CHAPTER – 5

PLAYING WITH NUMBERS

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 ÷ 11 = 7

(ii) 77 ÷ (Sum of digit) = 77 ÷ (4 + 3)

= 77 ÷ 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 ÷ 9 = 4

(ii) a difference of digits.

36 ÷ (7 – 3) = 36 + 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.

∴ abc + bca + cab

= 100a + 10b + c + 1006 + 10c + a + 100c + 10a + b

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

(i) When divided by 111, we get

111 (a + b + c) ÷ 111 = a + b + c

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

111 (a + b + c) ÷ (a + b + c) = 111

(iii) When divided by 37, we get

111 (a + b + c) ÷ 37 = 3(a + b + c)

(iv) When divided by 3, we get

111 (a + b + c) ÷ 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 ÷ 99 = 5

(ii) Divided by 5, we get

495 ÷ 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,

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

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

$9x - 9y = -9$

$x - y = -1$ … (ii)

Adding (i) and (ii), we get

$2x = 10$

$x = \frac{10}{2}$

$= 5$

$\therefore y = 1 + 5 = 6$

By substituting the vales of x and y, we get

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

$(y - x) = \frac{36}{9}$

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

$x + y = \frac{55}{11}$

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’

So the number is $x + 10 \times 2x + 100 \times 3x$

$= x + 20x + 300x$

$= 321x$

By reversing the digits,

Unit digit be '3x'

Ten's digit be '2x'

Hundreds digit be 'x'

So the number is $3x + 10 \times 2x + 100 \times x$

$= 3x + 20x + 100x$

$= 123x$

According to the condition,

$321x - 123x = 594$

$198x = 594$

$$x = \frac{594}{198}$$

$$= 3$$

$\therefore$ The number is $= 321x$

$= 321 \times 3 = 963$

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'

So the number = (x + 1) + 10(x – 1) + 100 × x

= x + 1 + 10x – 10 + 100x

= 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,

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

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

$$333x = 2664$$

$$x = \frac{2664}{333}$$

$$= 8$$

$\therefore$ 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.

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

Solution:

Since we know that,

12 – 5 = 7 = A

So, B = 8

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

Hence, A = 7 and B = 8

2.

$$\begin{array}{r} 5\ A \\ +\ 7\ 9 \\ \hline C\ B\ 3 \\ \hline \end{array}$$

Solution:

Since we know that,

9 + 4 = 13, ∴ A = 4

B = 1 + 5 + 7 = 3

C = 1

$$
\begin{array}{rrr}
 & 5 & 4 \\
+ & 7 & 9 \\
\hline
1 & 3 & 3 \\
\hline
\end{array}
$$

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

3.

$$
\begin{array}{rrrr}
 & \mathbf{4} & \mathbf{2} & \mathbf{A} \\
+ & \mathbf{2} & \mathbf{A} & \mathbf{5} \\
\hline
 & \mathbf{A} & \mathbf{0} & \mathbf{2} \\
\hline
\end{array}
$$

Solution:

Since we know that,

5 + 7 = 12, ∴ A = 7

1 + 2 + 7 = 10

1 + 4 + 2 = 7 = A

$$
\begin{array}{rrrr}
 & 4 & 2 & 7 \\
+ & 2 & 7 & 5 \\
\hline
 & 7 & 0 & 2 \\
\hline
\end{array}
$$

Hence, A = 7

4.

$$\begin{array}{cccc} & \mathbf{A} & \mathbf{A} \\ + & \mathbf{A} & \mathbf{A} \\ \hline \mathbf{B} & \mathbf{A} & \mathbf{3} \\ \hline \end{array}$$

Solution:

Since we know that,

A = 4 or 9

$A \neq 4$ as A + A = A, $4 + 4 \neq 4$

A = 9

B = 1

$$\begin{array}{cccc} & 9 & 9 \\ + & 9 & 9 \\ \hline 1 & 9 & 3 \\ \hline \end{array}$$

Hence A = 9, B = 1

5.

$$\begin{array}{cccc} & \mathbf{1} & \mathbf{8} & \mathbf{A} \\ + & \mathbf{B} & \mathbf{A} & \mathbf{7} \\ \hline & \mathbf{C} & \mathbf{B} & \mathbf{2} \\ \hline \end{array}$$

Solution:

