

## EXERCISE 5.1

**1. Write the following numbers in generalized form:**

(i) 89

(ii) 207

(iii) 369

**Solution:**

The generalized form is as follows:

(i)  $89 = 8 \times 10 + 9$

(ii)  $207 = 2 \times 100 + 0 \times 10 + 7 \times 1$

(iii)  $369 = 3 \times 100 + 6 \times 10 + 9 \times 1$

**2. Write the quotient, when the sum of a 2-digit number 34 and number obtained by reversing the digits is divided by**

(i) 11

(ii) sum of digits

**Solution:**

Given:

Sum of two-digit number 34 and the number obtained by reversing the digit  $43 = 34 + 43$   
 $= 77$

(i)  $77 \div 11 = 7$

(ii)  $77 \div (\text{Sum of digit}) = 77 \div (4 + 3)$   
 $= 77 \div 7$   
 $= 11$

**3. Write the quotient when the difference of a 2-digit number 73 and number obtained by reversing the digits is divided by**

(i) 9

(ii) a difference of digits.

**Solution:**

Given:

Difference of two digit number 73 and the number obtained by reversing the digits is  $= 73 - 37 = 36$

(i) divide by 9

So,  $36 \div 9 = 4$

(ii) a difference of digits.

$$36 \div (7 - 3) = 36 \div 4 \\ = 9$$

**4. Without actual calculation, write the quotient when the sum of a 3-digit number abc and the number obtained by changing the order of digits cyclically i.e. bca and cab is divided by**

(i) 111

(ii)  $(a + b + c)$

(iii) 37

(iv) 3

**Solution:**

Given:

Sum of 3-digit number abc and the number obtained by changing the order of digits i.e. bca and cab.

$$\therefore abc + bca + cab$$

$$= 100a + 10b + c + 100b + 10c + a + 100c + 10a + b$$

$$= 111a + 111b + 111c = 111(a + b + c)$$

(i) When divided by 111, we get

$$111(a + b + c) \div 111 = a + b + c$$

(ii) When divided by  $(a + b + c)$ , we get

$$111(a + b + c) \div (a + b + c) = 111$$

(iii) When divided by 37, we get

$$111(a + b + c) \div 37 = 3(a + b + c)$$

(iv) When divided by 3, we get

$$111(a + b + c) \div 3 = 37(a + b + c)$$

**5. Write the quotient when the difference of a 3-digit number 843 and number obtained by reversing the digits is divided by**

(i) 99

(ii) 5

**Solution:**

Given:

Difference of 3-digit number 843 and the number obtained by reversing the digit is 348

$$= 843 - 348 = 495$$

(i) Divided by 99, we get

$$495 \div 99 = 5$$

(ii) Divided by 5, we get

$$495 \div 5 = 99$$

**6. The sum of digits of a 2-digit number is 11. If the number obtained by reversing the digits is 9 less than the original number, find the number.**

**Solution:**

Given:

Sum of two digit number = 11

Let unit's digit be 'x'

and tens digit be 'y',

then  $x + y = 11$  ... (i)

and number =  $x + 10y$

By reversing the digits,

Unit digit be 'y'

and tens digit be 'x'

and number =  $y + 10x + 9$

Now by equating both numbers,

$$y + 10x + 9 = x + 10y$$

$$10x + y - 10y - x = -9$$

$$9x - 9y = -9$$

$$x - y = -1 \dots (ii)$$

Adding (i) and (ii), we get

$$2x = 10$$

$$x = 10/2$$

$$= 5$$

$$\therefore y = 1 + 5 = 6$$

By substituting the values of x and y, we get

$$\text{Number} = x + 10y$$

$$= 5 + 10 \times 6$$

$$= 5 + 60$$

$$= 65$$

$\therefore$  The number is 65.

