EXERCISE 8.1 PAGE NO: 8.6

1. Verify by substitution that:
(i) x = 4 is the root of 3x – 5 = 7
(ii) x = 3 is the root of 5 + 3x = 14
(iii) x = 2 is the root of 3x – 2 = 8x – 12
(iv) x = 4 is the root of (3x/2) = 6
(v) y = 2 is the root of y – 3 = 2y – 5
(vi) x = 8 is the root of (1/2)x + 7 = 11

Solution:
(i) Given x = 4 is the root of 3x - 5 = 7
Now, substituting x = 4 in place of 'x' in the given equation, we get
= 3(4) – 5 = 7
= 12 – 5 = 7
7 = 7
Since, LHS = RHS
Hence, x = 4 is the root of 3x - 5 = 7.

(ii) Given x = 3 is the root of 5 + 3x = 14.
Now, substituting x = 3 in place of 'x' in the given equation, we get
= 5 + 3(3) = 14
= 5 + 9 = 14
14 = 14
Since, LHS = RHS
Hence, x = 3 is the root of 5 + 3x = 14.

(iii) Given x = 2 is the root of 3x – 2 = 8x – 12.
Now, substituting x = 2 in place of 'x' in the given equation, we get
= 3(2) – 2 = 8(2) – 12
= 6 – 2 = 16 – 12
4 = 4
Since, LHS = RHS
Hence, x = 2 is the root of 3x – 2 = 8x – 12.

(iv) Given x = 4 is the root of 3x/2 = 6.

Now, substituting x = 4 in place of 'x' in the given equation, we get
= (3 × 4)/2 = 6
= (12/2) = 6
6 = 6
Since, LHS = RHS
Hence, x = 4 is the root of (3x/2) = 6.

(v) Given y = 2 is the root of y – 3 = 2y – 5.
Now, substituting y = 2 in place of 'y' in the given equation, we get
= 2 – 3 = 2(2) – 5
= -1 = 4 – 5
-1 = -1
Since, LHS = RHS
Hence, y = 2 is the root of y – 3 = 2y – 5.

(vi) Given x = 8 is the root of (1/2)x + 7 = 11.
Now, substituting x = 8 in place of 'x' in the given equation, we get
= (1/2)(8) + 7 =11
= 4 + 7 = 11
= 11 = 11
Since, LHS = RHS
Hence, x = 8 is the root of 12x + 7 = 11.

2. Solve each of the following equations by trial – and – error method:
(i) x + 3 =12
(ii) x -7 = 10
(iii) 4x = 28
(iv) (x/2) + 7 = 11
(v) 2x + 4 = 3x
(vi) (x/4) = 12
(vii) (15/x) = 3
(vii) (x/18) = 20

Solution:
(i) Given x + 3 =12
Here LHS = x +3 and RHS = 12

x	LHS	RHS	Is LHS = RHS
1	1 + 3 = 4	12	No
2	2 + 3 = 5	12	No
3	3 + 3 = 6	12	No
4	4 + 3 = 7	12	No
5	5 + 3 = 8	12	No
6	6 + 3 = 9	12	No
7	7 + 3 = 10	12	No
8	8 + 3 = 11	12	No
9	9 + 3 = 12	12	Yes

Therefore, if x = 9, LHS = RHS.
Hence, x = 9 is the solution to this equation.

(ii) Given x -7 = 10
Here LHS = x -7 and RHS = 10

x	LHS	RHS	Is LHS = RHS
9	9 – 7 = 2	10	No
10	10 -7 = 3	10	No
11	11 – 7 = 4	10	No
12	12 – 7 = 5	10	No
13	19 – 7 = 6	10	No
14	14 – 7 = 7	10	No
15	15 – 7 = 8	10	No
16	16 – 7 = 9	10	No
17	17 – 7 = 10	10	Yes

Therefore if x = 17, LHS = RHS
Hence, x = 17 is the solution to this equation.

(iii) Given 4x = 28
Here LHS = 4x and RHS = 28

x	LHS	RHS	Is LHS = RHS
1	4 × 1 = 4	28	No
2	4 × 2 = 8	28	No
3	4 × 3 = 12	28	No
4	4 × 4 = 16	28	No
5	4 × 5 = 20	28	No
6	4 × 6 = 24	28	No
7	4 × 7 = 28	28	Yes

Therefore if x = 7, LHS = RHS
Hence, x = 7 is the solution to this equation.

(iv) Given (x/2) + 7 = 11
Here LHS = (x/2) + 7 and RHS = 11
Since RHS is a natural number, (x/2) must also be a natural number, so we must substitute values of x that are multiples of 2.

x	LHS	RHS	Is LHS = RHS
2	(2/2) + 7 = 1 + 7 =8	11	No
4	(4/2) + 7 = 2 + 7 = 9	11	No
6	(6/2) + 7 = 3 + 7 = 10	11	No
8	(8/2) + 7 = 4 + 7 = 11	11	Yes

Therefore if x = 8, LHS = RHS
Hence, x = 8 is the solutions to this equation.

(v) Given 2x + 4 = 3x
Here LHS = 2x + 4 and RHS = 3x

x	LHS	RHS	Is LHS = RHS
1	2 (1) + 4 = 2 + 4 = 6	3 (1) = 3	No
2	2 (2) + 4 = 4 + 4 = 8	3 (2) = 6	No
3	2 (3) + 4 = 6 + 4 = 10	3 (3) = 9	No
4	2 (4) + 4 = 8 + 4 = 12	3 (4) = 12	Yes

Therefore if x = 4, LHS = RHS
Hence, x = 4 is the solutions to this equation.

(vi) Given (x/4) = 12
Here LHS = (x/4) and RHS = 12
Since RHS is a natural number, x/4 must also be a natural number, so we must substitute values of x that are multiples of 4.

x	LHS	RHS	Is LHS = RHS
16	(16/4) = 4	12	No
20	(20/4) = 5	12	No
24	(24/4) = 6	12	No
28	(28/4) = 7	12	No
32	(32/4) = 8	12	No
36	(36/4) = 9	12	No
40	(40/4) = 10	12	No
44	(44/4) = 11	12	No
48	(48/4) = 12	12	Yes

Therefore if x = 48, LHS = RHS
Hence, x = 48 is the solutions to this equation.

(vii) Given (15/x) = 3
Here LHS = (15/x) and RHS = 3
Since RHS is a natural number, 15x must also be a natural number, so we must substitute values of x that are factors of 15.

x	LHS	RHS	Is LHS = RHS
1	(15/1) = 15	3	No
3	(15/3) = 5	3	No
5	(15/5) = 3	3	Yes

Therefore if x = 5, LHS = RHS
Hence, x = 5 is the solutions to this equation.

(viii) Given (x/18) = 20
Here LHS = (x/18) and RHS = 20
Since RHS is a natural number, (x/18) must also be a natural number, so we must substitute values of x that are multiples of 18.

x	LHS	RHS	Is LHS = RHS
324	(324/18) = 18	20	No
342	(342/18) = 19	20	No
360	(360/18) = 20	20	Yes

Therefore if x = 360, LHS = RHS
Hence, x = 360 is the solutions to this equation.