Name : ________________________

Grade : VIII

Subject : Mathematics

Chapter : 16. Playing with numbers

Objective Type Questions **1 Marks**

I. Multiple choice questions

1. Generalised form a four-digit number abdc is **[NCERT Exemplar]**

a. $1000a + 100b + 10c + d$ b. $1000a + 100c + 10b + d$

c. $1000a + 100b + 10d + c$ d. $a \times b \times c \times d$

2. Generalised form of a two - digit number xy is **[NCERT Exemplar]**

a. $x + y$ b. $10x + y$ c. $10x - y$ d. $10y + x$

3. The usual form of 1000a + 10b + c is: **[NCERT Exemplar]**

a. abc b. abco c. aobc d. aboc

4. Let abc be a three-digit number. Then abc-cba is not divisible by. **[NCERT Exemplar]**

a. 9 b. 11 c. 18 d. 33

5. The sum of all the number formed by the digits x, y and z of the number xyz is divisible by **[NCERT Exemplar]**

a. 11 b. 33 c. 37 d. 74

6. A four digit number aabb is divisible by 55. Then possible value of b is / are. **[NCERT Exemplar]**

a. 0 and 2 b. 2 and 5 c. 0 and 5 d. 7

7. Let abc be a three digit number. Then abc + bca + cab is not divisible by **[NCERT Exemplar]**

a. a + b + c b. 3 c. 37 d. 9

8. A four-digit number 4 ab 5 is divisible by 55. Then the value of b - a is: **[NCERT Exemplar]**

a. 0 b. 1 c. 4 d. 5

9. If abc is a three digit number, then the number abc -a -b -c is divisble by **[NCERT Exemplar]**

a. 9 b. 90 c. 10 d. 11

10. A six-digit number is formed by repeating a three digit number. For example 256256, 678678, etc. Any number of this form is divisible by. **[NCERT Exemplar]**

a. 7 only b. 11 only c. 13 only d. 1001

11. If the sum of digits of a number is divisible by three, then the number is always divisible by **[NCERT Exemplar]**

a. 2 b. 3 c. 6 d. 9

12. If x + y + z = 6 and z is an odd digit, then the three-digit number xyz is **[NCERT Exemplar]**

a. an odd multiple of 3 b. odd multiple of 6

c. even multiple of 3 d. even multiple of 9

13. If 5 A + B 3 = 65, then the value of A and B is **[NCERT Exemplar]**

a. A = 2, B = 3 b. A = 3, B = 2 c. A = 2, B = 1 d. A = 1, B = 2

14. If A 3 + 8 B = 150, then the value of A + B is: **[NCERT Exemplar]**

a. 13 b. 12 c. 17 d. 15

15. If 5 A x A = 399, then the value of A is **[NCERT Exemplar]**

a. 3 b. 6 c. 7 d. 9

16. If 6 A x B = A 8 B, then the value of A - B is **[NCERT Exemplar]**

a. -2 b. 2 c. -3 d. 3

17. Which of the following numbers is divisible by 99 **[NCERT Exemplar]**

a. 913462 b. 114345 c. 135792 d. 3572406

1. c	2. b	3. c	4. c	5. c	6. c	7. d	8. b	9. a
10. d	11. b	12. a	13. c	14. a	15. c	16. a	17. b	

II. Multiple choice questions

1. Generalised form of a three-digit number xyx is **[NCERT Exemplar]**

a. $x + y + z$ b. $100x + 10y + z$ c. $100z + 10y + x$ d. $100y + 10z + z$

2. If 5A + 25 is equal to B2, then the value of A + B is

a. 15 b. 10 c. 8 d. 7

3. The sum of all the numbers formed by the digit x, y and z of the number xyz is divisible by

a. 11 b. 33 c. 37 d. 75

4. If $x + y + z = 6$ and z is an odd digit, then the three-digit number xyz is

a. an odd multiple of 3 b. odd multiple of 6

c. even multiple of 3 d. even multiple of 9

5. Which of the following numbers is divisible by 99?

a. 9,13,462 b. 1,14,345 c. 1,35,792 d. 35,72,406

6. If the division N ÷ 2 leaves no remainder and N ÷ 5 leaves remainder 4, then the units digit of N is

a. 4 or 9 b. 4 c. 9 d. number other than 4

7. The number 99,73,820 is divisible by

a. 4, 5 and 6 b. 4, 5, and 10 c. 3, 4 and 5 d. 3, 4 and 9

1. b	2. a	3. c	4. a	5. b	6. b	7. b

I. Fill in the blanks.

1. The sum of a two-digit number and the number obtained by reversing the divisible by ___________________. **[NCERT Exemplar]**

