15. Playing with Numbers

Exercise - 15.1

1. Using divisibility rules, find which of the following numbers are divisible by 2, 5, 10 (say yes or no) in the given table. What do you observe?

Numbers	Divisible by 2	Divisible by 5	Divisible by 10
524	Yes	NO	NO
1200			
535			
836			
780			
3005			
4820			
48630			

Soln:-

Numbers	Divisible by 2	Divisible by 5	Divisible by 10
524	Yes	NO	NO
1200	Yes	Yes	Yes
535	NO	Yes	NO
836	Yes	NO	NO
780	Yes	Yes	Yes
3005	NO	Yes	NO
4820	Yes	Yes	Yes
48630	Yes	Yes	Yes

2. Using divisibility test, determine which of the following numbers are divisible by 2.

a] 2144

Soln:- The last digit of the given number is 4, which is even.
Therefore, this number is divisible by 2.

b] 1258

Soln:- The last digit of given number is 8, which is even.
Therefore, this number is divisible by 2.

c] 4336

Soln:- The last digit of the given number is 6, which is even.
Therefore, this number is divisibly by 2.

d] 633

Soln:- The last digit of given number is 3, which is odd.
Therefore, this number is not divisible by 2.

e) 1352

Soln: The last digit of the given number is 2, which is even.
Therefore, this number is divisible by 2.

3. Using, divisibility test, determine which of the following numbers are divisible by 5.

a) 438750
b) 179015
c) 125
d) 639210
e) 17852

Soln: A number is divisible by 5, if its units digit be either '0' or 5.

∴ a) 438750, b) 179015, c) 125, d) 639210. are divisible by 5

4. Using divisibility tests, determine which of the following numbers are divisible by 10.

a) 54450
b) 10800
c) 7138965
d) 7016930
e) 10101010

Soln: If a number is divisible by 10, then its units digit must be '0'.

∴ a] 57450, b] 10800, d] 7016930
e] 1010101$\underline{0}$ are divisible by 10.

5. Write the number of factors for the following?

a] 18

Soln: The factors of 18 are:
1, 2, 3, 6, 9, 18.

Thus, the total no. of factors of 18 is 6.

b] 24

Soln: The factors of 24 are:
1, 2, 3, 4, 6, 8, 12, 24.

∴ Thus, the total no. of factors of 24 is 8.

c] 45

soln: Thus factors of 45 are:
1, 3, 5, 9, 15, 45

Thus, 6 factors of 45.

d] 90

Soln: The factors of 90 are:

1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90

Thus, the total no. of factors of 90 is 12.

e] 105

Soln: The factors of 105 are:

1, 3, 5, 7, 15, 21, 35, 105.

Thus, the total no. of factors of 105 is 8.

6. Write any 5 numbers which are divisible by 2, 5 & 10.

Soln: L.C.M. of 2, 5, 10 is 10.

So, if a number is divisible by 10, then it will be divisible by 2, 5, 10.

No. are:- 10, 20, 30, 40, 60, 100 etc.

7. A number 34A is exactly divisible by 2 & leaves a remainder 1, when divided by 5, find A.

Soln:

If 34A is divisible by 2 then the remainder should be equal to 0.

∴ A should be equal to 0, 2, 4, 6, 8.

∴ 340, 342, 344, 346, 348 are divisible by 2 & gives the remainder '0'.

Among these 346 is divisible by 5 & gives the remainder 1.

$$\therefore 34\underline{6} \longrightarrow \frac{6}{5} \quad (R=1)$$

∴ The value of A = 6.

Exercise - 15.2

1. If 345A7 is divisible by 3, supply the missing digit in place of 'A'.

Soln: Given, a number 345A7 is divisible by 3.

Need to find out A.

∴ sum of the digits of 345A7 must be divisible by 3.

3+4+5+A+7 = 19+A must be divided by 3.

Substitute A value from 0 to 9 by trial error method, we get

A might 2, or 5 or 8.

If A = 2, then 19+2 = 21 is divisible by 3.

If A = 5, then 19+5 = 24 is divisible by 3.

If A = 8, then 19+8 = 27 is divisible by 3.

Hence, A might be 2, or 5 or 8.

2. If 2791A, is divisible by 9, supply the missing digit in place of 'A'.

Soln:- If the sum of the digits of a number is divisible by 9, then the number is divisible by 9.

$\therefore 2791A = 2+7+9+1+A = 9\times 3$

$\therefore 19+A = 9\times 3 = 27$

$\therefore A = 27-19 = 8$

$\therefore A = \underline{8}$.

$\therefore$ Missing digit is $\underline{8}$.

3. Write some numbers which are divisible by 2, 3, 5, 9 & 10 also.

Soln:- The L.C.M. of 2, 3, 5, 9, 10 is 90.