**7. If the difference of two-digit number and the number obtained by reversing the digits is 36, find the difference between the digits of the 2-digit number.**

**Solution:**

Let us consider the unit digit be 'x'  
and tens digit be 'y'  
So, the number is  $= x + 10y$

By reversing the digits  
Unit digit be 'y'  
and tens digit be 'x'  
The number is  $y + 10x = 36$

Now by equating both numbers,

$$x + 10y - y - 10x = 36$$

$$-9x + 9y = 36$$

$$(y - x) = 36/9$$

$$y - x = 4$$

∴ The difference between digits of the 2-digit number is  $y - x = 4$ .

**8. If the sum of two-digit number and number obtained by reversing the digits is 55, find the sum of the digits of the 2-digit number.**

**Solution:**

Let us consider unit digit be 'x'  
and tens digit be 'y'  
So the number is  $x + 10y$

By reversing the digits  
Unit digit be 'y'  
and tens digit be 'x'  
The number is  $y + 10x = 55$

Now by equating both numbers,

$$x + 10y + y + 10x = 55$$

$$11x + 11y = 55$$

$$11(x + y) = 55$$

$$x + y = 55/11$$

$$x + y = 5$$

∴ Difference of the digits of the number is 5.

**9. In a 3-digit number, unit's digit, ten's digit and hundred's digit are in the ratio 1 : 2 : 3. If the difference of original number and the number obtained by reversing the digits is 594, find the number.**

**Solution:**

Given:

Ratio in the digits of a three digit number = 1 : 2 : 3

Let us consider unit digit be 'x'

Tens digit be '2x'

and hundreds digit be '3x'

$$\begin{aligned}\text{So the number is } & x + 10 \times 2x + 100 \times 3x \\ & = x + 20x + 300x \\ & = 321x\end{aligned}$$

By reversing the digits,

Unit digit be '3x'

Ten's digit be '2x'

Hundreds digit be 'x'

$$\begin{aligned}\text{So the number is } & 3x + 10 \times 2x + 100 \times x \\ & = 3x + 20x + 100x \\ & = 123x\end{aligned}$$

According to the condition,

$$321x - 123x = 594$$

$$198x = 594$$

$$x = 594/198$$

$$= 3$$

$$\begin{aligned}\therefore \text{The number is } & = 321x \\ & = 321 \times 3 = 963\end{aligned}$$

**10. In a 3-digit number, unit's digit is one more than the hundred's digit and ten's digit is one less than the hundred's digit. If the sum of the original 3-digit number and numbers obtained by changing the order of digits cyclically is 2664, find the number.**

**Solution:**

Let us consider the hundreds digit be 'x'

Unit digit be 'x + 1'

and ten's digit be 'x - 1'

$$\begin{aligned}\text{So the number } & = (x + 1) + 10(x - 1) + 100 \times x \\ & = x + 1 + 10x - 10 + 100x\end{aligned}$$

$$= 111x - 9$$

By reversing the digits,

Unit digit be 'x - 1'

Tens digit be 'x'

Hundred digit be 'x + 1'

So the number =  $x - 1 + 10x + 100x + 100$

$$= 111x + 99$$

and sum of original 3-digit number =  $x + 10(x + 1) + 100(x - 1)$

$$= x + 10x + 10 + 100x - 100$$

$$= 111x - 90$$

Now according to the condition,

$$111x - 9 + 111x + 99 + 111x - 90 = 2664$$

$$333x + 99 - 99 = 2664$$

$$333x = 2664$$

$$x = 2664/333$$

$$= 8$$

$$\therefore \text{The number} = 111x - 9$$

$$= 111(8) - 9$$

$$= 888 - 9$$

$$= 879$$

## EXERCISE 5.2

Find the values of the letters in each of the following and give reasons for the steps involved (1 to 11):

1.

$$\begin{array}{r} 4A \\ +35 \\ \hline B2 \end{array}$$

**Solution:**

Since we know that,

$$12 - 5 = 7 = A$$

$$\text{So, } B = 8$$

$$\begin{array}{r} 47 \\ +35 \\ \hline 82 \end{array}$$

Hence,  $A = 7$  and  $B = 8$

2.

