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| CLASS | VI |
| SUBJECT | MATHEMATICS |
| TOPIC | PLAYING WITH NUMBERS |
| SUB TOPIC | DIVISIBILITY RULES |
| NO OF SESSIONS | 3 / 8 |

Introduction:

Divisibility Rules:

These below rules will help us to know whether one number is divisible by another without much calculation.

Divisibility by 1

Any integer (not a fraction) is divisible by 1. Divisibility rule for 1 doesn't have any particular condition. Any number divided by 1 will give the number itself, irrespective of how large the number is.

Example:

$$15 \div 1, \text{ Quotient}=15, \text{ Remainder}=0$$

$$9999 \div 1, \text{ Quotient}=9999, \text{ Remainder}=0$$

Divisibility by 2

A number is divisible by 2 if it has any of the digits 0, 2, 4, 6 or 8 in its ones place.

Example:

Is 3110, 2222, 5974, 4356 and 1468 divisible by 2?

Numbers 3110, 2222, 5974, 4356 and 1468 are divisible by 2 as these numbers have only the digits 0, 2, 4, 6, 8 in the ones place.

Divisibility by 3

If the sum of the digits of the given number is divisible by 3, then the given number is also divisible by 3.

Example 1:

Is 7221 divisible by 3?

$$\text{Sum of the digits of } 7221 = 7 + 2 + 2 + 1 = 12$$

Number '12' is divisible by 3 ($12 \div 3 = 4$). So, 7221 is also divisible by 3.

Example 2:

Find the smallest digit and the greatest digit in the blank space of the number so that the number formed is divisible by 3.

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$$\text{Sum of the digits} = * + 6 + 7 + 2 + 4 = * + 19$$

To make the number divisible by 3, sum of its digits should be divisible by 3.

The smallest multiple of 3 that comes after 19 is 21.

Therefore, the smallest number is $21 - 19 = 2$.

Now, $2+3+3 = 8$ (no more 3 can be added as it will become two digits)

If we place 8, then the sums of the digits will be 27 and as 27 is divisible by 3, the given number will also be divisible by 3.

Divisibility by 4

A number with 3 or more digits is divisible by 4 if the number formed by its last two digits (i.e. ones and tens) is divisible by 4.

Example:

Is 4624 divisible by 4?

The last two digit of the given number is 24.

$24 \div 4 = 6$ (24 is divisible by 4)

So, 14624 is divisible by 4

Divisibility by 5

A number which has either 0 or 5 in its ones place is divisible by 5.

Example:

Is 5105 divisible by 5?

Here last digit is 5. So, 5105 is divisible by 5.

Divisibility by 6

If a number is divisible by 2 and 3 both then it is divisible by 6 also.

Example:

Is 4335 divisible by 6?

Step 1: Test of divisibility by 2.

Number 4335 end in odd number (i.e. 5). So, 4335 is not divisible by 2.

Step 2: Test of divisibility by 3.

Sum of the digit of the given number $4335 = 4 + 3 + 3 + 5 = 15$

Number '15' is divisible by 3. So, 4335 is divisible by 3.

Given number 4335 is divisible by 3 but not by 2. So, 4335 is not divisible by 6.

Divisibility by 7

Double the last number of the given number and then subtract it from the rest of the number left in the given number. If the answer we get is either 0 or any number divisible by 7, then the given number is divisible by 7.

Example:

Is 4494 divisible by 7?

Step1: Double the last digit

Here last digit is 4. Double of 4 is 8.

Step2: Subtract the answer from the rest of the number.

Number left is 449. So, subtract 8 from 449.

$$449 - 8 = 441$$

Step3: Number 441 is divisible by 7. So, 4494 is divisible by 7

Divisibility by 8

A number is divisible by 8, if the number formed by its last three digits is also divisible by 8.

Example:

Is the number 73512 divisible by 8?