2. The difference of a two-digit number and the number obtained by reversing its digits is always divisible by __________________. **[NCERT Exemplar]**

3. If $\begin{array}{r} 2\ B \\ +\ A\ B \\ \hline 8\ A \\ \hline \end{array}$ then A = _________________ and B = _________________. **[NCERT Exemplar]**

4. If $\begin{array}{r} A\ B \\ \times\ \ B \\ \hline 9\ 6 \\ \hline \end{array}$ then A = _________________ and B = _________________. **[NCERT Exemplar]**

5. If $\begin{array}{r} B\ 1 \\ \times\ \ B \\ \hline 4\ 9B \\ \hline \end{array}$ then B = __________________. **[NCERT Exemplar]**

1. 11	2. 9	3. A = 6, B = 3	4. A = 2, B = 4	5. B = 7

I. True / False

1. A two-digit number ab is always divisible by 2 if b is an even number. **[NCERT Exemplar]**

2. A three-digit number abc is divisible by 5 if c is an even number. **[NCERT Exemplar]**

3. A four-digit number abcd is divisible by 4 if ab is divisible by 4. **[NCERT Exemplar]**

4. A three digit number abc is divisble by6 if c is an even number and a + b + c a multiple of 3. **[NCERT Exemplar]**

5. Number of the form 3N + 2 will leave remainder 2 when divided by 3. **[NCERT Exemplar]**

1. True	2. False	3. False	4. True	5. True

I. Very short answers type questions.

1. If the division N ÷ 5 leaves a remainder of 3, what might be the one's digit of N? [NCERT Exemplar]

The one's digit, when divided by 5, must leave a remainder of 3. So, the one's digit must be either 3 or 8.

2. If the division N ÷ 5 leaves a remainder o 1 what might be the one's digit of N? [NCERT Exemplar]

If remainder = 1, then the one's digit of 'N' must be either 1 or 6.

3. If the division N ÷ 5 leaves a remainder of 4, what might be one's digit of N? Suppose that the division N ÷ 5 leaves a remainder of 4 and the division N ÷ 2 leaves a remainder of 1. What must be the one's digit of N? [NCERT Exemplar]

If remainder = 4, then the one's digit of 'N' must be either 4 or 9.

For $N \div 5$, remainder = 4

$\therefore$ One's digit cna be 4 or 9. ... (i)

Again, for $N \div 2$, remainder = 1

$\therefore$ N must be an odd number.

So, one's digit of N must be 1, 3, 5, 7 or 9. ... (ii)

From (i) and (ii) the one's digit of N must be 9.

4. If the division $N \div 2$ leaves a remainder of 1, what might be the one's digit of N? [NCERT Exemplar]

N is odd; so its one's digit is odd. Therefore, the one's digit must be 1, 3, 5, 7 or 9.

5. Suppose that the division $x \div 5$ leaves a remainder 4 and the division $x \div 2$ leaves a remainder 1. Find the ones digit of x.

Since, $x \div 5$ leaves a remainder 4, so ones digit of x can be 4 or 9. Also, since $x \div 2$ leaves a remainder 1, so one digit must be 9 only.

6. Check the divisibility of the following numbers by 9. **[NCERT Exemplar]**

a. 108 b. 616

a. 108

$\therefore$ 1 + 0 + 8 = 9

and 9 is divisible by 9

$\therefore$ 108 is divisible by 9.

b. 616

We have, 6 + 1 + 6 = 13

and 13 is not divisible by 9

$\therefore$ 616 is also not divisible by 9.

II. Very short answers type questions.

1. If a two digit number ab is always divisible by 2 then what kind of number b is?

Sol. We know that if a number is divisible by 2 then its ones place digit should be even. Hence, b must be an even number.