$$\begin{array}{r} 5A \\ +79 \\ \hline CB3 \end{array}$$

**Solution:**

Since we know that,

$$9 + 4 = 13, \therefore A = 4$$

$$B = 1 + 5 + 7 = 3$$

$$C = 1$$

$$\begin{array}{r} 54 \\ +79 \\ \hline 133 \end{array}$$

Hence,  $A = 4$ ,  $B = 3$ ,  $C = 1$

3.

$$\begin{array}{r} 42A \\ +2A5 \\ \hline A02 \end{array}$$

**Solution:**

Since we know that,

$$5 + 7 = 12, \therefore A = 7$$

$$1 + 2 + 7 = 10$$

$$1 + 4 + 2 = 7 = A$$

$$\begin{array}{r} 427 \\ +275 \\ \hline 702 \end{array}$$

Hence,  $A = 7$

4.

$$\begin{array}{r} AA \\ +AA \\ \hline BA8 \end{array}$$

**Solution:**

Since we know that,

$$A = 4 \text{ or } 9$$

$$A \neq 4 \text{ as } A + A = A, 4 + 4 \neq 4$$

$$A = 9$$

$$B = 1$$

$$\begin{array}{r} 99 \\ +99 \\ \hline 198 \end{array}$$

Hence  $A = 9, B = 1$

5.



$$\begin{array}{r} 18A \\ +BA7 \\ \hline CB2 \end{array}$$

**Solution:**

Since we know that,

$$5 + 7 = 12$$

$$\therefore A = 5$$

$$B = 4, C = 6$$

$$\begin{array}{r} 185 \\ +457 \\ \hline 642 \end{array}$$

Hence,  $A = 5, B = 4, C = 6$

6.

$$\begin{array}{r} A21B \\ +1CAB \\ \hline B496 \end{array}$$

**Solution:**

Since we know that,

$$B = 3 \text{ or } 8$$

$$\text{If } B = 8$$

$$1 + 1 + 7 = 9 \text{ then } A = 7$$

$$C = 4 - 2 = 2$$

$$7 + 1 = 8 = B$$

$$\begin{array}{r} 7218 \\ +1278 \\ \hline 8496 \end{array}$$

Hence,  $A = 7, B = 8, C = 2$

7.

$$\begin{array}{r} \mathbf{B\ 3\ 4\ 5} \\ +\mathbf{C\ 9\ B\ A} \\ \hline \mathbf{8\ B\ A\ 2} \end{array}$$

**Solution:**

Since we know that,

$$A = 7 (\because 5 + 7 = 12)$$

$$1 + 4 + 2 = 7(A)$$

$$\therefore B = 2$$

$$1 + 2 + 5 = 8, C = 5$$

$$\begin{array}{r} \mathbf{2\ 3\ 4\ 5} \\ +\mathbf{5\ 9\ 2\ 7} \\ \hline \mathbf{8\ 2\ 7\ 2} \end{array}$$

Hence,  $A = 7, B = 2, C = 5$

8.

$$\begin{array}{r} \mathbf{A\ B} \\ -\mathbf{B\ 6} \\ \hline \mathbf{4\ 7} \end{array}$$

**Solution:**

Since we know that,

$$B - 6 = 7$$

$$B = 3$$

$$A - 1 - B = 4$$

$$A - 1 - 3 = 4, A = 4 + 4 = 8$$

$$\begin{array}{r} \mathbf{8\ 3} \\ -\mathbf{3\ 6} \\ \hline \mathbf{4\ 7} \end{array}$$

Hence,  $A = 8, B = 3$

9.

$$\begin{array}{r} 2A \\ \times 3A \\ \hline B7A \end{array}$$

**Solution:**

Since we know that,

$$A = 1 \text{ or } 6 \text{ or } 5 \text{ as } 1 \times 1 = 1$$

$$\text{or } 6 \times 6 = 6$$

$$\text{or } 5 \times 5 = 5$$

Taking  $A = 5$

$$B = 8$$

$$\begin{array}{r} 25 \\ \times 35 \\ \hline 125 \\ 75 \times \\ \hline 875 \end{array}$$