$\therefore$ 90, 180, 270, 360, 450 are divisible by 2, 3, 5, 9, 10.

4. 2A8 is a number divisible by 2, what might be the value of A?

Soln:-

2A8 is a number divisible by 2, what might be the value we find.

If the units digit of a number be 0, 2, 4, 6, 8 then it is divisible by 2.

∴ 2A8 is divisible by 2, for any value of A.

∴ A = (0, 1, 2, 3, 4, 5, 6, 7, 8, 9)

=

5. 50B is a number divisible by 5, what might be the value of B?

Soln: Given, a number 50B divisible by 5

Need to find out the value of B.

∴ 50B is divisible by 5 if the unit place is either 0 or 5.

∴ Hence, the value of B might be 0 or 5.

= =

6. 2p is number which is divisible by 2 & 3, what is the value of p.

Soln:-

The given number is 2p.

If 2p is divisible by 2, 3 then 2p should be a multiple of 6.

[∵ Lcm of 2, 3 is 6]

∴ 2p = 24, 30, ------

$24 \longrightarrow 2+4 \longrightarrow \frac{6}{3}$ CR = 0

∴ p = 4.

7. 542 leaves remainder 2 when divided by 5, & leaves remainder 1, when divided by 3, what is the value of z?

Soln: Given, 542 a number.

542 divided by 5 leaves a remainder 2.

542 divided by 3 leaves a remainder 1.

Need to find value of z.

Substitute z value from trial error method from 0 to 9 satisfying the above conditions, we get

$\therefore z = 7$.

Since, 54z = 547 divided by 5 leaves remainder 2.

& 547 divided by 3 leaves remainder 1.

Hence, value of z is 7.

8. 27Q leaves remainder 3 when divided by 5 & leaves remainder 1 when divided by 2, what is remainder when it is divided by 3?

Soln: 27Q leaves remainder 3 when divided by 5 & leaves remainder 1 when divided by 2.

$\therefore$ 27Q is divided by 5 gives the remainder 3.

$\therefore$ 27Q & = 27 (0+3) = 273 (Q = 3) (T)

= 27 (0+8) = 278 (Q = 8)

27Q is divided by 2 gives 9 remainder 1.

i.e $27Q = 27(0+1) = 271 (Q=1)$

$\therefore 27Q = 27(0+3) = 273 (Q=3)$ (T)

$\therefore$ From above situations $Q = 3$

$\therefore 27Q = 273 \rightarrow 2+7+3 \rightarrow \frac{12}{3} (R=0)$

$\therefore$ 273 is divisible by 3 & given remainder '0'.

Exercise - 15.3

1. Check whether the given numbers are divisible by '6' or not?

a] 273432

soln: In the given number, units place digit is '2', therefore it divisible by 2.

sum of digits of a number = 2+7+3+4+3+2 = 21

∴ 21 is divisible by 3.

∴ This number is divisible by 3.

∴ for a number, which is divisible by 2 & 3, is divisible by 6.

∴ 273432 is divisible by 6.

b] 100533

soln: The given number is not divisible by 2.

∴ It is not divisible by 6.

c] 784076

Soln: The given number is not divisible by 3.

∴ It is not divisible by 6.

d] 24684

Soln: The units place of given number is 2. so it is divisible by 2.

Sum of digits of number = 2+4+6+8+4

= 24 is divisible by 3.

∴ 24684 is divisible by 6.

2. check whether the given numbers are divisible by '4' or not?

Soln:

a] 3024

b] 1000

c] 412

d] 56240

Soln:

Number	Divisible by 4	Yes/No
a] 3024	$3024 \rightarrow \frac{24}{4}$ (R=0)	Yes
b] 1000	$1000 \rightarrow \frac{0}{4}$ (R=0)	Yes
c] 712	$712 \rightarrow \frac{12}{4}$ (R=0)	Yes
d] 56240	$56240 \rightarrow \frac{40}{4}$ (R=0)	Yes

3. Check whether the given numbers are divisible by '8' or not?

a] 4808
b] 13284
c] 1000
d] 76728

Soln:

Number	Divisible by 4	Yes/No
a] 4808	$4808 \rightarrow \frac{808}{8}$ (R=0)	Yes
b] 1324	$1324 \rightarrow \frac{324}{8}$ (R≠0)	No

c] 1000 $1000 \rightarrow \frac{0}{8}$ (R=0) Yes

d] 76728 $76728 \rightarrow \frac{728}{8}$ (R=0) Yes

4. Check whether the given numbers are divisible by '7' or not?

a] 427

Soln: By divisibility rules, we have

$(2a+3b+c)$

$\therefore [2(4)+3(2)+7] = 8+6+7$

$= \underline{21}$

$\therefore$ 21 is divisible by 7.

