EXERCISE 3.5 PAGE NO: 3.33

1. Construct the composition table for $\times_4$ on set S = {0, 1, 2, 3}.

Solution:

Given that $\times_4$ on set S = {0, 1, 2, 3}

Here,

$1 \times_4 1$ = remainder obtained by dividing 1×1 by 4

= 1

$0 \times_4 1$ = remainder obtained by dividing 0×1 by 4

= 0

$2 \times_4 3$ = remainder obtained by dividing 2×3 by 4

= 2

$3 \times_4 3$ = remainder obtained by dividing 3×3 by 4

= 1

So, the composition table is as follows:

$\times_4$	0	1	2	3
0	0	0	0	0
1	0	1	2	3
2	0	2	2	2
3	0	3	2	1

2. Construct the composition table for $+_5$ on set S = {0, 1, 2, 3, 4}

Solution:

$1 +_5 1$ = remainder obtained by dividing 1 + 1 by 5

= 2

$3 +_5 1$ = remainder obtained by dividing 3 + 1 by 5

= 2

$4 +_5 1$ = remainder obtained by dividing 4 + 1 by 5

= 3

So, the composition table is as follows:

$+_5$	0	1	2	3	4
0	0	1	2	3	4
1	1	2	3	4	0
2	2	3	4	0	1
3	3	4	0	1	2
4	4	0	1	2	3

3. Construct the composition table for $\times_6$ on set S = {0, 1, 2, 3, 4, 5}.

Solution:

Here,

$1 \times_6 1$ = remainder obtained by dividing 1×1 by 6

= 1

$3 \times_6 4$ = remainder obtained by dividing 3×4 by 6

= 0

$4 \times_6 5$ = remainder obtained by dividing 4×5 by 6

= 2

So, the composition table is as follows:

$\times_6$	0	1	2	3	4	5
0	0	0	0	0	0	0
1	0	1	2	3	4	5
2	0	2	4	0	2	4
3	0	3	0	3	0	3
4	0	4	2	0	4	2
5	0	5	4	3	2	1

4. Construct the composition table for $\times_5$ on set $Z_5 = \{0, 1, 2, 3, 4\}$

Solution:

Here,

$1 \times_5 1$ = remainder obtained by dividing 1×1 by 5

= 1

$3 \times_5 4$ = remainder obtained by dividing 3×4 by 5

= 2

$4 \times_5 4$ = remainder obtained by dividing 4×4 by 5

= 1

So, the composition table is as follows:

$\times_5$	0	1	2	3	4
0	0	0	0	0	0
1	0	1	2	3	4
2	0	2	4	1	3
3	0	3	1	4	2
4	0	4	3	2	1

5. For the binary operation $\times_{10}$ set $S = \{1, 3, 7, 9\}$, find the inverse of 3.

Solution:

Here,

$1 \times_{10} 1$ = remainder obtained by dividing 1×1 by 10

= 1

$3 \times_{10} 7$ = remainder obtained by dividing 3×7 by 10

= 1

$7 \times_{10} 9$ = remainder obtained by dividing 7×9 by 10

= 3

So, the composition table is as follows:

$\times_{10}$	1	3	7	9
1	1	3	7	9
3	3	9	1	7
7	7	1	9	3
9	9	7	3	1

From the table we can observe that elements of first row as same as the top-most row.
So, $1 \in S$ is the identity element with respect to $\times_{10}$
Now we have to find inverse of 3
$3 \times_{10} 7 = 1$
So the inverse of 3 is 7.