2. What is the usual form of 1000a +10b + c? **[NCERT Exemplar]**

Since hundred place is not given then 0 will come in hundreds place. Hence, the usual form will be a0bc.

3. What type of numbers are divisible by 33?

All the numbers which are divisible by 3 as well as 11 will be divisible by 33.

4. What is the number by which the sum of any two digit number and its reverse is always divisible?

The number will be 11. Any two digit number is in the form 10 x a + b. Its reverse is 10 x b + a. Sum = 10a + b + 10b + a = 11a + 11b = 11(a + b)

5. What do you mean by Cryptarithms?

Sol. Cryptarithms are puzzles, on various operations on numbers, in which letters take the place of digits and one has to find out which letter represents which digit. (Or) Cryptarithms is a maths puzzle in which the digits are replaced by letters of the alphabet or other symbols.

6. Insert `+-, x or +' in each box to make the statement true.

(i) (50❑ 9) ❑3 = 150 (ii) (60❑ 8) ❑17 = 4

Sol. (i) (50 x 9) ÷ 3 = 450 ÷ 3 =150 ∴ (50 $\boxed{\times}$ 9) $\boxed{\div}$ 9 = 150

(ii) (60 + 8) ÷17 = 68 ÷17 = 4 ∴ (60 $\boxed{+}$ 8) $\boxed{\div}$ 17 = 4

I. Short answers type questions.

1. A three-digit number 42x is divisible by 9. Find the value of x. **[NCERT Exemplar]**

Since, 42x is divisible by 9, the sum of its digits, i.e. 4 _ 2 + x must be divisible by 9.

i.e., 6 + x is divisible by 9.

i.e., 6 + x = 9 or 18, ...

Since, x is a digit, therefore 6 + x = 9 or x = 3.

2. Find the value of A and B if **[NCERT Exemplar]**

$$\begin{array}{r} 4\ 1\ A \\ +\ B\ \ 4 \\ \hline 5\ 1\ 2 \\ \hline \end{array}$$

From ones column A + 4 gives a number whose ones digit is 2. So, A =b 8. The value of B can be obtained by solving 2 + B is a number whose ones digit is 1. So, B = 9.

$$\begin{array}{r} 4\ 1\ 8 \\ +\ \ 9\ 4 \\ \hline 5\ 1\ 2 \\ \hline \end{array}$$

3. Find the value of the letters of the following questions. **[NCERT Exemplar]**

$$\begin{array}{r} 8\ \ 5 \\ +\ 4\ \ A \\ \hline BC\ 3 \\ \hline \end{array}$$

Sol. ∴ 5 + A = 13 or 23 or 33 etc.

∴ A = 13 - 5 = 8

or A = 23 - 5 18 is not possible

$\therefore \quad A = 8$

$$\begin{array}{r r r} & 8 & 5 \\ + & 4 & 8 \\ \hline & 13 & 3 \\ \hline \end{array}$$

Thus A = 8, B = 1, C = 3

4. If 1 P where Q - P = 3, then find the values of

$$\begin{array}{r r} \times & P \\ \hline Q & 6 \\ \hline \end{array}$$

P and Q **[NCERT Exemplar]**

Sol. $\therefore \quad P \times P = 16 \text{ or } 36$

If $P \times P = 16 \Rightarrow P = 4$

Then,
$$\begin{array}{r r} 1 & 4 \\ \times & 4 \\ \hline 5 & 6 \\ \hline \end{array}$$

Hence, $Q = 5, P = 4 \text{ But } Q - P = 3$

So, P = 4 is not possible

Now take $P \times P = 36 \Rightarrow P = 6$

Then,
$$\begin{array}{r r} 1 & 6 \\ \times & 6 \\ \hline 9 & 6 \\ \hline \end{array}$$

Thus, P = 6 and Q = 9

5. If 1 AB = CCA = 697 and there is no carry-over in addition, find the value of A + B + C. **[NCERT Exemplar]**

Sol. 1 AB + CCA = 697

Hence, B + A = 7

A + C = 9

1 + C = 6

$\Rightarrow$ C = 6 - 1 = 5

$\therefore$ A + C = 9

$\Rightarrow$ A + 5 = 9

$\Rightarrow$ A = 4

$$B + A = 7$$

$\Rightarrow$ $B + 4 = 7$

$\Rightarrow$ $B = 3$

Now, $A + B + C = 4 + 3 + 5$

$= 12$

6. In a two digit number the units digit is four times the tens digit and the sum of the digits is 10. Find the number. **[NCERT Exemplar]**