$\therefore$ 427 is divisible by 7.

b] 3514

Soln: By divisibility rules, we have

$(2a+3b+c)$

$\therefore [6(3) + 2(5) + 3(1) + 4] = 18 + 10 + 3 + 4$

$= 35$ is divisible by 7.

$\therefore$ 3514 is divisible by 7.

c] 861

Soln: By divisibility rule, we have

$(2a + 3b + c)$

$\therefore [2(8) + 3(6) + 1] = 16 + 18 + 1 = 35$

$\therefore$ 35 is divisible by 7

$\therefore$ 861 is divisible 7.

d] 4676

Soln: $\therefore [6(4) + 2(6) + 3(7) + 6] = 24 + 12 + 21 + 6$

$= 63$ is divisible by 7.

$\therefore$ 4676 is divisible by 7.

5. Check whether the given numbers are divisible by '11' or not?

a] 7876764 b] 536393 c] 110011 d] 1210121
e) 758043 f) 8338472 g) 54678 h) 13431
i) 433423 j) 168861

Soln:-

Number	Divisible by 11	Yes or No
a] 7876764	7876764 → (7+6+6) − (8+7+4) → $\frac{0}{11}$ (R=0)	Yes
b] 536393	536393 → (5+6+9) − (3+3+3) = 20−9 → $\frac{11}{11}$ (R=0)	Yes
c] 110011	110011 → (1+0+1) − (1+0+1) → $\frac{0}{11}$ (R=0)	Yes
d] 1210121	1210121 → (1+1+1+1) − (2+0+2) → $\frac{0}{11}$ (R=0)	Yes
e) 758043	758043 → (7+8+4) − (5+0+3) = 19−8 → $\frac{11}{11}$ (R=0)	Yes
f) 8338472	8338472 → (8+8+7) − (8+3+4+2) → $\frac{1}{11}$ (R≠0)	No
g) 54678	54678 → (5+6+8) − (4+7) → $\frac{8}{11}$ (R≠0)	No

h) 13431	13431 → (1+4+1) - (3+3) → $\frac{0}{11}$ (R=0)	Yes
i) 4234123	4234123 → (4+3+2) - (2+4+3) → $\frac{0}{11}$ (R=0)	Yes
j) 168861	168861 → (1+8+6) - (6+8+1) → $\frac{0}{11}$ (R=0)	Yes

6. If a number is divisible by '8', then it also divisible by '4' also. Explain ?

Soln: If a number is divisible by 8 it is also divisible by 4.

∴ If a number is divisible by 8, it is also divisible by the factors of 8.

factors of 8 = 1, 2, 4, 8

∴ The number which is divisible by 8, is also divisible by 4.

7. A 3-digit number 4A3 is added to another 3-digit number 98A to give four digit number 13B7, which is divisible by 11. Find (A+B).

Soln:

The given 3-digited numbers are
= 4A3, 984

$\therefore$ 4A3 + 984 = 13B7.

If it is divisible by 11 then,

13B7 = (1+B) - (3+7)

$\therefore$ (B+1) - (10) = 0

$\therefore$ B - 9 = 0

$\therefore$ B = 9

$\therefore$ 4A3
984
1397

~~satisfied~~ . ~~i.e.~~ ~~B = 9~~ .

$\therefore$ A + B = 9

$\therefore$ A = 9 - 8 = 1

$\therefore$ A = 1

$\therefore$ A + B = 1 + 9

$\therefore$ A + B = 10

Exercise - 15.4

1. Check whether 25110 is divisible by 45.

Soln: Given number is 25110.

Prime factorization of $45 = 5 \times 9$

So, it is sufficient to find the number divisible with 5 & 9.

∴ 25110 is divisible by 5 as '0' is at units place.

∴ the of digits of a number $= 2+5+1+1+0 = 9$

which is divisible by 9.

Hence, the given number 25110 is divisible by 45.

2. Check whether 61479 is divisible by 81.

Soln:- If 61479 is divisible by 81, then it is divisible by 9.

If the sum of the digits of number is divisible by 9, then the entire number is divisible by 9.

∴ 61479 → 6+1+4+7+9 → $\frac{27}{9}$ (R=0)

∴ 61479 is divisible by 81.

[∵ 9 is factor of 81.]

3. Check whether 864 is divisible by 36? verify whether 864 is divisible by all the factors of 36?

Soln: 864 is divisible by 2 & 3.

∴ 864 is divisible by 6.

∴ 864 is divisible by 36 [∵ 6 is factor of 36]

∴ factors of 36 = 1, 2, 3, 4, 6, 9, 12, 18, 36.

