3}\times 18-\frac{5}{2}\times 18=\frac{4x}{9}\times 18-\frac{2x}{3}\times 18$

$6x-45=8x-12x$

$6x+12x-8x=45$

$18x-8x=45$

$10x=45$

$x=\frac{45}{10}$

$x=4\cdot 5$

**Question 13:**

$\frac{4(y+2)}{5}=7+\frac{5y}{13}$

**Solution:**

$\frac{4y+8}{5}=7+\frac{5y}{13}$

$\frac{4y+8}{5}=\frac{91+5y}{13}$

(By cross multiplying)

$13(4y+8)=5(91+5y)$

$52y+104=455+25y$

$52y-25y=455-104$

$27y=351$

$y=\frac{351}{27}$

$y=13$

**Question 14.**

$\frac{a+5}{6}-\frac{a+1}{9}=\frac{a+3}{4}$

**Solution:**

Since, L.C.M. of denominators 6, 9 and 4=36

Multiplying each term by 36 $\Rightarrow \frac{a+5}{6}\times 36-\frac{a+1}{9}\times 36=\frac{a+3}{4}\times 36$

$6(a+5)-4(a+1)=9(a+3)$

$6a+30-4a-4=9a+27$

$6a-4a-9a=27-30+4$

$6a-13a=1$

$-7a=1$

$a=-\frac{1}{7}$

**Question 15:**

$\frac{2x-13}{5} - \frac{x-3}{11} = \frac{x-9}{5} + 1$

**Solution:**

$\frac{2x-13}{5} - \frac{x-3}{11} = \frac{x-9}{5} + \frac{1}{1}$

Since, L.C.M. of denominators$5,11,5$ and $1 = 55$

$\therefore \frac{2x-13}{5} \times 55 - \frac{x-3}{11} \times 55 = \frac{x-9}{5} \times 55 + \frac{1}{1} \times 55$

$11(2x - 13) - 5(x - 3) = 11(x - 9) + 55$

$22x - 143 - 5x + 15 = 71x - 99 + 55$

$22x - 5x - 11x = -99 + 55 + 143 - 15$

$6x = 198 - 114$

$6x = 84$

$x = \frac{84}{6}$

$x = 14$