



SpeedLabs
MATHS

ICSE 8th

TEEVRA EDUTECH PVT. LTD.

1. What is the original number, if the sum of the digits of a two-digit number is seven. By interchanging the digits is twenty seven more than the original number?

Ans. Let the original number be $10a + b$.

Then, 'a' is the tens digit and 'b' is the units digit.

Since the sum of the digits is 7,

Therefore $a + b = 7$,

i.e., $b = 7 - a$.

So, the original number is $10a + (7 - a)$.

Therefore, the number obtained by interchanging the digits is

$10(7 - a) + a$,

and so we have $\{10(7 - a) + a\} - \{10a + (7 - a)\} = 27$.

Solving this equation, we get

$a = 2$.

And so, $b = 7 - 2$

$= 7 - 2$

$= 5$.

Hence, the original number is $10a + b = 20 + 5 = 25$.

2. In a two-digit number, the digit in the units place is four times the digit in the tens place and sum of the digits is equal to 10. What is the number?

Ans. Let the original number be $10a + b$

Then, $b = 4a$ and $a + b = 10$.

We put $b = 4a$ in $a + b = 10$ so that $a + 4a = 10$,

i.e., $5a = 10$,

i.e., $a = 2$.

Therefore, $a = 2$

and $b = 4a$, [where we know $a = 2$]

$b = 4 \times 2$

$b = 8$

Hence, the number is $10a + b = 20 + 8 = 28$.

3. Complete the magic square given below so that the sum of the numbers in each row or in each column or along each diagonal is fifteen.

6	1	
	5	

- Ans.** The number in the lower-right corner = $15 - (6 + 5) = 4$. Fill this number in the cell.
 The number in the lower-middle cell = $15 - (1 + 5) = 9$. Fill this number in the cell.
 The number in the lower-left corner = $15 - (9 + 4) = 2$. Fill this number in the cell.
 The number in the middle-left cell = $15 - (6 + 2) = 7$. Fill this number in the cell.
 The number in the upper-right corner = $15 - (6 + 1) = 8$. Fill this number in the cell.
 The number in the middle-right cell = $15 - (7 + 5) = 3$. Fill this number in the cell.

6	1	8
7	5	3
2	9	4

4. Insert the eight four-digit numbers in the 4×4 grid, four reading across and four reading down.

5 4 1 7
 9 1 3 2
 8 6 2 1
 3 7 5 1
 6 1 9 3
 1 4 7 6
 2 7 3 5
 6 5 2 8

- Ans.** We begin with selecting the two numbers which have the same first digit. Such numbers are 6193 and 6528. Place any of these numbers (say 6193) in the top row. Then, the other number (6528) will appear in the leftmost column. The number 1476 will appear in the second left column. The number 9132 will appear in the third left column and the number 3751 will appear in the rightmost column.

6	1	9	3
5	4	1	7
2	7	3	5
8	6	2	1

The grid will then appear as shown alongside.

5. In the following problem, replace the letters of the English alphabet by digits (two or more letters may have the same value) to complete the procedure of division.

$$\begin{array}{r}
 \overline{) 4AB} \\
 \underline{-DE} \\
 3F \\
 \underline{-GH} \\
 0
 \end{array}$$

Ans. In the quotient, the first number is 5 and we know that $9 \times 5 = 45$.

Therefore, $D = 4$ and $E = 5$.

Now, $48 - 45 = 3$

Therefore, $A = 8$.

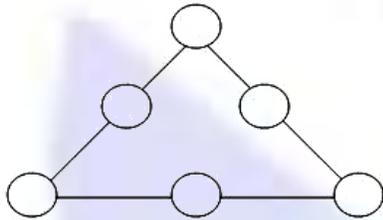
Also, to make the number $3F$ to be divisible by 9 we must have $F = 6$.

And so, $C = 4$ and $B = 6$. Also, $G = 3$, $H = 6$.

Thus, the division works out as shown below:

$$\begin{array}{r} 54 \\ 9 \overline{) 486} \\ \underline{- 45} \\ 36 \\ \underline{- 36} \\ 0 \end{array}$$

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

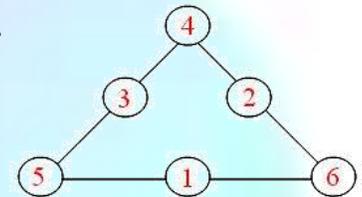


Ans. Place the largest numbers, i.e., 4, 5 and 6, at the three corners of the triangle.

Now, $4 + 5 = 9$, $4 + 6 = 10$ and $5 + 6 = 11$

Therefore, by placing 3 between 4 and 5, 2 between 4 and 6, and 1 between

5 and 6 we get the desired magic triangle.



7. Ask a friend to write any number 'a'. Again, ask him to write any other number 'b'. Add the two numbers to get the 3rd number. To this (third) number add the number 'b'. You thus get the 4th number. To this (fourth) number add the 3rd number so as to get the 5th number. Add the 4th and the 5th numbers to get the 6th number. Continue the process till you reach the 10th number. Ask your friend to calculate the sum of all the 10 numbers you obtained. You can solve it before anyone else. How?