Number	Divisible by 1, 2, 3, 4, 6, 9, 12, 18, 36	Yes/NO
864 →	1 → 1 is factor of every no. $\frac{864}{1}$ (R=0)	Yes
864 →	2 → $\frac{4}{2}$ (R=0)	Yes
864 →	3 → 8+6+4 $\left[\frac{18}{3}(R=0)\right]$	Yes
864 →	6 → $\frac{864}{6}$ (R=0) [∵ It is divisible by 2, 3	Yes

864 →	9 → 8+6+4 $\left[\frac{18}{9}(R=0)\right]$	Yes
864 →	12 → $\frac{864}{12}(R=0)$ [∵ 6 is factor of 12]	Yes
864 →	18 → $\frac{864}{18}(R=0)$ [∵ 9 is factor of 18]	Yes
864 →	36 → $\frac{864}{36}(R=0)$ [∵ 6 is a factor of 36]	Yes

∴ 864 is divisible by all the factor of 36.

4. Check whether 756 is divisible by 42? verify whether 756 is divisible by all the factors of 42?

Soln: 756 is divisible by 2 & 3.

∴ 756 is divisible by 6.

$2a+3b+c = 2\times7+3\times5+6 = 14+15+6$ —

$\frac{35}{7}(R=0)$

∴ 756 is divisible by 7.

∴ 756 is divisible by 42.
[∵ 6, 7 are the factors of 42.]

Factors of 42 = 1, 2, 3, 6, 7, 14, 21, 42.

Number	Divisible by 1, 2, 3, 6, 7, 14, 21, 42	Yes/No
756 →	1 is a factor of every number = $\frac{756}{1}$ (R=0)	Yes
756 →	2 → $\frac{6}{2}$ (R=0)	Yes
756 →	7+5+6 $\left[\frac{18}{3}(R=0)\right]$	Yes
756 →	$\frac{756}{6}$ (R=0) [∵ 2, 3 are factors of 6]	Yes
756 →	2a+3b+c = 2×7+3×5+6 = 14+15+6 $\left[\frac{35}{7}(R=0)\right.$	Yes
756 →	14 → $\frac{756}{14}$ (R=0) [∵ 7 is factor of 14]	Yes
756 →	21 → $\frac{756}{21}$ (R=0) [∵ 3, 7 are factors of 21]	Yes
756 →	42 → $\frac{756}{42}$ (R=0) [∵ 6, 7 are factors of 42]	Yes.

5. Check whether 2156 is divisible by 11 & 7? Verify whether 2156 is divisible by product of 11 & 7?

Soln:

For, the number 2156 the difference of the digits of odd places & even places must be divisible by 11 or it must be 0.

$\therefore (2+5)-(1+6) = 7-7 = 0$

$\therefore$ the number is divisible by 11.

Now, we know $(6a+2b+3c+d)$ by divisibility rule.

$\therefore 6(2)+2(1)+3(5)+6 = 12+2+15+6$

$= 35.$

$\therefore$ 35 is divisible by 7.

$\therefore$ Product of 11, 7 = 77 which is divisible by 7.

Hence, 2156 is divisible by 11 & 7 & divisible by product of 11 & 7.

6. Check whether 1435 is divisible 5 & 7? Verify if 1435 is divisible by the product of 5 & 7?

Soln:-

We have,

1435 is divisible by 5, since, units digit of number is 5.

∴ Now, we know $(6a+2b+3c+d)$ by divisibility rule,

$\therefore 6(1)+2(4)+3(3)+5 = 6+8+9+5$

$= 28$ is divisible by 7.

∴ 1435 is divisible by 7.

The product of 5 & 7 is 35.

∴ 1435 is divisible by 35 because it is divisible by 5 & divisible by 7.

Hence, 1435 is divisible by 5 & 7 & divisible by product of 5 & 7.

7. Check whether 456 & 618 are divisible by 6? Also check whether 6 divides the sum of 456 & 618?

soln: Given, no. are 456 & 618.

$\therefore$ 456 + 618 = 1074.

~~Number Divisible by 2~~

Let take 456, 618 & 1074 simultaneously.

No.	Divisible by 2 Yes/NO	Divisible by 3 Yes/NO	Divisible by 6 Yes/NO
456	$456 \rightarrow \frac{6}{2}$ (R=0) Yes	$4+5+6 \rightarrow \frac{15}{3}$ (R=0) Yes	Yes
618	$618 \rightarrow \frac{8}{2}$ (R=0) Yes	$6+1+8 \rightarrow \frac{15}{3}$ (R=0) Yes	Yes
1074	$1074 \rightarrow \frac{4}{2}$ (R=0) Yes	$1+0+7+4 \rightarrow \frac{12}{3}$ (R=0) Yes	Yes

Hence, 6 divisides the sum of 456 & 618 = 1074.

8. Check whether 876 & 345 are divisibly by 3? also check whether 3 divides the difference of 876 & 345?

soln: Given numbers are 876 & 345.

difference of these i.e. 876 - 345 = 531.