Since we know that,

$5 + 7 = 12$

$\therefore A = 5$

$B = 4, C = 6$

$$\begin{array}{cccc} & 1 & 8 & 5 \\ + & 4 & 5 & 7 \\ \hline & 6 & 4 & 2 \\ \hline \end{array}$$

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

6.

$$\begin{array}{ccccc} & \mathbf{A} & \mathbf{2} & \mathbf{1} & \mathbf{B} \\ \mathbf{+} & \mathbf{1} & \mathbf{C} & \mathbf{A} & \mathbf{B} \\ \hline & \mathbf{B} & \mathbf{4} & \mathbf{9} & \mathbf{6} \\ \hline \end{array}$$

Solution:

Since we know that,

$B = 3$ or 8

If $B = 8$

$1 + 1 + 7 = 9$ then $A = 7$

$C = 4 - 2 = 2$

$7 + 1 = 8 = B$

$$\begin{array}{r} 7\ 2\ 1\ 8 \\ +\ 1\ 2\ 7\ 8 \\ \hline 8\ 4\ 9\ 6 \\ \hline \end{array}$$

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

7.

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

Solution:

Since we know that,

A = 7 (∵ 5 + 7 =12)
1 + 4 + 2 = 7(A)
∴ B = 2
1 + 2 + 5 = 8, C = 5

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

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

8.

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

Solution:

Since we know that,

B – 6 = 7

B = 3

A – 1 – B = 4

A – 1 – 3 = 4, A = 4 + 4 = 8

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

Hence, A = 8, B = 3

9.

$$\begin{array}{r} \mathbf{2}\ \mathbf{A} \\ \times\ \mathbf{3}\ \mathbf{A} \\ \hline \mathbf{B}\ \mathbf{7}\ \mathbf{A} \\ \hline \end{array}$$

Solution:

Since we know that,

A = 1 or 6 or 5 as 1 × 1 = 1

or 6 × 6 = 6

or 5 × 5 = 5

Taking A = 5

B = 8

$$\begin{array}{ccc} & 2 & 5 \\ \times & 3 & 5 \\ \hline 1 & 2 & 5 \\ 7 & 5 & \times \\ \hline 8 & 7 & 5 \\ \hline \end{array}$$

Hence, A = 5, B = 8

10.

$$\begin{array}{ccc} & \mathbf{A} & \mathbf{B} \\ \times & \mathbf{A} & \mathbf{B} \\ \hline \mathbf{6} & \mathbf{A} & \mathbf{B} \\ \hline \end{array}$$

Solution:

Since we know that,

B × B = B

B = 1, 6, 5

If B = 5, and A = 2, then

25 × 25 = 625

$$\begin{array}{ccc} & 2 & 5 \\ \times & 2 & 5 \\ \hline 6 & 2 & 5 \\ \hline \end{array}$$

Hence, A = 2 and B = 5

11.

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

Solution:

Since we know that,

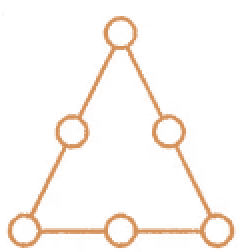
A = 2 or 8

Let A = 2

$$\begin{array}{r} 2\ 2 \\ \times\ 4\ 2 \\ \hline 9\ 2\ 4 \\ \hline \end{array}$$

Hence, A = 2

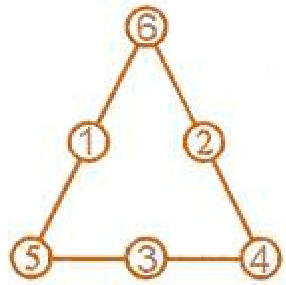
12. Fill in the numbers from 1 to 6 (without repetition) so that each side of the magic triangle adds up to 12.

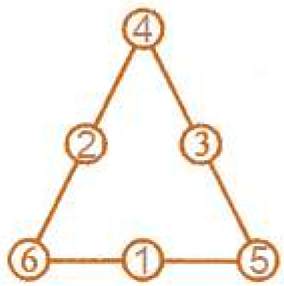


Solution:

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 + 15 = 30

3 + 12 = 5 + 10 = 30

3 + 14 + 0 = 17 + 13 = 30

0 + 6 = 9 + 15 = 30

0 + 7 + 12 = 19 + 11 =30

15 + 1 + 12 = 28 + 2 = 30

8 + 6 + 11 = 25 + 5 = 30

13 + 6 + 1 = 20 + 10 = 30

14 + 5 + 2 = 21 + 9 = 30

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

3

3 3

3 9 3

3 – 27 3

3 – 729 – 3

– – – – – 3

Solution:

Here is the complete triangle:

3

3 3

3 9 3

3 27 27 3

3 81 729 81 3

3 243 59049 59049 243 3

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) 46f8894875
(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 4618894875 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 × 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

∴ x = 2, 5, 8

(ii) 74 × 5284 is divisible by 3

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

Then, 30 + x is divisible by 3

∴ 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
∴ z = 0, 9

9. In each of the following replace × by a digit so that the number formed is divisible by 9:

(i) 49 × 2207
(ii) 5938 × 623
Solution:

(i) 49 × 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 × 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 × 542
(ii) 709 × 94
Solution:

(i) 97 × 542

It is divisible by 6

It is divisible by 2 and 3

Since its unit digit is 2

∴ 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

∴ The '*' place can be replaced by 0 or 3 or 6 or 9.

(ii) 709 × 94

It is divisible by 6

It is divisible by 2 and 3

We know that its unit digit is 4

∴ 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

∴ 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 × 2456
(ii) 86 × 6194
Solution:

(i) 64 × 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 11or 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

∴ * is 6.

(ii) 86 × 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.

Mental Maths

Question 1: Fill in the blanks:

(i) The sum of a 2-digit number and number obtained by reversing the digits is always divisible by 11 and ……….

(ii) The difference of a 2-digit number and number obtained by reversing the digits is always divisible by ………. and ……….

(iii) The difference of a 3=digit number a b c (a > c) and the number obtained by reversing the digits is always divisible by ………. and ……….

(iv) The next number of the series 0, 1, 1, 2, 3, 5, 8, 13, is ……….

(v) The general form of a 2 digit number 57 is ……….

(vi) Usual form of number 100 × 7 + 10 × 4 + 1 is ……….

(vii) If the division N ÷ 5 leaves remainder 4 and the division N ÷ 2 leaves remainder 1, then unit's digit of N must be ……….

(viii) If 213×52 is divisible by 9, then digit x is ……….

Solution:

(i) The sum of a 2-digit number and number obtained by reversing the digits is always divisible by 11 and sum of digits.
(ii) The difference of a 2-digit number and number obtained by reversing the digits is always divisible by 9 and difference of the digits.
(iii) The difference of a 3=digit number a b c (a > c) and number obtained by reversing the digits is always divisible by 99 and (a – c).
(iv) The next number of the series 0, 1, 1, 2, 3, 5, 8, 13, is 21 and 34.
{∵ 8 + 13 = 21 + 13 = 34}

(v) General form of a 2 digit number 57 is 10 × 5 + 7 × 1.

(vi) Usual form of number $100 \times 7 + 10 \times 4 + 1$ is $100 \times 7 + 10 \times 4 + 1$ is 741.

(vii) If the division $N \div 5$ leaves remainder 4 and the division $N \div 2$ leaves remainder 1, then unit's digit of N must be 9.

(viii) If 213×52 is divisible by 9, then digit x is 5. Sum of digits = $2 + 1 + 3 + 5 + 2 + x$ is divisibility 9

$= 13 + x$ is divisible by 9

$\therefore x = 5$ or $13 + 5 = 18 - 9 = 2$

Question 2: State whether the following statements are true (T) or false (F):

(i) If the division N ÷ 5 leaves a remainder 4, then unit's digit of N maybe 1 or 6.

(ii) If the division N ÷ 2 leaves a remainder 1, then unit's digit of N maybe 1, 3, 5, 7 or 9.

(iii) If a number is divisible by any number m, then it will also be divisible by each of the factors of m.

(iv) If a number is divisible by sum of two numbers then it will also be divisible by each of the two numbers separately.

(v) If 3651x is divisible by 9, then value of digit x is 3.

(vi) If 42×7 is divisible by 3, then value of digit x is 4.

(vii) The number 152875 is divisible by 9.

(viii)The number 389072 is divisible by 8.

(ix) The number 27402 is divisible by 6.

(x) The number 359249 is not divisible by 11.

Solution:

(i) If the division N = 5 leaves a remainder 4, then unit's digit of N may be 1 or 6. False

Correct:
The unit digit will be 4 or 9.

