Learn the Divisibility Rule of Numbers for WBCS Prelims Exam

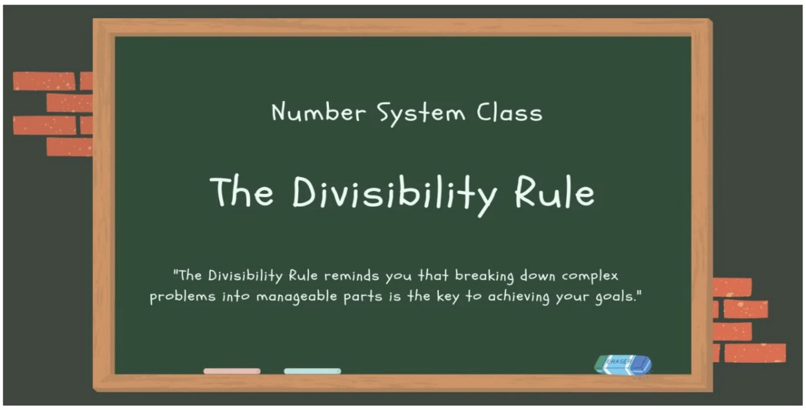
Gearing up for the WBCS Prelims Exam requires a multifaceted approach, and a strong foundation in mathematical concepts is undeniably one of the pillars of success. Among the various mathematical tools at your disposal, understanding the Divisibility Rule of Numbers stands out as a critical skill. This comprehensive guide is tailored to provide you with a profound understanding of these rules, making them an indispensable part of your problem-solving arsenal.

In the realm of competitive exams, the ability to quickly and accurately determine if one number is divisible by another is a game-changer. It not only saves precious time during the exam but also serves as a tool to enhance your accuracy. This guide not only deciphers the rules but also equips you with the practical knowledge and skills necessary to apply them effectively. Whether you're a seasoned test-taker or embarking on your WBCS journey, this resource will empower you to face mathematical challenges with confidence, ensuring that the Divisibility Rule becomes a trusted ally in your pursuit of success in the WBCS Prelims Exam.

This is the second part of the '**Number System**' blog series. So, before understanding Divisibility Rule, first understand the 'Classification of Numbers' by clicking the embedded link. Now, let's start understanding the divisibility rule.

Basic Divisibility Rules of Numbers

Basic Divisibility Rules of Numbers are fundamental in math. They help quickly determine if a number is divisible by 2, 3, 5, 7, and more, aiding in problem-solving and simplifying calculations.



So, now we are going to understand the basic divisibility rules of some common numbers to ease your calculation.

Divisibility of 2: A number is always divisible by 2 if it is an even number i.e. its last digit is 0, 2, 4, 6 or 8.

Divisibility of 3: A number is divisible by 3 if the sum of its digits is divisible by 3.

Divisibility of 4: A number is divisible by 4 if the last two digits of the number are divisible by 4.

Divisibility of 5: A number is divisible by 5 if its last digit is 0 or 5.

Asutosh Mukherjee Road, College Para, Hathi More, Siliguri, West Bengal
+91 - 8436586516, +91-8436900456
thedhronas@gmail.com
thedronas.com

Divisibility of 6: A number is divisible by 6 if it is even and the sum of its digits is divisible by 3.

Divisibility of 8: A number is divisible by 8 if its last 3 digits are divisible by 8.

Divisibility of 10: A number is divisible by 10 if its last digit is 0.

Divisibility of 12: A number is divisible by 12 if it is divisible by both 3 and 4.

Let's look at this example.

E.g. Check whether 4326 is divisible by 12 or not.

Sol: We know that, a number is divisible by 12 if it is divisible by both 3 and 4. So,

Checking the divisibility by 3: 4 + 3 + 2 + 6 = 15

15 is divisible by 3, so, 4326 is divisible by 3

Checking the divisibility by 4: Last 2 digits of 4326 are 26 which is not divisible by 4.