Number	Divisible by 3	Yes/NO	Difference is divisible by 3
876	$8+7+6 \Rightarrow \frac{21}{3}(R=0)$	Yes	876 - 345 = 531
345	$3+4+5 \rightarrow \frac{12}{3}(R=0)$	Yes	The difference of 876 & 345 is divisible by 3.
531	$5+3+1 \rightarrow \frac{9}{3}(R=0)$	Yes	

Hence, the difference 876 & 345 = 531 is also divisible by 3.

9. Check whether $2^2+2^3+2^4$ is divisible by 2 or 4 or by both 2 & 4?

Soln: Given, $2^2+2^3+2^{4^2}$

Need to calculate if it divisible by 2 or 4 or both.

$\therefore 2^2+2^3+2^4 = 4+8+32 = 44$

44 is divisible by 2 or 4 or by both, since unit place of a number is divisible by 2 or 4 or both.
Hence, the number is divisible by 2 or 4 or both

10. Check whether 32^2 is divisible by 4 or 8 or by both 4 & 8?

Soln: Given, 32^2.

$\therefore 32^2 = 1024$

Now, by divisibility rule, we have,
$(10c + d)$ must be divisible by 4

$\therefore$ 1024 is divisible by 4, since,

$10(2) + 4 = 24$ is divisible by 4.

Now, by divisibility rule, we have,

$(100b + 10c + d)$ must be divisible by 8.

$\therefore$ 1024 is divisible by 8.

Since, $100(0) + 10(2) + 4 = 24$ is divisible by 8.

Hence, 32^2 is divisible by both 4 & 8.

11. If A679B is a 5-digit number is divisible by 72 find 'A' & 'B'?

Soln: If A679B is divisible by 72, then it should be divisible by 8 & 9.

[∵ 8, 9 are factors of 72]

A679B is divisible by 9, then

$A+6+7+9+B = A+B+22 = 27\ (9\times3)$

$\Rightarrow A+B=5$ ——— ①

$\therefore A679B \longrightarrow \frac{79B}{8}$ [From B(2,4,6,8), we take B=2]

$= \frac{792}{8}$ [R=0]

$\therefore B = 2$

$\therefore$ From ① $\longrightarrow A+2=5$

$\therefore A = 5+2$

$\therefore A = 3$

$\therefore A = 3$ & $B = 2$.

Exercise - 15.5

1. Find the missing digits in the following additions.

a]

$$\begin{array}{r} 111 \\ +\quad A \\ +\quad 77 \\ \hline 197 \end{array}$$

Soln: $1 + A + 7 = 17$

$\therefore A = 17 - 8 = 9$

$\therefore A = 9$

b]

$$\begin{array}{r} 222 \\ +\quad\ 8 \\ +\quad BB \\ \hline 285 \end{array}$$

Soln: $2 + 8 + B = 15$

$\therefore B = 15 - 10$

$\therefore B = \underline{5}$

$2 + 1 + B = 8 \quad \therefore B = 8 - 3 = 5$

$\therefore B = \underline{5}$

c]
$$\begin{array}{r} A\ A\ A \\ +\quad\ 7 \\ +\ A\ A \\ \hline 3\ 7\ 3 \end{array}$$

Soln :- $A + 7 + A = 13$

$\therefore \quad 2A = 6$

$A = 3A + A + 1 = 7$

$2A = 6 \quad \therefore A = 3$

$\therefore \quad A = 3$

d]
$$\begin{array}{r} 2\ 2\ 2\ 2 \\ +\quad\ 9\ 9 \\ +\quad\ \ 9 \\ \hline A\ A\ A \\ \hline 2\ 9\ 9\ A \end{array}$$

Soln :- From 1st column.

$2 + 9 + 9 + A = 26$

$A = 26 - 20 = 6$

From 2nd column

$\therefore \quad 2 + 1 + A = 9 \quad \therefore \quad A = 9 - 3 = 6$

$\therefore \quad A = 6$

e)
$$\begin{array}{r} B\ B \\ +\quad 6 \\ \hline A\ A\ A \\ \hline 4\ 6\ 1 \end{array}$$

Soln: $B+6+A = 11$ or 21 ——— ①

$\therefore B+A+(10\text{ or }2) = 6$

$\therefore A+1 = 4 \rightarrow A = 3$

$\therefore$ From ①, $B+6+3 = 11 \rightarrow B = 2$

$\therefore A = \underline{\underline{3}}$, $B = \underline{\underline{2}}$.

