09 May 2023

Divisibility Rules:

1 all nos r divisible by 1 ∵ they r equal to themselves.

2 A no is divisible by 2 if the last digit is even (0, 2, 4, 6, 8).

3 A no is divisible by 3 if the sum of digits is div. by 3

eg: 1521

$1+5+2+1 = 9$ & 9 is div. by 3

∴ 1521 is div by 3

4 A no is div. by 4 if the last two digits are div. by 4.

eg: 1768

$$
\begin{array}{r}
17 \\
4\overline{)68} \\
-4 \\
\hline
28 \\
-28 \\
\hline
0
\end{array}
$$

∴ 68 is div. by 4

1768 is also div by 4

5 A no. is div. by 5 if the last digit is either 0/5

eg: 235, 1425, 160, etc.

6 A no. is divisible by 6 if it is divisible by 2 & 3 both.

eg: 366

$$\frac{366}{2} = 183$$ ✓

$$366 = 3+6+6 = 15$$

$$\frac{15}{3}$$ ✓

∴ 366 is div. by 6.

7 A no. is div. by 7 if the difference blw twice the unit digit & the no obtained by removing the unit digit is div. by 7.

eg: 175

Unit digit = 5

$17 - (2 \times 5) = 17 - 10 = 7$

7 is div. by 7.

∴ 175 is div. by 7.

8 A no is div. by 8 if the last 3 digits are div. by 8.

eg: 5632

$$\begin{array}{r} 79 \\ 8\overline{)632} \\ -56 \\ \hline 72 \\ -72 \\ \hline 0 \end{array}$$

$\therefore$ 632 is div. by 8

$\Rightarrow$ 632 is div. by 8

9 A no. is divisible by 9 if the sum of digits is div. by 9

eg: 3042

$3+0+4+2 = 9$ (which is divisible by 9)

$\therefore$ 3042 is div. by 9.

eg: 1728

$1+7+2+8 = 18$ (—— 11 ——)

$\therefore$ 1728 is div. by 9.

10 A no. is div by 10 if it ends in 0

eg: 20, 370, 1210, etc.

11 A no. is div. by 11 if the difference b/w sum of digits in odd positions & sum of digits in even positions is either 0 or a multiple of 11.

eg: 3589

3	5	8	9
	O		O
	E		E

$3+8 = 11$

$5+9 = 14$

$14-11 = 3$

$\therefore$ 3 is not div. by 11

$\therefore$ 3589 is not div. by 11.

eg: 1 7 1 1 6

1 2 3 4 5

1, 3, 5 — Odd places

2, 4 — Even places

1+1+6 = 8

7+1 = 8

8 − 8 = 0

12 A no. is div. by 12 if it is div. by 3 & 4.

eg: 540

540 = 5+4+0

= 9

9 / 3 ✓

540 ÷ 4 = 10 (40, 40, 0) ✓

∴ 540 is div. by 12.

13 To test if a no is div by 13, multiply last digit by 4, then add this product to the rest of the no. w/o last digit. If result is div. by 13, then the original no is also div. by 13.

eg: 1346

6 × 4 = 24

24 + 134 = 158

158 is not div. by 13.

∴ 1346 is also not div by 13.

14 To test if a no. is div. by 14, check if it is div. by both 2 & 7.

eg: 1568

$\frac{1568}{2}$ ✓ $\quad \frac{1568}{7}$: $156 - (8 \times 2)$

$= 156 - 16$

$= 140$

$\frac{140}{7}$ ✓

∴ 1568 is div. by 14.

15 To test if a no. is div. by 15, check if it is div. by 3 & 5 both.

eg: 2025

2025: $2+0+2+5 = 9$

$\frac{9}{3}$ ✓

2025: last digit is 5. ✓

∴ 2025 is div. by 15.

HCF. Highest Common Factor / Greatest Common Factor GCD

It is largest positive integer that divides 2/more nos w/o leaving a remainder.

eg: Find HCF of 48 & 60.

Soln: Factors of:

48 = 1, 2, 3, 4, 6, 8, 12, 16, 24, 48

60 = 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

Among the common factors underlined in blue above, the highest is 12.

∴ GCD / HCF = 12

LCM: Least Common multiple

It is the smallest positive integer that is a multiple of 2 or more nos.

eg:

LCM of 20 & 36

Multiples of:

20 – 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340, 360, 380 & so on.

36 – 36, 72, 108, 144, 180, 216, 252, 288, 324, 360 & so on.

Lowest Common Multiple = 180

Problem on Percentages:

1. If a restaurant bill comes to $85 & you want to leave a 20% tip, how much will the total be?

Soln: $\frac{20}{100} \times 85 = 17$

$\therefore$ $85 + 17 = \$102$.

2. A car is purchased for $20,000 & is sold a year later for $23,000. What is the percentage increase in the car's value?

Soln: $\$23000 - \$20000 = \$3000$

$$\frac{\$3000}{\$20000} = 0.15$$

i.e. 15%.

Ratios:

1. The ratio of no. of boys to girls in a school is 5:7. If there are 180 more girls than boys in the school, how many students are there in the school?

Soln: Let's assume #boys in school is $5x$ &
#girls —"— $7x$

$\therefore 7x = 5x + 180$

$\therefore 2x = 180$

$\therefore x = 90.$

$\therefore$ #boys $= 5x = 5(90) = 450$
#girls $= 7x = 7(90) = 630$

$\therefore$ Total no. of student $= 450 + 630$
$= 1080$

2. The sum of 3 nos is 120, & the ratio of 1st no to 2nd no is 4:5. The ratio of 2nd to 3rd no is 3:2. Find the first no

Soln: 38.92