Sol. Let the tens digit $= x$

Then the units digit $= 4x$

According to condition,

$$x + 4x = 10$$

or $5x = 10$

or $x = \frac{10}{5} = 2$

Thus tens digit = 2

and units digit = $4 \times 2 = 8$

Hence, required number = 28

7. $756x$ is a multiple of 11, find the value of x. **[NCERT Exemplar]**

Sol. Since, 756x is a multiple of 11.

Then, $7 + 6 = 5 + x$

$\Rightarrow$ $13 = 5 + x$

$\Rightarrow$ $x = 13 - 5$

$\Rightarrow$ $x = 8$

8. Find all possible values of y for which the 4 digit number $51y^3$ is divisible by 9. Also, find each such number. **[NCERT Exemplar]**

Sol. Since, Number $= 51y^3$

Then sum of digits $= (5 + 1 + y + 3)$

$= (9 + y)$,

Which must divisible by 9

When y = 0 or y = 9

$\therefore$ Required numbers are 5103 and 5193.

II. Short answers type questions.

1. Without actual division find the remainder when 3,79,843 is divided by 3.

We can find the remainder by dividing the sum of all the digits of the given number

Sum of digits = 3 + 7 + 9 + 8 + 4 + 3 = 34

When 34 divided by 3, we get 1 as remainder.

Hence, division of 3,79,843 by 3 leaves remainder 1.

2. If 2A7 + A = 33, then find the value of A. **[NCERT Exemplar]**

Sol $\frac{2A7}{A}$ = 33 $\Rightarrow$2A7 = 33A

$\Rightarrow$ 2x100 +Ax10 + 7 x 1 = 33A

$\Rightarrow$ 200 + 7 +10A = 33A

$\Rightarrow$ 207 = 33A - 10A $\Rightarrow$ 207 = 23A

$\Rightarrow$ A = $\frac{207}{23}$ = 23

Hence, the value of A = 9.

3. $1y3y6$ is divisible by 11. Find the value of y.

As per the divisibility rule of 11,

Sum of even place number = y + y = 2y

and sum of odd place number = 1+ 3 + 6 =10

Now difference = 10 - 2y

If the difference equalises 0, then

10 - 2y = 0

2y =10 $\Rightarrow$ y = 5

4. Fill in the blank squares of the magic square so that the sum of the numbers in each column, row and both the diagonals is 0.

	0	
–11	14	

Let the squares be filled as shown below. Sum of the numbers along one diagonal is -11 + 0 + c = 0

a	*b*	*c*
d	0	*e*
–11	14	*f*

$\Rightarrow$ c = 11

Sum of the numbers along 2nd column = 14 + 0 + b = 0

$\Rightarrow$ b = - 14

Sum of the numbers along first row = a + b + c = 0

$\Rightarrow$ a - 14 + 11 = 0 $\Rightarrow$ a = 3

Sum of the numbers along first column = a + d - 11 = 0

$\Rightarrow 3+d-11=0 \qquad \Rightarrow \qquad d = 8$

Sum of the numbers along second row = d + 0 + e = 0

$\Rightarrow 8 + 0 + e = 0 \qquad \Rightarrow \qquad e = -8$

Sum of the numbers along third row = - 11 + 14 + f = 0

$\Rightarrow f = -3$

$\therefore$ We have

3	–14	11
8	0	– 8
–11	14	– 3

5. Solve:

$$\begin{array}{rrr} & C & A \\ + & A & B \\ \hline D & D & A \\ \hline \end{array}$$

Sol. A + B = A is possible when B = 0, D must be 1 and B = 0,

So, we have

$$\begin{array}{rrr} & C & A \\ + & A & 0 \\ \hline & 11 & A \\ \hline \end{array}$$

Now sum of digits C and A is 11, without a carry digit.

So, these may be 8 + 3 or 3 + 8, or 4 + 7 or 7 + 4, or 6 + 5 or 5 + 6 or 2 + 9 or 9 + 2.