2. Find the value of 'A' in the following.

a] $7A - 16 = A9$

Soln: let
$$\begin{array}{r} 7\ A \\ -\ 1\ 6 \\ \hline A\ 9 \end{array} \quad . \quad \begin{array}{r} 7\ 5 \\ -\ 1\ 6 \\ \hline 5\ 9 \end{array}$$

$\therefore 7A - 16 = A9$

$\therefore A - 6 = 9$

If $A = 5$ it is possible.

$\therefore A = 5$ (or)

$7A - 16 = A9$

$\therefore 7 \times 10 + (1 \times A) - 16 = (A \times 10 + 9 \times 1)$

$\therefore 70 + A - 16 = 10A + 9$

$\therefore 9A = 45$

$\therefore A = 5.$

$\therefore A = \underline{5}.$

b] $107 - A9 = 1A$

soln: $107 - A9 = 1A$

$\therefore 107 - (10 \times A + 9 \times 1) = (1 \times 10 + A \times 1)$

$\therefore 107 - 10A - 9 = 10 + A$

$\therefore 11A = 88 \quad A = 8$

$\therefore A = \underline{8}$

c] $A36 - 1A4 = 742$

soln: $A36 - 1A4 = 742$

$\therefore (100 \times A + 3 \times 10 + 6 \times 1) - (1 \times 100 + A \times 10 + 4 \times 1) = 742$

$\therefore \quad 100A + 36 - 100 - 10A - 4 = 742$

$\therefore \quad 90A = 810$

$\therefore \quad A = \frac{810}{90}$

$\therefore \quad A = \underline{9}$.

3. Find the numerical value of letters given below

a]

	D	E
		X 3
F	D	E

Soln: If $E \times 3 = E$ the E should be equal to 0 (or) 5.

$5 \times 3 = 15, \quad 0 \times 3 = 0$

$\therefore \quad 3 \times D + 0 = 1D \quad [\text{If } E = 0]$

$\therefore \quad 3D = 10 + D$

$\therefore \quad 2D = 10$

$\therefore \quad D = \underline{5}$

$\therefore$ D = 5, E = 0, then,

$\therefore$
$$\begin{array}{r} 5\ 0 \\ \times\ 3 \\ \hline 1\ 5\ 0 \\ F\ D\ E \end{array}$$

$\therefore$ F = 1, D = 5, E = 0 .

b]
$$\begin{array}{r} [G]\ [H] \\ \times\ 6 \\ \hline [C]\ [G]\ [H] \end{array}$$

Soln:- If H X 6 = H then H should be equal to 0, 2, 6, 8

G6 = 1G [If H = 0]

$\therefore$ 6G + 0 = 10 + G

$\therefore$ 5G = 10

$\therefore$ G = 10/5 = 2

$\therefore$

$\therefore$
$$\begin{array}{r} 2\ 0 \\ \times\ 6 \\ \hline 1\ 2\ 0 \\ C\ G\ H \end{array}$$

$\therefore$ C = 1, G = 2, H = 0 .

4. Replace the letters with appropriate digits.

a] $73K \div 8 = 9L$

Soln: Given, $73K \div 8 = 9L$

$\therefore \frac{73K}{8} = 9L$

if $73K$ is divisible by 8, then

$K = \{1, 2, 3, \ldots\ldots, 9\}$

select $K = 6$ from the set

$\therefore \frac{736}{8} \quad (R = 0)$

$\therefore \frac{736}{8} = 92 = 9L$

$\therefore 90 + 2 = (9 \times 10 + L \times 1)$

$\therefore 90 + 2 = 90 + L$

$\therefore L = 2$

$\therefore K = 6$ & $L = 2$.

b] $1MN \div 3 = MN$

Soln: Given, $1MN \div 3 = MN$

If $1MN$ is divisible by 3 then sum of all the digits is divisibly by 3.

$\therefore 1 + M + N = 3 \times \{1, 2, 3\}$

Let $1 + M + N = 3 \times 2 = 6$ say

$M + N = 5$ ——— ①

$\frac{1MN}{3} = MN$

$\therefore 1MN = 3[MN]$

$\therefore 1 \times 100 + M \times 10 + N \times 1 = 3[M \times 10 + N \times 1]$

$\therefore 100 + 10M + N = 3[10M + N]$

$\therefore 100 + 10M + N = 30M + 3N$

$\therefore 20M + 2N = 100$

$\therefore 10M + N = 50$ ——— ②

∴ from ① & ②,

$$\begin{array}{r} 10m + N = 50 \\ (-)\ \ m + N = 5 \\ \hline 9m = 45 \end{array}$$

$$\therefore m = \frac{45}{9} = 5$$

$$\therefore m = 5$$

$10m + N = 50$ (-) $m + N = 5$ $9m = 45$

$$\therefore m = 5$$

if $m = 5$ then, $m + N = 5$

$$\therefore N = 0$$

$$\therefore m = 5,\ N = 0 \qquad \left[\because \frac{150}{3} = 50\right]$$

5. If ABB × 999 = ABC123 (where A, B, C are digits) find the values of A, B, C.

soln:-

$$\begin{array}{r} 7\ (7) \\ A\ B\ B \\ \times\ 9\ \ 9\ \ 9 \\ \hline A\ B\ C\ 1\ 2\ 3 \end{array}$$

From $ABB \times 999 = ABC123$, the product of units digit is equal to 3.

