Divisibility rule

Divisibility Rule	Definition
Divisibility rule of 2	Any number whose last digit is an even number (0, 2, 4, 6, 8) is divisible by 2
Divisibility rule of 3	A number is divisible by 3 if the sum of its digits is divisible by 3.
Divisibility rule of 4	A number is divisible by 4, if the number formed by the last two digits is divisible by 4.
Divisibility rule of 5	A number is exactly divisible by 5 if it has the digits 0 or 5 at one's place.
Divisibility rule of 6	A number is exactly divisible by 6 if that number is divisible by 2 and 3 both. It is because 2 and 3 are prime factors of 6.
Divisibility rule of 7	Double the last digit and subtract it from the remaining leading truncated number to check if the result is divisible by 7 until no further division is possible
Divisibility rule of 8	If the last three digits of a number are divisible by 8, then the number is completely divisible by 8.
Divisibility rule of 9	It is the same as of divisibility of 3. Sum of digits in the given number must be divisible by 9.
Divisibility rule of 11	If the difference of the sum of alternative digits of a number is divisible by 11, then that number is divisible by 11.

- **Divisibility rule for 1**
  - Every number is divisible by 1.

    Example: 5 is divisible by 1

- **Divisibility rule for 2**

- Any even number or number whose last digit is an even number (0, 2, 4, 6, 8) is divisible by
  Example: 220 is divisible by 2.

- **Divisibility rule for 3**
  - A number is divisible by 3 if the sum of its digits is divisible by 3.
    Example: 315 is divisible by 3.
    Here, 3 + 1 + 5 = 9

    9 is divisible by 3. It means 315 is also divisible by 3.

- **Divisibility rule for 4**
  - A number is divisible by 4, if the number formed by the last two digits is divisible by 4.
    Example: 7568 is divisible by 4
    Here, 68 is divisible by 4 (68÷4 = 17)

Therefore, 7568 is divisible by 4

- **Divisibility rule for 5**
  - A number is exactly divisible by 5 if it has the digits 0 or 5 at one's place.
    Example: 5900, 57895, 4400, 1010 are divisible by 5.

- **Divisibility rule for 6**
  - A number is exactly divisible by 6 if that number is divisible by 2 and 3 both. It is because 2 and 3 are prime factors of 6.
    Example: 63894 is divisible by 6, the last digit is 4, so divisible by 2, and sum 6+3+8+9+4 = 30 is divisible by 3.

- **Divisibility rule for 7**
  - Double the last digit and subtract it from the remaining leading truncated number to check if the result is divisible by 7 until no further division is possible
    Example: 1093 is divisible by 7

Remove 3 from the number and double it = 6

Remaining number is 109, now subtract 6 from 109 = 109 – 6 = 103.

Repeat the process, We have last digit as 3, double = 6

Remaining number is 10, now subtract 6 from 10 = 10 – 6 = 4.

As 4 is not divisible by 7, hence the number 1093 is not divisible by 7.

- **Divisibility rule for 8**
  - If the last three digits of a number are divisible by 8, then the number is completely divisible by 8.

Example: 215632 is divisible by 8, as last three digits 632 is divisible by 8.

- **Divisibility rule for 9**
  - It is the same as of divisibility of 3. Sum of digits in the given number must be divisible by 9.
    Example: 312768 is divisible by 9, Sum of digits = 3+1+2+7+6+8 = 27 is divisible by 9.

- **Divisibility rule for 10**

- Any number whose last digit is 0, is divisible by 10. Example: 10, 60, 370, 1000, etc.

- **Divisibility rule for 11**
  - If the difference of the sum of alternative digits of a number is divisible by 11, then that number is divisible by 11. Example: 737 is divisible by 11 as 7 + 7 = 14 and 14 – 3 = 11, 11 is divisible by 11.

    416042 is divisible by 11 as 4 + 6 + 4 = 14 and 1 + 0+ 2 = 3, 14 – 3 = 11, 11 is divisible by 11.

- **Divisibility rule for 12**
  - A number is exactly divisible by 12 if that number is divisible by 3 and 4 both. Example: 108 is divisible by 12. Sum of digit = 1 + 8 = 9, 9 is divisible by 3. And last two digits 08 is divisible by 4. Therefore, 108 is divisible by 12.

- **Divisibility rule for 13**
  - Multiply the last digit with 4 and add it to remaining number in a given number, the result must be divisible by 13. Example: 208 is divisible by 13, 20 + (4 x 8) = 20 + 32 = 52, 52 is divisible by 13.

- **Divisibility rule for 14**
  - A number is exactly divisible by 14 if that number is divisible by 2 and 7 both. It is because 2 and 7 are prime factors of 14.