Thus, we may have many answers to these problems like

$$\begin{array}{r} 83 \\ +30 \\ \hline 113 \\ \hline \end{array} \qquad \begin{array}{r} 38 \\ +80 \\ \hline 118 \\ \hline \end{array} \qquad \begin{array}{r} 47 \\ +70 \\ \hline 117 \\ \hline \end{array} \qquad \begin{array}{r} 74 \\ +40 \\ \hline 114 \\ \hline \end{array}$$

$$\begin{array}{r} 56 \\ +60 \\ \hline 116 \\ \hline \end{array} \qquad \begin{array}{r} 65 \\ +50 \\ \hline 115 \\ \hline \end{array} \qquad \begin{array}{r} 92 \\ +20 \\ \hline 112 \\ \hline \end{array} \qquad \begin{array}{r} 29 \\ +90 \\ \hline 119 \\ \hline \end{array}$$

Note that generally a Cryptarithmetic has only one solution. So, we cannot put the above example in this category.

I. Long answer type questions.

1. A three digit number 2 a 3 is added to the number 326 to give a three digit number 5b 9 which is divisible by 9. Find the value of b - a. [NCERT Exemplar]

Sol. Given,

$$\begin{array}{cccc} & 2 & a & 3 \\ + & 3 & 2 & 6 \\ \hline & 5 & b & 9 \\ \hline \end{array}$$

Since, 5 b 9 divisible by 9.

So, (5 + b + 9) is divisible by 9.

So, clearly b = 4

and a = 2

Thus, b - a = 4 - 2

= 2

2. If from a two-digit number, we subtract the number formed by reversing its digit then the result so obtained is a perfect cube. How many such numbers are possible? Write all of them. [NCERT Exemplar]

Sol. Let two digit number be 10 a + b

Number after reversing the digit = 10b + a

According to condition, (10 a + b) - (10 b + a)

= 9a - 9b

= 9 (a - b) is a perfect cube

Then surely a - b = 3

So, if a = 9 then b = 6

So Number = 96

If a = 8 then b = 5

So, number = 85

If a = 7 then b = 4

So, number = 74

If a = 6 then b = 3

So, number = 63

If a = 5 then b = 2

So, number = 52

If a = 4 then b = 1

So, number = 41

If a = 3 then b = 0

So, number = 30

3. Let E = 3, B = 7 and A = 4. Find other digit in the

		B	A	S	E
Sum +		B	A	L	L
	G	A	M	E	S

Sol. Putting the value of E, B and B in the sum

		7	4	S	3
+		7	4	I	I
	G	4	M	3	S

$\therefore$ 7 + 7 = 14, clearly G = 1

3 + L = 5 $\Rightarrow$ S - L = 3 ... (i)

Clearly S + L = 13 ... (ii)

From (i) of (ii), S = 8 and L = 5

and M = 1

So, G = 1, S = 8, L = 5, M = 1

4. Work out the following multiplication

1 2 3 4 5 6 7 9

x 9

Use the result to answer the following question.

a. What will be 12345679 x 45?

b. What will be 12345679 x 63?

c. By what number should 12345679 be multiplied to get 888888888?

d. By what number should 12345679 be multiplied to get 999999999? [NCERT Exemplar]

Sol. 1 2 3 4 5 6 7 8

x 9

a. 12345678 x 45 = (12345679 x 9) x 5

= (111111111) x 5

= 555555555

b. 12345679 x 63 = (12345679 x 9) x 7

= (111111111) x 7

= 777777777

c. ∴ 12345679 x 9 = 111111111

To get 888888888, we should multiply

by 9 x 8 = 72

5. If 51x3 is a multiple of 9, where x is a digit, then what is the value of x?

[NCERT Exemplar]

Sol. We have, the sum of the digits of 51x3 = 5 + 1 + x + 3 = 9 + x

Since, 51x3 is divisible by 9.

∴ (9 + x) must be divisible by 9.

∴ (9 + x) must be equal to 0 or 9 or 18 or 27 or ...

But x is a digit, then

$9 + x = 9 \Rightarrow x = 0$

$9 + x = 18 \Rightarrow x = 9$,

$x = 27 \Rightarrow x = 18$ which is not possible.