(ii) If the division N ÷ 2 leaves a remainder 1, then unit's digit of N may be 1, 3, 5, 7 or 9. True

(iii) If a number is divisible by any number m, then it will also be divisible by each of the factors of m. True

(iv) If a number is divisible by sum of two numbers then it will also be divisible by each of the two numbers separately. False

Correct:
As if 33 is divisible by 7 + 4 = 11, then it will not divisibly by 7 or 4 separately.
(v) If 3651x is divisible by 9, then value of digit x is 3. True

(vi) If 42×7 is divisible by 3, then value of digit x is 4. False
Correct:
As in 4247, sum of digits 4 + 2 + 4 + 7 = 17 is not divisible by 3.

(vii) The number 152875 is divisible by 9. False

Correct:

As digits of 152875 = 1 + 5 + 2 + 8 + 7 + 5 = 28 which is not divisible by 9.

(viii) The number 389072 is divisible by 8. True

(ix) The number 27402 is divisible by 6. True

(x) The number 359249 is not divisible by 11. False

Correct:
As it is divisible by 11

Multiple Choice Questions

Choose the correct answer from the given four options (3 to 13):

Question 3: When the sum of a 2-digit number ab and number obtained by reversing the digits is divided by (a + b), then quotient is
(a) a – b
(b) 9
(c) 11
(d) None of these
Solution:
A 2-digit number ab and number obtained by
reversing the digit is divided by (a + b), then the quotient is 11. (c)

Question 4: When the sum of a 3-digit number abc and numbers obtained by changing the order of the digits cyclically is divided by 111, then quotient is
(a) 37
(b) a – b + c
(c) a + b + c
(d) 3
Solution:
Sum of 3-digit number abc and number obtained by
changing the order of the digits cyclically is divided by 111,
then quotient is a + b + c. (c)

Question 5: If A + A + A = BI, where A and B are different digits, then
(a) A = 1, B = 5
(b) A = 5, B = 2
(c) A = 5, B = 1

(d) A = 7, B = 2

Solution:

A + A + A = BI, where A and B are different digits then A = 7, B = 2.

As unit digit of sum = 1

∴ A will be $x = \frac{\{21\}}{\{3\}} = x = 7$

$\{\because x = \frac{\{11\}}{\{3\}}, \frac{\{31\}}{\{3\}}$ are not naturals$\}$

∴ A = 7, B = 2 (c)

Question 6. Which of the following numbers is not divisible by 2?

(a) 437218

(b) 437821

(c) 437812

(d) 437182

Solution:

Which of the following is not divisible by 2

437821 as it's unit digit is 1. (b)

Question 7. Which of the following numbers is not divisible by 10?

(a) 32570

(b) 32750

(c) 32500

(d) 32075

Solution:

Which of the given number is not divisible by 10

32075, (as it's unit digit is not zero) (d)

Question 8.Which of the following numbers is divisible by 4?

(a) 98764

(b) 98746

(c) 98674
(d) 98647
Solution:
Which of given number is divisible by 4.
98764 as number forming last two digits is 64
which is divisible by 4. (a)

Question 9.Which of the following numbers is divisible by 8?
(a) 32466
(b) 32476
(c) 32486
(d) 32456
Solution:
Which of the following is divisible by 8.
32456 as number formed by last three digits 456 is divisible by 8. (d)

Question 10.Which of the following numbers is divisible by 11?
(a) 725824
(b) 752824
(c) 725842
(d) 725482
Solution:
Which of the following is divisible by 11.
725824 as the difference of the sum of digits at odd places
and sum of digit an even place is divisible by 11. (a)

Question 11.Which of the following numbers is not divisible by 9?
(a) 24354
(b) 24453
(c) 24534

(d) 24564
Solution:
Which of the following is not divisible by 9.
24564 as the sum of its digits is not divisible by 9. (d)

Question 12. If 467 × 8 is divisible by 3, then value of x
(a) 1
(b) 2
(c) 3
(d) 4
Solution:
$\because$ 467×8 is divisible by 3
$\therefore 4 + 6 + 7 + 8 + x = 25 + x$ is divisible by 3
$\therefore 25 + x = 27, 30, 33$
$\therefore x = 2, 5, 8$
$x = 2$ (b)