So, 4326 is not divisible by 4 and hence, it is not divisible by 12. (**Ans.**)

So, like this, by looking at 4326, we can say that it has 6 (an even number) the end, so it is divisible by 2. It is divisible by 3 also (solved above). It is not divisible by 4 (solved above). It doesn't have 5 or 0 at the unit digit, so it is not divisible by 5. Since it is an even number and also divisible by 3, it is divisible by 6. Since it is not divisible by 4 hence it is not divisible by any multiple of 4 i.e. it is not divisible by 8 (also last three digits are not divisible by 8). It is not divisible by 5 so it is not divisible by 10 (also it doesn't have 0 at the end). It is also not divisible by 12 (solved above).

But, what about 7, 9, 11 and 13? Let's start discussing the Divisibility rule of 9 and 11. then, we will discuss 7 and 13 too.

Divisibility rule of 9 and 11

First, we will discuss the divisibility rule of 9.

Divisibility rule of 9:

If sum of the digits of the number is 9 at the end (or a multiple of 9), hence it is divisible by 9.

E.g. 356211 has sum of the digits, 3 + 5 + 6 + 2 + 1 + 1 = 18 and 18 had sum of the digits, 8 + 1 = 9.

So, 356211 is divisible by 9.

Divisibility rule of 11:

If the difference between the sum of the digits at odd places (from right) and the sum of the digits at even place (from right) is 0 or a multiple of 11, hence it is divisible by 11.

Asutosh Mukherjee Road, College Para, Hathi More, Siliguri, West Bengal
+91 - 8436586516, +91-8436900456
thedhronas@gmail.com
thedronas.com

E.g. 356213 has the sum of the digits at odd places, 3 + 2 + 5 = 10 and the sum of the digits at even places, 1 + 6 + 3 = 10.

So, 10 – 10 = 0.

Hence it is divisible by 11.

Now, the most interesting fact is, the divisibility rule of 9 and 11 is also applicable for 99, 999, 101, 1001, etc. but in a slightly different way.

Let's understand this thing by taking an example of a number 'abcdefg'.

- This number is divisible by 9 if: (a + b + c + d + e + f + g) is 9 at the end (or a multiple of 9)
- This number is divisible by 99 if: (a + bc + de + fg) is divisible by 99. [Pairing from right side]
- This number is divisible by 999 if: (a + bcd + efg) is divisible by 999. [Tripling from right side]

And so on…

Also,

- This number is divisible by 11 if: (g + e + c + a) – (d + f + b) is 0 or 11
- This number is divisible by 101 if: (fg + bc) – (de + a) is 0 or a multiple of 101 [Pairing from right side]
- This number is divisible by 1001 if: (efg + a) – (bcd) is 0 or a multiple of 1001 [Tripling from right side]

And so on…

Let us take some examples to understand it clearly.

E.g. Check whether 4636665 is divisible by 9, 99 and 999 or not.

Sol: Divisibility by 9: 4 + 6 + 3 + 6 + 6 + 6 + 5 = 36 and 3 + 6 = 9

So, yes it is divisible by 9

Divisibility by 99: (Pairing from right side) 4 + 63 + 66 + 65 = 198

So, yes it is divisible by 99

[Note: Since the number is divisible by 99. Hence, it is also divisible by all the factors of 99. And so, this number is divisible by 9**]**

Divisibility by 999: (Tripling from right side) 4 + 636 + 665 = 1305

So, no it is not divisible by 999.

E.g. Check whether 8064143 is divisible by 11, 101, 1001.

Sol: Divisibility by 11: (3 + 1 + 6 + 8) – (4 + 4 + 0) = 18 – 8 = 10

Asutosh Mukherjee Road, College Para, Hathi More, Siliguri, West Bengal
+91 - 8436586516, +91-8436900456
thedhronas@gmail.com
thedronas.com

So, it is not divisible by 11

Divisibility by 101: (Pairing from right side) (43 + 06) – (41 + 8) = 49 – 49 = 0

So, it is divisible by 101

Divisibility by 1001: (Tripling from right side) (143 + 8) – (064) = 151 – 64 = 87

So, it is not divisible by 1001.