∴ The required value of x = 0 *or* 9.

II. Long answer type questions.

1. Let D = 3, L = 7 and A = 8. Find the other digits in the sum. **[NCERT Exemplar]**

```
  M A D
  + A S
  +   A
-------
B U L L
```

Sol. By putting values we get

```
  M 8 3
  + 8 S
  +   8
-------
B U 7 7
```

Considering the sum of ones place we get

$3 + S + 8 = 17$

$S = 17 - 11 = 6$

Tens place will come 7 easily

Now the sum of Hundreds place; 1 will come as carry over and M + 1 is resulting of 2 digits, i.e., B and U, so, M must be 9.

Hence, the final value be

```
 9 8 3
   8 6
     8
-------
1 0 7 7
-------
```

Hence, M = 9, S = 6, B = 1, U = 0.

2. Fill in the boxes with the correct digits.

3 ❑ 4 ❑	(I Row)
x 3 7 1	(II Row)
❑❑❑❑	(III Row)
❑❑3 ❑2 x	(IV Row)
9 1 ❑ 8 x x	(V Row)
❑❑❑0 0 6 ❑	(VI Row)

Sol. Give number to each row. Since all blanks are given for multiplication by 1 in 371.

∴ We will look for 7.

The units digit is given as 2 (see IV Row)

We know, $7 \times 6 = 42$

Unit digit for number in I Row is 6

Now, multiply 7 by 4, to complete IV Row and I Row.

Thus we have,

3 ❑ 4 ❑	(I Row)
x 3 7 1	(II Row)
❑❑❑❑	(III Row)
❑❑3 ❑ 2 x	(IV Row)
9 1 ❑ 8 x x	(V Row)
❑❑❑ 0 0 6 ❑	(VI Row)

Now, the whole multiplication can easily be completed as we have got both the numbe to be multiplied with.

```
    3 0 4 6
    x 3 7 1
-----------
    3 0 4 6
  2 1 3 2 2 x
  9 1 3 8 x x
-----------
 11 3 0 0 6 6
-----------
```

3. Without performing actual computation, write the quotient when sum of all possibly 3-digit numbers formed by three digits 4, 6, 7 is divided by:

(i) 222. (ii) 17.

Sol. (i) We know that when the sum of all possible 3-digit numbers formed by given three digits is divided by 222 gives quotient the sum of the digits. So, the sum of all possible 3-digit numbers formed by three digits 4, 6, 7 when divided by 222 gives quotient 17(4 + 6 + 7)

(ii) We know that when the sum of all possible 3-digit numbers formed by given t hive digits is divided by sum of the digits gives quotient 222. So, the sum of all possible 3-digit numbers formed by three digits 4, 6, 7 when divided by 17(4 + 6 +7) gives quotient 222.

4. Find the value of A, B, C, D, E, F, G and H to complete the procedure of division.

Sol. In the puzzle, first number of quotient is 5.

So, 9 x 5 = DE ⇒ 45 = DE ⇒ D = 4 and E = 5

Now, 48 - 45 = 3. Therefore, A = 8

Also, to make the number 3F divisible by 9 we must have F = 6 and so C = 4 and B = 6

Also, since 3F - GH = 0 ⇒ 3F = GH

⇒36 = GH [∴ F = 6]

⇒G = 3 and H = 6

```
9 ) 4 A B ( 5C
  - D E
    ---
      3 F
    - G H
    -----
        0

9 ) 4 8 6 ( 54
  - 4 5
    ---
      3 6
    - 3 6
    -----
        0
```

I. High order Thinking Skills [HOTS] Questions.

1. a. Find the values of A, B, C, D, E, F and G in the following.

$$
\begin{array}{r}
AB)\overline{4CDE}\,(1FG \\
-28 \\
\hline
15D \\
-140 \\
\hline
16E \\
-16E \\
\hline
\times \\
\hline
\end{array}
$$

b. Write a 3 digit number abc as

$100a + 10b + c = 99a + 11b + (a - b + c)$

$= 11 (9a + b) + (a - b + c)$

If the number is divisible by 11, then what can you say about $(a - b + c)$? Is it necessary that $(a + c - b)$

Should be divisible by 11?

