

EXERCISE 8.1

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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

$$= (3 \times 4)/2 = 6$$

$$= (12/2) = 6$$

$$6 = 6$$

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) $(15/x) = 3$

(viii) $(x/18) = 20$

Solution:

(i) Given $x + 3 = 12$

Here LHS = $x + 3$ and RHS = 12

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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	$13 - 7 = 6$	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	$4 \times 1 = 4$	28	No
2	$4 \times 2 = 8$	28	No
3	$4 \times 3 = 12$	28	No
4	$4 \times 4 = 16$	28	No
5	$4 \times 5 = 20$	28	No
6	$4 \times 6 = 24$	28	No
7	$4 \times 7 = 28$	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, $15/x$ 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.

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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.



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