Question 13. If 36x52y8 is divisible by 9, then x + y is
(a) 2
(b) 3
(c) 4
(d) 5
Solution:
$\because$ 36x52y8 is divisible by 9
$\therefore 3 + 6 + 5 + 2 + 8 + x + y$
$\Rightarrow 24 + x + y$ is divisible by 9
$24 + (x + y) = 27$
$x + y = 27 – 24 = 3$ (b)

Value Based Question

Question 1: Rishabh plays a game with two dice in a fete. He draw three columns on a chart paper. In the left most column he write the digits less than 7 and in the right most column he write the numbers greater than 7. In the middle column he write digit 7 only. He offer people to keep money on any one of the column. He throws two dice together, if the sum of the digits on the two dice is less than 7, he doubles the money kept on the left most column and collect the money kept on remaining two columns. Similarly, he doubles the money on right most column if the sum of digits is greater than 7 and triples on the middle column if sum of the digits is 7. What digits should he write on left most and right most columns?
Is this game a sort of gambling? Is gambling a good way of earning money?

Solution:

Two dice are thrown:

Less than 7	More than 7
1	7
2	8
3	9
4	10
5	11
6	12

It is a sort of gambling which is against
the law of government as well as society.
It should be stopped.

Higher Order Thinking Skills (Hots)

Question 1: If the difference of two digit number and number obtained by reversing the digits is 45, then write all possible 2-digit numbers.

Solution:

The difference of 2-digit number and the number obtained by reversing the digits is 45, then the two numbers will be

16, 61 ($\because$ 61 – 16 = 45)
27, 72 ($\because$ 72 – 27 = 45)
38, 83 ($\because$ 83 – 38 = 45)
49, 94 ($\because$ 94 – 49 = 45)

Check Your Progress

Question 1: In a 2-digit number, sum of digits is 7. If the difference of 2 digit number and number obtained by reversing the digits is 9, then find the number.

Solution:

Sum of a two-digit number = 7
Let unit digit = x
and ten's digit = y
Then $x + y = 7$ …(i)
and number will be $x + 10y$
By reversing the order of the digits,
Unit digit=y
and ten's digit = x
Then number = $y + 10x$
$\therefore (r + 10y) - (y + 10x) = 9$
$\Rightarrow x + 10y - y - 10x = 9$
$\Rightarrow 9y - 9x = 9 \Rightarrow y - x = 1$ …(ii)
Adding (i) and (ii),
$2y = 8 \Rightarrow y = 4$ and $x = 7 - 4 = 3$
$\therefore$ Number = $3 + 10 \times 4 = 3 + 40 = 43$
and $4 + 10 \times 3 = 4 + 30 = 34$

Question 2: In a 3 digit number, the difference of hundred's digit and unit's digit is 5. Find the quotient when the difference of 3-digit number and number obtained by reversing the digits is divided by 9.

Solution:

In 3-digit number,
Let unit digit = x

Ten’s digit = y
and hundreds digit = z
Now, number x + 10y + 100z
and y – x = 5 …..(i)
By reversing the digits,
Unit digit = z
Tens’ digit = y
Hundred digit = x
Then number,
⇒ z + 10y + 100x
According to the condition,

$$\frac{(x+10y+100z)-(z+10y+100x)}{9}$$

$$\Rightarrow \frac{x+10y+100z-z-10y-100x}{9}$$

$$= \frac{99z-99x}{9} = 11z - 11x$$

$$= 11(z-x) = 11 \times 5 \quad \text{[From (i)]}$$

$$= 55$$

Question 3: Without actual calculation, write the quotient when sum of 3 digit numbers 567, 675 and 756 is divided by
(i) 111
(ii) 18
(iii) 37
(iv) 3
Solution:
Sum of 3-digit of 3-digit number
= x + y + z = 5 + 6 + 7 = 18
Sum of 3-digit number = 567 + 675 + 756

(i) When divided by 111, then quotient = $x + y + z = 5 + 6 + 7$
(ii) When divided by 18, then quotient = 111
(iii) When divided by 37, then $3 \times 18 = 54$
(iv) When divided by 3, then = $37 \times 18 = 666$

Question 4: Find the values of the letters in each of the following and give reasons for the steps involved:

(i)

$$\begin{array}{ccc} A & B & 2 \\ + & 2 & A \\ \hline A & A & 8 \\ \hline \end{array}$$

(ii)

$$\begin{array}{cccc} & 4 & A & B \\ + & A & B & 7 \\ \hline 1 & 0 & 2 & 3 \\ \hline \end{array}$$