Example: 1246 is divisible by 14, as the last digit is even, so divisible by 2. Now check for 7,

Remove 6 from the number and double it = 12

Remaining number is 124, now subtract 124 from 12 = 112.

Repeat the process, We have the last digit as 2, double = 4

The remaining number is, now subtract 11 from 4 = 7

As 7 is divisible by 7, hence the number 1246 is divisible by 7.

- **Divisibility rule for 15**
  - If the number divisible by both 3 and 5, it is divisible by 15.
  - Example: 23505 is divisible by 15.
  - Check for 3: 2 + 3 + 5 + 0 +5 = 15, 15 is divisible by 3. Check for 5: It has the 5 at one's place, therefore, divisible by 5.

- **Divisibility rule for 16**
  - The number formed by last four digits in the given number must be divisible by 16.

    Example: 152448 is divisible by 16 as last four digits (2448) are divisible by 16.

- **Divisibility rule for 17**
  - Multiply the last digit with 5 and subtract it from remaining number in a given number, the result must be divisible by 17.

Example: 136 is divisible by 17. 13 – (5 x 6) = 13 – 30 = 17, 17 is divisible by 17.

- **Divisibility rule for 18**
  - If the number is divisible by both 2 and 9, it is divisible by 18. Example: 92754 is divisible by 18. Check for 2: the last digit is even, therefore, it is divisible by 2. Check for 9: 9 + 2 + 7 + 5 + 4 = 27, 27 is divisible by 9.

- **Divisibility rule for 19**
  - Multiply the last digit with 2 and add it to remaining number in a given number, the result must be divisible by 19. Example: 285 is divisible by 19, 28 + (2 x 5) = 28 + 10 = 38, 38 is divisible by 19.

- **Divisibility rule for 20**
  - The number formed by last two digits in the given number must be divisible by 20.

    Example: 245680 is divisible by 20, because the last two digits 80 is divisible by 20.

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Type 1: Find the largest or smallest number

Question 1. Find the smallest 4 digit number which is exactly divisible by 41?

Options.

A. 1000

B. 1023

C. 1025

D. 1012

Solution Smallest 4 digit number is 1000

On dividing 1000 by 41, remainder = 16

Required number = 1000 + (41 – 16) = 1025

Correct option: C

Question 2. Find the Largest 3 digit number which is exactly divisible by 25?

Options.

A. 975

B. 905

C. 980

D. 950

Solution Largest Three digit numbers is 999

On dividing 999 by 25, remainder = 24

Required number = 999 – 24 = 975

Correct option: A

Type 2: Which of the following numbers is/or not divisible by given number.

Question 1. Which of these numbers is divisible by 3?

Options.

A. 1003

B. 253

C. 1031

D. 1221

Solution 1003 = 1 + 0 + 0 + 3 = 4, 4 is not divisible by 3

253 = 2 + 5 + 3 = 10, 10 is not divisible by 3

1031 = 1 + 0 + 3 + 1 = 5, 5 is not divisible by 3

1221 = 1 + 2 + 2 + 1= 6, 6 is divisible by 3

Correct option: D

Question 2. Which of these numbers is not divisible by 10?

Options.

A. 1250

B. 1253

C. 1930

D. 1220

Solution Last digit of 1253 is not 0 so it is not divisible by 10

Correct option: B

Type 3: Tips and Tricks to Solve Divisibility Questions.
Find the remainder

Question 1. Find out the remainder of $2125^{52^{12}}$

Options.

A. 1

B. 2

C. 0

D. 3

Solution Convert 2122_{12} in multiple of 16 = 16 x 16 x 16

$=24\times24\times24_{24}\times2_{4}\times2_{4}$

Now divide each number by 5

On dividing 16 by 5 we get remainder as 1

Now, multiply all the remainders 1 x 1 x 1 = 1

Correct option: A

Question 2. Find out the remainder when 747_4 is divided by 5.

Options.

A. 0

B. 4

C. 1

D. 2

Solution Divide 7 by 5 Remainder will 2

$2\times2\times2\times22\times2\times2\times2 = 16$

Now divide 16 by 5

On dividing 16 by 5 we get remainder as 1

Correct option: C

Divisibility Rules Questions with Solutions

1. Check whether 1440 is divisible by 15.

Solution:

Given number = 1440.

Now, we need to check whether the number 1440 is divisible by 15.

According to the divisibility rule of 15, a numeral is divisible by 15 if it is divisible by both 3 and 5.

Since the unit digit of 1440 is 0, it is divisible by 5.

Also, the sum of digits of 1440 = 1 + 4 + 4 + 0 = 9

Hence, the sum of digits is 9, it is divisible by 3.