Hence,  $A = 5, B = 8$

10.

$$\begin{array}{r} AB \\ \times AB \\ \hline 6AB \end{array}$$

**Solution:**

Since we know that,

$$B \times B = B$$

$$B = 1, 6, 5$$

If  $B = 5$ , and  $A = 2$ , then

$$25 \times 25 = 625$$

$$\begin{array}{r} 25 \\ \times 25 \\ \hline 625 \end{array}$$

Hence,  $A = 2$  and  $B = 5$

11.

$$\begin{array}{r} \text{A A} \\ \times 4 \text{ A} \\ \hline 9 \text{ A } 4 \end{array}$$

**Solution:**

Since we know that,

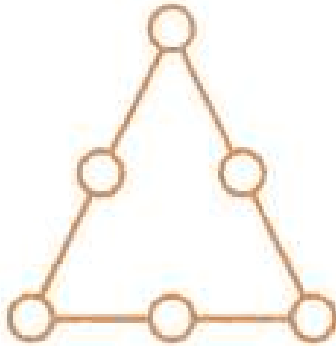
A = 2 or 8

Let A = 2

$$\begin{array}{r} 22 \\ \times 42 \\ \hline 924 \end{array}$$

Hence, A = 2

12. Fill in the numbers from 1 to 6 (without repetition) so that each side of the magic triangle adds up to 12.



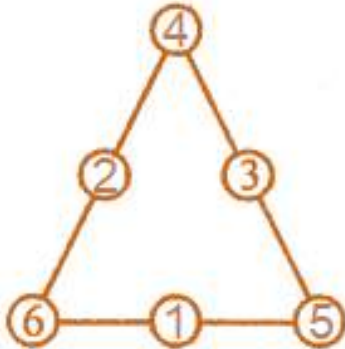
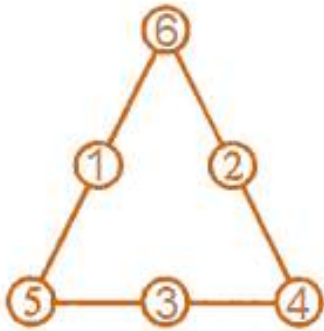
**Solution:**

Given:

Numbers 1 to 6 without repetition:

The sum from each side = 12

There can be much more solutions such as



13. Complete the magic square given alongside using number 0, 1, 2, 3, ....., 15 (only once), so that sum along each row, column and diagonal is 30.

3	14		0
8		6	
4			7
		1	12

**Solution:**

Given:

In the magic square, the use of number 0, 1, 2, 3, ....., 15

So, only once the sum along each row, column and diagonal is 30.

Some numbers are already filled.

3	14	13	0
8	5	6	11
4	9	10	7
15	2	1	12

$$3 + 8 + 4 = 15 + \underline{15} = 30$$

$$3 + 12 = \underline{5} + \underline{10} = 30$$

$$3 + 14 + 0 = 17 + \underline{13} = 30$$

$$0 + 6 = \underline{9} + \underline{15} = 30$$

$$0 + 7 + 12 = 19 + \underline{11} = 30$$

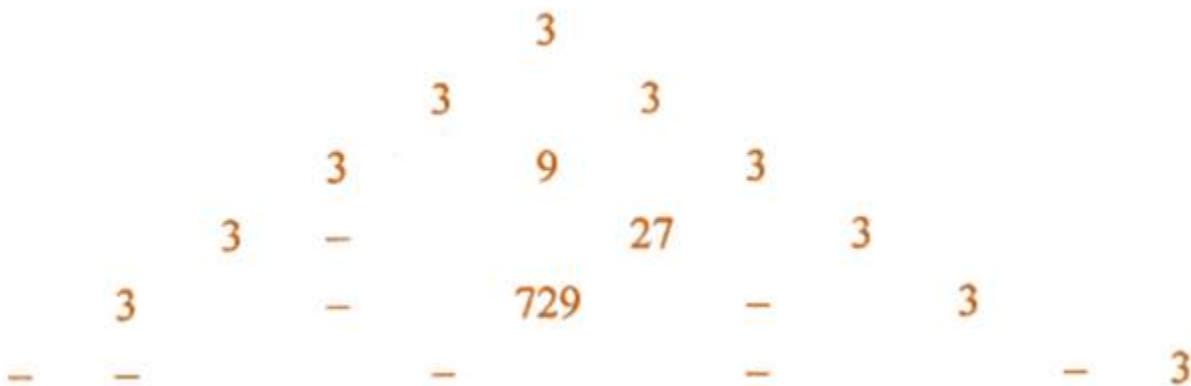
$$\underline{15} + 1 + 12 = 28 + \underline{2} = 30$$