$\therefore$ $B \times 9 = 3$ is the units digit.

If $B = 7$, then,

$7 \times 9 = \underline{6}\ \underline{3}$

$$\begin{array}{r} A\ 7\ 7 \\ \times\ 9\ 9\ 9 \\ \hline (9A+6)\ 9\ 3 \\ (9A+6)\ 9\ 3 \\ (9A+6)\ 9\ 1 \\ \hline (9A+6)\ [(9A+6)+9]\ [(9A+6)+13]\ 2\ 3 \\ A\ B\ \quad C\ \quad 1\ \quad 23 \end{array}$$

By trial & error method

$9 \times 8 + 6 = 78$

9

3

21

1 $\quad \therefore A = 8$

$\therefore 9 \times 8 + 6 = 78$

9

$7 = C$

$\therefore A = 8, B = 7, C = 6$

$\therefore$ The required product $= 876123$

$\therefore A = 8, B = 7, C = 6.$

Exercise - 15.6

1. Find the sum of integers which are divisible by 5 from 1 to 100.

Soln: Given, sum of integers from 1 to 100.

The numbers which are divisible by 5 are
5, 10, 15, ..., 100.

∴ Now, sum of integers from 1 to N

$$= \frac{N(N+1)}{2}$$

Sum of integers from 1 to 100 divisible by 5.

$$= (5+10+\ldots+100)$$

$$= 5(1+2+\ldots+200)$$

$$= 5\left(\frac{20(20+1)}{2}\right)$$

$$= 5\left(\frac{20(21)}{2}\right)$$

$$= (5 \times 10 \times 21)$$

$$= 1050.$$

Hence the, sum of integers is 1050.

2 Find the sum of integers which are divisible by 2 from 11 to 50.

Soln: Given, Sum of integers from 11 to 50.

Now, Sum of integers from 1 to N

$$= \frac{N(N+1)}{2}$$

Sum of integers divisible by 2 from 11 to 50 = sum of integers divisible by 2 from 1 to 50 - sum of integers divisible by 2 from 1 to 49.

$$= (2+4+6+\text{---}+50) - (2+4+6+\cdots+10)$$

$$= 2(1+2+3+\cdots+25) - 2(1+2+\cdots+5)$$

$$= 2\left(\frac{25(25+1)}{2}\right) - 2\left(\frac{5(5+1)}{2}\right)$$

$$= (25 \times 26) - (5 \times 6)$$

$$= 650 - 30$$

$$= 620$$

Hence the sum of integers which are divisible by 2 from 11 to 50 are 620.

3. Find the sum of integers which are divisible by 2 & 3 from 1 to 50.

Soln:

Numbers which are divisible by 2 & 3.
i.e. which are divisible by 6 from 1 to 50 are, 6, 12, 18, ..., 48.

Sum of the numbers $= 6+12+18+\ldots+48$

$= 6(1+2+3+\ldots+8)$

$= 6\left[\frac{8(8+1)}{2}\right]$

$= 3\times8\times9$

$= 216$

∴ Sum of integers which are divisible by 2 & 3 from 1 to 50 is 216.

4. (n^3-n) is divisible by 3. Explain the reason.

Soln: Given, (n^3-n) is divisible by 3.

Here, (n^3-n) can be written as $n(n^2-1)$

$\therefore n(n^2-1^2)$

$= n(n-1)(n+1)$

$= (n-1)\,n(n+1)$

It is the product of three consecutive numbers.

The product of three consecutive numbers in divisible by 3.

Example:

Let $n = 2$,

Substitute in above equation, we get

$\therefore (2-1)(2)(2+1) = 1 \times 2 \times 3$

$= 6$ which is divisible by 3.

Hence, $(n^3 - n)$ is divisible by 3.

5. Sum of 'n' odd number of consecutive numbers is divisible by 'n'. Explain the reason.

soln: Given, sum of 'n' odd numbers of consecutive numbers is divisible by 'n'.

Sum of 'n' consecutive odd numbers

$$= \frac{(2n-1)(2n)}{2}$$

$$= n(2n-1)$$

$\therefore$ it is multiple of n.

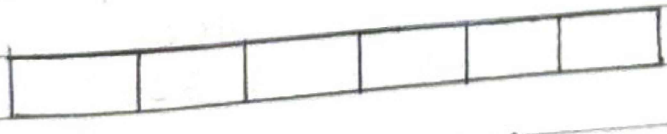
Hence, Sum of 'n' consecutive odd numbers is divisible by n.