Since 1440 is divisible by both 3 and 5, 1440 is divisible by 15.

2. Is 2848 divisible by 11?

Solution:

The given number is 2848.

To check whether the number 2848 is divisible by 11, follow the below steps:

Step 1: First, find the sum of alternative digits.

It means,

2 + 4 = 6

8 + 8 = 16

Step 2: Find the difference between 6 and 16.

The difference between 6 and 16 = 16 – 6 = 10.

Step 3: Check whether the difference value obtained in step 2 is divisible by 11 or not.

Here, the difference = 10, which is not divisible by 11.

Therefore, 2848 is not divisible by 11.

3. How many three-digit numbers are divisible by 5?

Solution:

As we know, the sequence of three-digit numbers that are divisible by 5 is:

100, 105, 110, 115, 120, …995.

Therefore, we can say that the given sequence is in Arithmetic Progression with the first digit being 100 and the common difference being 5.

i.e, a = 100, d = 5 and nth term = 995

Now, we need to find the number of three-digit numbers that are divisible by 5.

Therefore,

995 = 100 + (n-1)5

995 = 100 + 5n – 5

995 = 95 + 5n

5n = 995 – 95

5n = 900

Therefore, n = 900/5 = 180.

Therefore, the number of 3-digit numbers that are divisible by 5 is 180.

4. Check whether the number 2024 is divisible by 4.

Solution:

Given number: 2024.

As we know, a number is divisible by 4, if the last two digits of the given number are exactly divisible by 4.

In the given number 2024, the last 2 digits are 24.

Here, 24 is completely divisible by 4.

i.e., 24/4 = 6.

Therefore, 2024 is divisible by 4.

5. Is 119 divisible by 7?

Solution:

Given number: 119.

Using the divisibility rule of 7, let's check whether 119 is divisible by 7 or not.

Step 1: Multiply the last digit of 119 by 2.

Here, we get 9 × 2 = 18

Step 2: Now, subtract 18 from 11, and we get -7.

Since -7 is a multiple of 7, we can say 119 is divisible by 7.

Therefore, 119 is divisible by 7.

6. Is 99992 divisible by 8?

Solution:

Given number: 99992.

According to the divisibility rule of 8, a number is divisible by 8 if the last three digits of a number are divisible by 8.

In the number 99992, the last 3 digits are 992.

Now, we need to check whether 992 is divisible by 8.

When 992 is divisible by 8, we get the quotient as 124 and the remainder as 0.

So, 992 is divisible by 8.

Therefore, 99992 is divisible by 8.

7. Check whether the number 2112 is divisible by 6?

Solution:

The given number is 2112.

As we know, the number is divisible by 2 and 3, and then the number is divisible by 6.

In the given number 2112, the last digit is an even number, i.e. 2, and hence the number 2112 is divisible by 2.

Also, the sum of digits of 2112 is divisible by 3, and hence 2112 is divisible by 3.

i.e., 2 + 1 + 1 + 2 = 6, which is divisible by 3.

Hence, we can say that the number 2112 is divisible by 6.

8. Check whether 4355 is divisible by 13?

Solution:

Given number: 4355

To check whether the given number is divisible by 13, follow the below steps:

Step 1: Multiply the unit digit of the given number by 4.

i.e. 5 × 4 = 20

Step 2: Now add the product obtained in step 1 with the remaining digits of the given number.

i.e., 20 + 435 = 455

Step 3: Repeat step 1 and step 2, until we get the two-digit number.

i.e, 45 + (5 × 4)

⇒ 45 + 20

⇒ 65

Hence, 65 is divisible by 13, and therefore we can conclude that 4355 is divisible by 13.

9. Is 783 divisible by 9?

Solution:

Yes, the number 783 is divisible by 9.

Explanation:

To check whether 783 is divisible by 9, add all the digits of the given number. If the sum value is divisible by 9, then the given number should be divisible by 9.

i.e., 7 + 8 + 3 = 18.

18 is divisible by 9.

Therefore, 783 is divisible by 9.

10. Check whether 10032 is divisible by 12, and justify your answer.

Solution:

Yes, the number 10032 is divisible by 12.

Justification:

As we know, a number is divisible by 12 if it is divisible by both 3 and 4.

Now, we have to check the divisibility rule of 3 and 4 for the given number 10032.

Checking for Divisibility Rule of 3:

10032 = 1 + 0 + 0 + 3 + 2 = 6, which is divisible by 3.

Checking for Divisibility Rule of 4:

The last two digits of 10032 are 32, which is divisible by 4.

Hence, the number 10032 is divisible by both 3 and 4, we can say that the number 10032 is divisible by 12.

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