$$8 + 6 + \underline{11} = 25 + \underline{5} = 30$$

$$\underline{13} + 6 + 1 = 20 + \underline{10} = 30$$

$$14 + \underline{5} + \underline{2} = 21 + \underline{9} = 30$$

**14. Fill in the blanks to complete the following number triangle:**



**Solution:**

Here is the complete triangle:

$$\begin{array}{cccccccc}
 & & & & 3 & & & \\
 & & & & 3 & & 3 & \\
 & & 3 & & 9 & & 3 & \\
 & 3 & & \underline{27} & & 27 & & 3 \\
 3 & & \underline{81} & & 729 & & \underline{81} & 3 \\
 \underline{3} & & \underline{243} & & \underline{59049} & & \underline{243} & \underline{3}
 \end{array}$$



### EXERCISE 5.3

**1. Which of the following numbers are divisible by 5 or by 10:**

(i) 87035

(ii) 75060

(iii) 9685

(iv) 10730

**Solution:**

We know that,

A number is divisible by 5 if its unit digit is 5 or 0.

A number is divisible by 10 if its unit digit is 0.

So, 87035, 75060, 9685, 10730 are all divisible by 5.

75060 and 10730 are divisible by 10.

**2. Which of the following numbers are divisible by 2, 4 or 8:**

(i) 67894

(ii) 5673244

(iii) 9685048

(iv) 6533142

(v) 75379

**Solution:**

A number is divisible by 2 if its unit digit is 2, 4, 6, 8 or 0.

A number is divisible by 4 if the number formed by the last two digits is divisible by 4.

A number is divisible by 8 if the number formed by the last three digits is divisible by 8.

So Number 67894, 5673244, 9685048, 6533142 are divisible by 2.

Numbers, 5673244, 9685048 are divisible by 4

and numbers 9685048 is divisible by 8.

**3. Which of the following numbers are divisible by 3 or 9:**

(i) 45639

(ii) 301248

(iii) 567081

(iv) 345903

(v) 345046



**Solution:**

A number is divisible by 3 if the sum of its digits is divisible by 3.

A number is divisible by 9 if the sum of its digits is divisible by 9.

So the numbers 45639, 301248, 567081, 345903 are divisible by 3.

And 49639, 301248, 467081 are divisible by 9.

**4. Which of the following numbers are divisible by 11:**

(i) 10835

(ii) 380237

(iii) 504670

(iv) 28248

**Solution:**

A number is divisible by 11 if the difference of the sum of digits at the odd places and sum of the digits at even places is zero or divisible by 11.

So the numbers 10835, 380237, 28248 are divisible by 11.

**5. Which of the following numbers are divisible by 6:**

(i) 15414

(ii) 213888

(iii) 469876

**Solution:**

A number is divisible by 6 if it is divisible by 2 as well as by 3.

So the numbers 15414 and 213888 are divisible by 6.

**6. Which of the following numbers are divisible by 7:**

(i) 468894875

(ii) 3794856

(iii) 39823

**Solution:**

A number is divisible by 7 if the difference of the sum of digits in alternate blocks of three digits from the right to the left is divisible by 7.

So the numbers 468894875 and 39823 are divisible by 7.