Sol. a. Clearly A = 2, b = 8

Now, (13 - 8) =5, then c = 3

$$
\begin{array}{r}
28)\overline{4CDE}\,(156 \\
-28 \\
\hline
15D \\
-140 \\
\hline
16E \\
-168 \\
\hline
\times \\
\hline
\end{array}
$$

$\therefore$ $28 \times 5 = 140$

$\Rightarrow$ $F = 5$

$D - 0 = 6$

$\Rightarrow$ $D = 6$

Also, $28 \times 6 = 168$

$\Rightarrow$ G = 6 and E = 8

Hence, A = 2, B = 8, C = 3, D = 6, E = 8, F = 5 and G = 6

b. Yes! it is necessary that $(a - b + c)$ should be divisible by 11.

2. a. Without performing actual division, find the remainder when 28735429 is divisible by 11.

b. Can 231 be written is an even digit number, then 28735429 = a multiple of 11 + sum of its digits in even places sum of its digits in odd places.

= a multiple of 11 + (8 + 4 + 3 + 9) - (2 + 7 + 5 + 2)

= a multiple of 11 + 24 - 16

= a multiple of 11 + 8

Hence, required number = 8

b. Yes, 231 can be written in the form of $10b + a$

i.e., since (231 - 1) is divisible by 10, then

231 - 1 = 230

⇒ 231 - 1 = 10 x 23

⇒ 231 - 1 = 10 x 23 + 1

⇒ 231 = 10b = a

Where a = 1 and b = 23

II. High order Thinking Skills [HOTS] Questions.

1. Given that the number $\overline{148101a095}$ is divisible by 11, where a is some digit, what are possible value of a?

Sol. If $\overline{148101a095}$ is divisible by 11, then (1 + 8 + 0 + a + 9) - (4 + 1 + 1 + 0 + 5) must be a multiple of 11.

⇒ (a + 18) - 11 is a multiple of 11 ⇒ a + 7 should be multiple of 11

It means either a + 7 = 0 or a + 7 = 11 ...(1)

or a + 7 = 22 and so on

But a is a digit which can vary from 0 to 9

From (1) a + 7 = 11 ⇒ a = 11 - 7 = 4

Hence, possible value of a = 4.

2. A number trick is given below

"Think of a 3-digit number; add 7 to it; then double it; subtract 4 and then divide it by 2. Now subtract the original number from this. You will be left with 5!"

Explain how this trick works.

Sol. Let that number be 345

Add 7 → 345 + 7 = 352

Double it → 352 x 2 = 704

Subtract 4 → 704 - 4 = 700

Divide by 2 → $\frac{700}{2}$ = 350

Subtract original number → 350 - 345 = 5

It is required number.

Explanation: Let the three digit number be abc. Then abc = 100a + 10b + c

Adding 7 gives → 100a + 10b + c + 7

Double it → 2(100a + 10b + c + 7)

Subtract 4 → 200a + 20b + 2c + 14 - 4

Divide by 2 → $\frac{200a}{2} + \frac{20b}{2} + \frac{2c}{2} + \frac{10}{2} = 100a + 10b + c + 5 = abc + 5$

Subtracting the original number gives → $abc + 5 - abc = 5$

I. Value based questions.

1. a. In a 3-digit number, the hundreds digit is twice the tens digit while the units digit is thrice the tens digit. Also, the sum of its digits is 19.

b. Write a 4-digit number abcd as

1000a + 100b + 10c + d = (1001a + 99b + 11c) - (a - b + c - d)

= 11 (91a + 9b + c) + [(b = d) - (a + c)]

If the number abcd is divisible by 11, then what can you say about [(b + d) - (a + c)]?

Sol. a. Let the tens digit = x

Then hundreds digit $= 2x$

and the units digit $= 3x$

According to condition,

$2x + x + 3x = 18$

$\Rightarrow$ $6x = 18$

$\Rightarrow$ $x = 3$

Therefore, hundreds digit = 2 × 3 = 6

tens digit = 3

units digit = 9

Hence, required number = (100 × 6 + 10 × 3 + 9

= 639

b. $[(b = d) - (a + c)]$ is divisible by 11.