6. Is $1^{11} + 2^{11} + 3^{11} + 4^{11}$ divisible by 5? Explain.

Soln:- Sum of units digit of number $1^{11} + 2^{11} + 3^{11} + 4^{11} = 1 + 8 + 7 + 4$

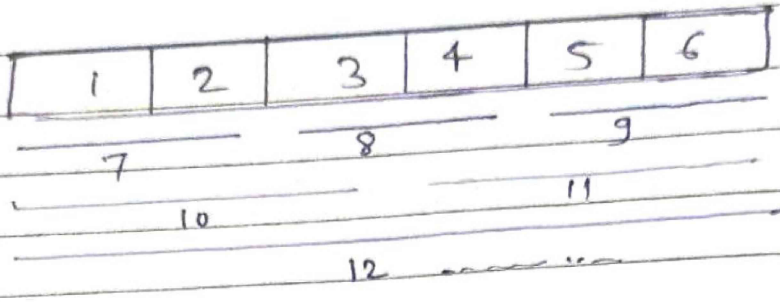
$$= 20 \longrightarrow \frac{20}{5} \quad (R=0)$$

$\therefore$ $1^{11} + 2^{11} + 3^{11} + 4^{11}$ is divisible by 5.

7. 

find the number of rectangles of the given figure?

Soln:-



∴ No. of rectangle in the given figures = 1+2+3+4+5+6 = 21.

21 rectangles are there in figure.

8. Rahul's father wants to deposit some amount of money every year on the day of Rahul's birthday. On his 1st birthday ₹100, on his 2nd birthday ₹300, on his 3rd birth day ₹600, on his 4th birth day ₹1000 & so on. What is the amount deposited by his father on Rahul's 15th birthday.

Soln:

No. of D.O.B	Amount deposited
1	100
2	300
3	600
4	1000
⋮	⋮
14	10,500
15	12,400

100 300 600 1000 ....

+200 +300 +400

Rahul's father deposits on every year 200, 300, 400 more than before year

Then he deposits on every year 200, 300, 400 more.

Then he deposits ₹ 10,500 on 14th birthday

∴ The amount deposits on 15th birthday

= 10,500 + 1500

= ₹ 12500.

Amount deposited by his father on Rahul's 15th birthday is ₹ 12,500.

9. Find the sum of integers from 1 to 100 which are divisible by 2 or 5.

Soln: Sum of numbers which are divisible by 2 from 1 to 100

= 2 + 4 + 6 + ... + 100

$= 2(1+2+3+\cdots\cdots+50)$

$= 2 \times \left[\frac{50(50+1)}{2}\right]$

$= 50 \times 51$

$= 2550$

Sum of numbers which are divisible by 5 from 1 to 100

$= 5+10+15+\cdots\cdots+100$

$= 5(1+2+3+\cdots+20)$

$= 5\left[\frac{20(20+1)}{2}\right]$

$= 5 \times 10 \times 21$

$= 1050$

∴ Sum of the numbers which are divisible by both 2 & 5 $= 2550+1050$

$= 3600$

∴ Sum of numbers which are divisible by 2 or 5 from 1 to 100

$= 10+20+\cdots+1000$ [Lcm of 2, 5 is 10]

$= 10(1+2+\cdots+10)$

$= 10\left[\frac{10(10+1)}{2}\right]$

$= 5 \times 10 \times 11$

$= 550$

∴ The sum of required numbers
$3600 - 550 = 3050$
$=$

Sum of integers which are divisible by 2 or 5 from 1 to 100 is $\underline{\underline{3050}}$.

10. Find the sum of integers from 11 to 1000 which are divisible by 3.

Soln: Given, sum of integers from 11 to 1000.

Now, sum of integers from 1 to $N = \frac{N(N+1)}{2}$

∴ Sum of integers divisible by 3 from 11 to 1000
= sum of integers divisible by 3 from 1 to 1000
− sum of integers divisible by 3 from 1 to 10.

$$= (3+6+9+\cdots+999) - (3+6+\cdots+9)$$

$$= 3(1+2+3+\cdots+333) - 3(1+2+\cdots+3)$$

$$= 3\left[\frac{333(333+1)}{2}\right] - 3\left[\frac{3(3+1)}{2}\right]$$

$$= 3\left[\frac{333(334)}{2}\right] - 3\left[\frac{3(4)}{2}\right]$$

$$= 3[333(167)] - 3(6)$$

$$= 3(55611) - 18$$

$$= 166833 - 18$$

$$= 166815$$

Hence, the sum of integers from 11 to 1000 which are divisible by 3 is 166815.