Ans. Let the first two numbers be 13 and 16.

Then, you get your ten numbers as:

1st — 13

2nd — 16

3rd — 29

4th — 45

5th — 74

6th — 119

7th — 193

8th — 312

9th — 505

10th — 817

You can obtain the sum simply by multiplying the seventh numbers, i.e., 193, by 11.

You thus get 2123. (This result can be verified by actually adding up the above 10 numbers.)

Note: Such numbers are called **Fibonacci numbers**.

In a Fibonacci system of numbers we get the ten numbers as:

a, b, (a + b), (a + 2b), (2a + 3b), (3a + 5b), (5a + 8b), (8a + 13b), (13a + 21b), (21a + 34b).

Adding all these numbers we get the sum (55a + 88b) which is equal to 11(5a + 8b), i.e., 11 times the seventh number.

8. In the following grid, fill up the numbers from 2 to 9 (repetition not allowed) such that there occur only two numbers in each row and also in each column. The product of the two numbers must be equal to the number given in the margin.

				36
				35
				24
				12
45	32	16	14	

Ans.

9	4			36
5			7	35
	8	3		24
		6	2	12
45	32	16	14	

Hints: Begin by placing the lowest number, i.e., 2, in the square corresponding to the two smallest multiples of this number (i.e., 2) in the margins.

9. Complete the magic square:

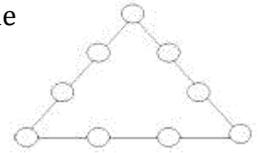
	14		0
8		6	11
4			5
	2	1	12

Ans.

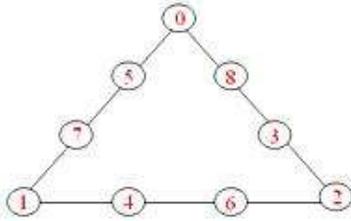
3	14	13	0
8	5	6	11
4	9	10	7
15	2	1	12

Trick: Sum up the numbers in the column which is completely filled with numbers. Proceed with completing the row or column which has three numbers and only one cell empty.

10. In the following triangle, fill in the numbers from 0 to 8 (without repetition) in the nine circles so that the numbers on each side of the triangle add up to 13.

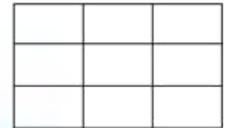


Ans.



Trick: Put 0, 1 and 2 at the three vertices of the triangle.

11. In the given 3×3 grid, arrange the digits from 1 to 9 (without repetition) such that the sum of the numbers surrounding any cell is a multiple of the number in the cell.



Ans.

4	8	9
1	3	7
5	6	2

Note: There is only one possible arrangement, except that any of the rotated forms of the above arrangement may be displayed.

12. In the magic box there are 10 hidden mines. Around the numbered square the total number of mines hidden in the 8 squares, indicates the numbers in various squares. Now you have to find 10 mines.

	2			0		1	
	3		1		2		
	1	0		1			
	2					1	0
	1			0		1	
1	1		1			1	
	1			1	1	2	2
			1		1		

Note that: The numbered squares do not have any mines.

Hint: There is a mine in the lower-left corner.

Ans.

M	2	M	X	0	X	1	X
X	3	X	1	X	2	M	1
M	1	0	X	1	M	X	X
X	2	X	X	X	X	1	0
M	1	X	X	0	X	1	X
1	1	X	1	X	X	1	M
X	1	X	M	1	1	2	2
M	X	1	X	1	X	M	X

Trick: First cross out all empty squares around the squares numbered 0. Then, begin by using the Hint (provided in the question).

13. Find the digits x and y ($x > y$) such that the five-digit number $19x9y$ is divisible by 36.

Ans. A number is divisible by 36 if it is divisible by both 4 and 9.

Now, for $19 \times 9y$ to be divisible by 4,

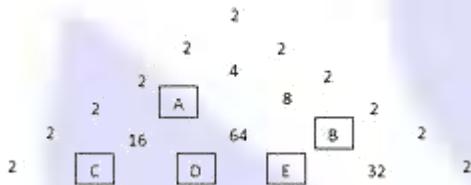
we must have $y = 2$ or $y = 6$ (since the number formed by the last two digits must be divisible by 4).

Also, for $19 \times 9y$ to be divisible by 9, the sum of the digits must be divisible by 9.

Therefore, when $y = 2$, then $x = 6$ and when $y = 6$, then $x = 2$.

Since, $x > y$, we have $x = 6, y = 2$.

14. Find the values A, B, C, D and E to complete the number triangle given below:



Ans. $A = 8, B = 16, C = 32, D = 1024, E = 1024$

Explanation: Each number is equal to the product of the two nearest numbers in the row just above it.

15. Solve the following cryptograms .

(A cryptogram is an arithmetic puzzle formed by replacing the digits by the letters of the English alphabet):

(i) Find the values of A, B and C for

Ans. $A = 1, B = 2$ and $C = 5$

(ii) Find the values of A, B, C, D, E, F, G, H and I for

Ans. $A = 5, B = 7, C = 9, D = 2, E = 6, F = 1, G = 8, H = 4, I = 0$