Here last three digits are 512.

$$512 \div 8 = 64$$

As 512 is completely divisible by 8. So, the given 73512 is also divisible by 8.

Divisibility by 9

Given number is divisible by 9, if the sum of the all the digits of given number is divisible by 9.

Example:

Is 6687 divisible by 9?

$$\text{Sum of the digit} = 6 + 6 + 8 + 7 = 27$$

Number '27' is divisible by 9. So, the given number 6687 is divisible by 9.

Divisibility by 10

Any number that ends in 0 is divisible by 10.

Example:

Is 3670 divisible by 10?

As number ends in 0. So, 3670 is divisible by 10.

Divisibility by 11

Starting from left add all the number on odd positions and add all the number on even positions. Then subtract the two results. If the resultant number is divisible by 11 or is equal to 0, then the given number is divisible by 11.

Example:

Is 3729 divisible by 11?

$$\text{Sum of odd positions} = 3 + 2 = 5$$

$$\text{Sum of even positions} = 7 + 9 = 16$$

Subtract the two results, $16 - 5 = 11$. As the resultant number 11 is divisible by 11, so 3729 is divisible by 11.

Some More Divisibility Rules:

1. If a number is divisible by another number then it is divisible by each of the factors of that number.

Example:

Is 1488 divisible 12?

$$1488 \div 12 = 124$$

Yes, 1488 is divisible by 12. Therefore, number 1488 is also divisible by factors of 12 (i.e. 1, 2, 3, 4, 6 and 12).

2. If a number is divisible by two co-prime numbers then it is divisible by their product also.

Example:

$$1365 \div 3 = 455$$

$$1365 \div 5 = 273$$

Here, divisor 3 and 5 are co-prime numbers. Therefore, given number 1365 is also divisible by the product of 3 and 5.

$$1365 \div 15 (3 \times 5 = 15) = 91$$

3. If two given numbers are divisible by a number, then their sum is also divisible by that number.

Example:

$$245 \div 5 = 49$$

$$405 \div 5 = 81$$

The numbers 245 and 405 are both divisible by 5. Therefore, sum of 245 and 405 is also divisible by 5.

$$650 \div 5 = 130 \text{ (Note: } 245 + 405 = 650\text{)}$$

4. If two given numbers are divisible by a number; then their difference is also divisible by that number.

Example:

$$1722 \div 7 = 246$$

$$875 \div 7 = 125$$

The numbers 1722 and 875 are both divisible by 7. Therefore, difference of 1722 and 875 is also divisible by 7.

$$847 \div 7 = 121 \text{ (Note: } 1722 - 875 = 847\text{)}$$

Assignment

1. Test the divisibility of the following numbers by 2:
(i) 2650 (ii) 69435 (iii) 59628
(iv) 789403 (v) 357986 (vi) 367314
2. Test the divisibility of the following numbers by 4
(i) 618 (ii) 2314 (iii) 63712
(iv) 35056 (v) 946126 (vi) 810524
3. Test the divisibility of the following numbers by 5:
(i) 4965 (ii) 23590 (iii) 35208
(iv) 723405 (v) 124684 (vi) 438750
4. Test the divisibility of the following numbers by 6:
(i) 2070 (ii) 46523 (iii) 71232
(iv) 934706 (v) 251780 (vi) 872536
5. Test the divisibility of the following numbers by 7:
(i) 826 (ii) 117 (iii) 2345
(iv) 6021 (v) 14126 (vi) 25368
6. Test the divisibility of the following numbers by 8:
(i) 9364 (ii) 2138 (iii) 36792
(iv) 901674 (v) 136976 (vi) 1790184
7. Test the divisibility of the following numbers by 9:
(i) 2358 (ii) 3333 (iii) 98712
(iv) 257106 (v) 647514 (vi) 326999
8. Test the divisibility of the following numbers by 10:
(i) 5790 (ii) 63215 (iii) 55555

Homework: Exercise 3.3