(iii)

$$\begin{array}{ccc} A & A & B \\ & \times & B \\ \hline 8 & 8 & A \\ \hline \end{array}$$

Solution:

(i)

$$\begin{array}{ccc} 6 & 4 & 2 \\ + & 2 & 6 \\ \hline 6 & 6 & 8 \\ \hline \end{array}$$

$A = 8 – 2 = 6$
$B = A – 2 = 6 – 2 = 4$
$\therefore A = 6, B = 4$

(ii)

$$\begin{array}{cccc} & 4 & 5 & 6 \\ + & 5 & 6 & 7 \\ \hline 1 & 0 & 2 & 3 \\ \hline \end{array}$$

$3 = 7 + B \Rightarrow B = 3 – 7 = 13 – 7 = 6$
$A = 2 – B = 2 – 6 = 12 – 6 = 6 – 1 = 5$
$\therefore A = 5, B = 6$

(iii)

$$\begin{array}{ccc} 4 & 4 & 2 \\ & \times & 2 \\ \hline 8 & 8 & 4 \\ \hline \end{array}$$

$B \times B = A$
$\therefore B = 2 \times 2 = 4$
and $4 \times 2 = 8$
Hence, $A = 4, B = 2$

Question 5: If 923×783 is divisible by 11, what is the value of digit x?
Solution:
923×783 is divisible by 11
3 + 7 + 3 + 9 = 22 and 8 + x + 2 = 10 + x
Then 22 – 10 – x divisible by 11
12 – x = divisible by 11 x = 1

Question 6: Check the divisibility of following numbers by 2, 3, 9 and 11:

(i) 76543
(ii) 65432
(iii) 98765436
(iv) 234567
Solution:
2, 3, 9, 11
(i) 76543
(a) Sum of digits = 7 + 6 + 5 + 4 + 3 = 25
∵ Unit digit is 3,
∴ It is not divisible by 2

(b) ∵ Sum of digits = 25
∴ It is not divisible by 3 as well by 9
(c) Sum of digits on odd places = 3 + 5 + 7 = 15
and on even places = 4 + 6 = 10
and difference = 15 – 10 = 5
∴ It is not divisible by 11 also.

(ii) 65432
(a) ∵ Its unit digit is 2
∴ It is divisible by 2

(b) Sum of digits = 6 + 5 + 4 + 3 + 2 = 20
So, it is not divisible by 3 as well as by 9

(c) Sum of digits at odd places = 2 + 4 + 6 = 12
and even places = 3 + 5 = 8 Difference = 12 – 8 = 4
∴ It is also not divisible by 11.

(iii) 98765436
(a) ∵ Its unit's digit is 6
∴ It is divisible by 2

(b) Sum of digits
=6 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 48
It is divisible by 3 but not by 9

(c) Sum of digits at odd places = 6 + 4 + 6 + 8 = 24
and at even places = 3 + 5 + 7 + 9 = 24
Difference = 24 – 24 = 0
∴ It is divisible by 11.

(iv) 234567
(a) ∵ Unit digit is 7
∴ It is not divisible by 2

(b) Sum of digits = 7 + 6 + 5 + 4 + 3 + 2 = 27
∴ It is divisible by 3 as well as by 9

(c) Sum of digits at odd places = 7 + 5 + 3 = 15
and at even places = 6 + 4 + 2 = 12

Difference = 15 – 12 = 3
∴ It is not divisible by 11.

Question 7.Check the divisibility of the following numbers by 5 or 10:

(i) 23565
(ii) 45270
Solution:
5 or 10
(i) 23565
∵ It's unit's digit is 5.
∴ It is divisible by 5 not by 10

(ii) 45270
∵ It's unit's digit is 0
∴ It is divisible by 5 as well as by 10

Question 8: Check the divisibility of the following numbers by 4 or 8:

(i) 47596
(ii) 593024
Solution:
4 or 8
(i) 47596
(a) ∵ The number formed by its last 2-digits = 96 which is divisible by 4
∴ It is divisible by 4

(b) The number formed by its last 3-digits = 596
Which is not divisible by 8
∴ It is not divisible by 8

(ii) 593024

(a) ∵ The number formed by its last 2-digit = 24

Which is divisible by 4

∴ It is divisible by 4

(b) The number formed by last 3-digit = 024

Which is divisible by 8

∴ It is divisible by 8 also.