We will discuss it in detail in some other section of this series. Now, let's look the most asked topic, the divisibility rule of 7 and 13.

Divisibility rule of 7 and 13

We have a rule for 7 that if the difference between the number of tens in the number and twice the unit digit is divisible by 7. But it has some limitations. It is good for some small numbers like 651, 994, 1078 etc. but it is a very time-consuming process for numbers like 456745.

So, we can do some additional stuff here.

We know how to find whether a number is divisible by 1001 or not. And,

1001 = 7 × 11 × 13

So, if a number is divisible by 1001 it will also be divisible by 7 and 13.

Yeah, I know what you are thinking right now! If there is a number, which is not divisible by 1001 but divisible by 7 then how can we check it.

We will discuss it too but for that you need to understand few concepts like Factors, multiples, LCM, HCF, Divisors, Remainders etc. For now, just remember that 1001 is the product of three prime numbers 7, 11 and 13. But if you already have the knowledge about these topics and directly want to know about the Divisibility rule of 7 and 13 in detail, then click on the embedded link.

Now, Let's look at some question on Divisibility Rule that were asked in **WBCS Exams**.

Examples on Divisibility Rule for Better Understanding

E.g. If the number 97251*6 is completely divisible by 11, then the smallest whole number in place of * will be **[WBCS Exam 2018]**

Sol: 97251*6 has the sum of the digits at odd places, 6 + 1 + 2 + 9 = 18 and the sum of the digits at even places, * + 5 + 7 = 12 + *.

Asutosh Mukherjee Road, College Para, Hathi More, Siliguri, West Bengal
+91 - 8436586516, +91-8436900456
thedhronas@gmail.com
thedronas.com

For the number to be divisible by 11, (12 + *) - 18 should be equal to 11 or 0

For 11:

⇒ (12 + *) - 18 = 11

⇒ * - 18 = 11

⇒ * = 28 (but it should only be of 1 digit)

For 0:

⇒ (12 + *) - 18 = 0

⇒ (12 + *) = 18

⇒ * = 6

Hence, the value of * is 6. (**Ans.**)

E.g. The difference between the squares of two consecutive even integers is always divisible by **[WBCS Exam 2021]**

1. 3 2. 4 3. 6 4. 7

Sol: This is a tricky question but not a very hard question. Let 2n be an even number. So, its next consecutive even number will be 2n + 2.

Now, according to the question,

⇒ $(2n + 2)^2 - (2n)^2 = 4n^2 + 4 + 8n - 4n^2 = 4 + 8n = 4(1 + 2n)$

Hence, the difference between the squares of two consecutive even integers is always divisible by 4. (**Ans.**)

E.g. The sum of all two digit numbers divisible by 5 is **[WBCS Exam 2018]**

1. 1035 2. 1245 3. 1230 4. 945

Sol: The two digit numbers divisible by 5 are 10, 15, 20, 25, 30, 35, ..., 95

⇒ (10 + 15 + 20 + ... + 95) = 5(2 + 3 + 4 + ... + 19)

= 5[(1 + 2 + 3 + 4 + ... + 19) -] = 5[(19/2)(2 + 18) - 1]

= 5[190 - 1] = 945 (**Ans.**)

In conclusion, mastering the Divisibility Rule of Numbers is a significant step towards achieving success in the WBCS Prelims Exam. This guide has equipped you with a deep understanding of these fundamental rules, allowing you to save time, improve accuracy, and enhance your problem-solving skills.

As you journey toward your WBCS goals, remember that the Divisibility Rule is not just a mathematical concept but a powerful tool in your toolkit. With dedication and practice, you can confidently tackle math-related challenges, secure a competitive edge, and approach the WBCS Prelims with the certainty of success.

So, this is all for this blog. We will discuss the Factors and Multiples in our next blog of this 'Number System' blog series. Till then, keep practicing!