**7. (i) If  $34x$  is a multiple of 3, where  $x$  is a digit, what is the value of  $x$ ?**

(ii) If  $74 \times 5284$  is a multiple of 3, where  $x$  is a digit, find the value(s) of  $x$ .

**Solution:**

(i)  $34x$  is a multiple of 3

If  $3 + 4 + x = 7 + x$  is divisible by 3

Then  $x + 7 = 9$

$x = 9 - 7$

$= 2$

$\therefore x = 2, 5, 8$

(ii)  $74 \times 5284$  is divisible by 3

$7 + 4 + x + 5 + 2 + 8 + 4$  is divisible by 3

Then,  $30 + x$  is divisible by 3

$\therefore x = 0, 3, 6, 9$

**8. If  $42z3$  is a multiple of 9, where  $z$  is a digit, what is the value of  $z$ ?**

**Solution:**

$42z3$  is a multiple of 9

Then,  $4 + 2 + z + 3$  is divisible by 9

$9 + z$  is divisible by 9

So either  $9 + z = 9$  or  $9 + z = 0$

$z = 9 + 9 = 18$ , or  $z = 9 - 9 = 0$

$\therefore z = 0, 9$

**9. In each of the following replace  $\times$  by a digit so that the number formed is divisible by 9:**

(i)  $49 \times 2207$

(ii)  $5938 \times 623$

**Solution:**

(i)  $49 \times 2207$  is divisible by 9

Then,  $4 + 9 + x + 2 + 2 + 0 + 7$  is divisible by 9

$24 + x$  is divisible by 9

$24 + x = 27$

$x = 27 - 24$

$= 3$ , which is divisible by 9

$\therefore x = 3$

(ii)  $5938 \times 623$  is divisible by 9

Then,  $5 + 9 + 3 + 8 + x + 6 + 2 + 3$  is divisible by 9

$36 + x$  is divisible by 9

So,  $36 + x = 36$  or  $45$

$x = 36 - 36 = 0$  or  $x = 45 - 36 = 9$

$\therefore x = 0, 9$

**10. In each of the following replace \* by a digit so that the number formed is divisible by 6:**

(i)  $97 \times 542$

(ii)  $709 \times 94$

**Solution:**

(i)  $97 \times 542$

It is divisible by 6

It is divisible by 2 and 3

Since its unit digit is 2

$\therefore$  It is divisible by 2.

It is divisible by 3

Since, its sum of its digits  $9 + 7 + 5 + 4 + 2 = 27$  [which is divisible by 3]

$27 + '*' = 27$ , or  $30, 33, 36$

$\therefore$  The '\*' place can be replaced by 0 or 3 or 6 or 9.

(ii)  $709 \times 94$

It is divisible by 6

It is divisible by 2 and 3

We know that its unit digit is 4

$\therefore$  It is divisible by 2

It is divisible by 3

Since its sum of its digits  $= 7 + 0 + 9 + 9 + 4 + * = 29 + *$  [which is divisible by 3]

$29 + * = 30$ , or  $33$ , or  $36$

$\therefore$  The '\*' place can be replaced by 1 or 4 or 7.

**11. In each of the following replace \* by a digit so that the number formed is divisible by 11:**

(i)  $64 \times 2456$

(ii)  $86 \times 6194$

**Solution:**

(i)  $64 \times 2456$

It is divisible by 11

The difference between the sum of digits of odd places and sum of digits of even place is divisible by 11 or it is zero.

Now,  $6 + 4 + * + 6 - 5 + 2 + 4$  [which is divisible by 11]

$16 + * - 11$  is divisible by 11

$5 + x$  is divisible by 11

$\therefore *$  is 6.

(ii)  $86 \times 6194$

It is divisible by 11

The difference between the sum of digits of odd places and sum of digits of even places is divisible by 11 or it is zero.

Now,  $4 + 1 + * + 8 = 13 + *$

$9 + 6 + 6 = 21$

$21 - (13 + *)$  is divisible by 11

$21 - 13 - *$  is divisible by 11

$8 - *$  is divisible by 11

$\therefore *$  is 8.