Did you know that you can determine whether a number will give you a remainder or not when divided by another number without performing an actual division? There's no magic involved! The only trick is to apply the divisibility rules.

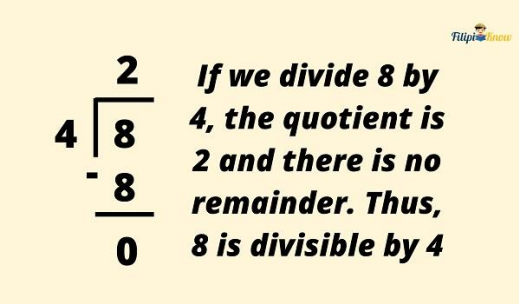
Are you ready to learn the tricks? Let's discuss these rules one by one in this reviewer.

What does "divisible" mean?

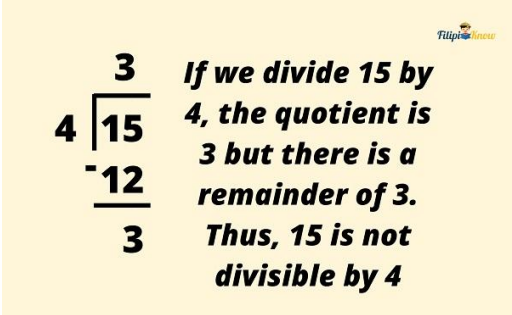
Let's start by defining the word "divisible".

A number is divisible by a certain number if it is capable of being divided by the latter and leaves no remainder.

For example, 8 is divisible by 4 since when you divide 8 by 4, the answer is 2 and there is no remainder.



On the other hand, 15 is not divisible by 4 since when you divide 15 by 4, the answer is 3 but there is a remainder of 3.



Divisibility Rules.

Divisibility rules are the rules that you can use to determine if one number is divisible by another. The good thing about these divisibility rules is that you don't have to perform the actual long division process just to determine whether the number is divisible by a certain number or not.

All you have to do is to apply these rules.

Let us explore these rules one by one

Divisibility Rule for 1: *All integers are divisible by 1*.

This is just common sense. If you divide any number by 1, the result is the same number and there's no remainder. Therefore, every number is divisible by 1.

Divisibility Rule for 2: *An integer is divisible by 2 if and only if its last digit is even (0, 2, 4, 6, and 8)*.

Recall that even numbers are those that can be divided by 2 without a remainder. The even number digits are 0, 2, 4, 6, and 8.

If the last digit of a number is an even number, then that number is divisible by 2. For example, 30826 is divisible by 2 since the last digit of 30826 is 6 which is an even number.

Example 1: Is 45034 divisible by 2?

Yes, 45034 is divisible by 2 since its last digit is an even number which is 4.

Example 2: Is 10987 divisible by 2?

No, the last digit of 10987 is 7 which is not an even number. Hence, 10987 is not divisible by 2.

Divisibility Rule for 3: *An integer is divisible by 3 if and only if the sum of its digits is divisible by 3.*

To determine if a number is divisible by 3, add the digits of the number and then divide the sum by 3. If the answer has no remainder, then the number is divisible by 3.

Example 1: Is 3438 divisible by 3?

Add the digits of 3438: 3 + 4 + 3 + 8 = 18

When you divide 18 by 3, the answer is 6 and it has no remainder.

Therefore, 3438 is divisible by 3.

Example 2: Is 5422 divisible by 3?

Add the digits of 5422: 5 + 4 + 2 + 2 = 13

When you divide 13 by 3, the answer is 4 but there's a remainder of 1.

Hence, 5422 is not divisible by 3

Divisibility Rule for 4: *An integer is divisible by 4 if and only if its last two digits are divisible by 4.*

If the last two digits of the given number leave no remainder when divided by 4, then the given number is divisible by 4.

Example 1: Does 3,400,280 leave remainder when divided by 4?

The last two digits of 3,400,280 are 80. When we divide 80 by 4, the result is 20 and there is no remainder. Therefore, 3,400,280 is divisible by 4.

Example 2: Is 54230 divisible by 4?

The last two digits of 54230 are 30 which are not divisible by 4. Therefore, 54230 is not divisible by 4.

Example 3: What are the possible values of A so that 341A is divisible by 4?

If 341A is divisible by 4, then the last two digits which are 1A must be divisible by 4. Now, what do you think must be the value of A so that 1A is divisible by 4.

Note that 12 and 16 are divisible by 4 (since they are multiples of 4 also). Therefore, the possible values of A are 2 and 6.

Divisibility Rule for 5: *An integer is divisible by 5 if and only if its last digit is 0 or 5.*

This is the easiest among the divisibility rules. Once you see the last digit of a number is 0 or 5, then that number is divisible by 5.

For instance, 45005 is divisible by 5 since the last digit of 45005 is 5.

132000000 is also divisible by 5 since the last digit of 132000000 is 0.

On the other hand, 15723122 is not divisible by 5 since its last digit is neither 0 nor 5.

Example 1: If A is a nonzero positive whole number, what must be the value of A so that 3214A is divisible by 5?

A number is divisible by 5 if and only if its last digit is either 0 or 5. Hence, the last digit of 3214A must be 0 or 5 so that it will be divisible by 5. Then, A can either be 0 or 5. However, the problem stated that A must be nonzero. Therefore, A must be equal to 5.

Divisibility Rule for 6: *An integer is divisible by 6 if and only if it is even and divisible by 3.*

There are two things you need to consider to determine whether a number is divisible by 6 or not:

- Is the given number an even number (or divisible by 2)?
- Is the given number divisible by 3?

If one of these conditions is not met, then the number is not divisible by 6.

Example 1: Is 1932 divisible by 6?

Using the divisibility rule for 6:

- *Is the given number an even number?* Yes, 1932 is an even number since it is divisible by 2 (the last digit of 1932 is 2 which is an even number).
- *Is the given number divisible by 3?* Yes, because the sum of the digits of 1932 is 1 + 9 + 3 + 2 = 15 and 15 is divisible by 3.

Since both of the conditions are met, then 1932 is divisible by 6.

Example 2: Is 41024 divisible by 6?

Using the divisibility rule for 6:

- *Is the given number an even number?* Yes, 41024 is an even number since it is divisible by 2 (the last digit of 41024 is 4 which is an even number).
- *Is the given number divisible by 3?* No, because the sum of digits of 41024 is 4 + 1 + 0 + 2 + 4 = 11 and 11 is not divisible by 3.

Since one of the conditions is not met, then 41024 is not divisible by 6.

Divisibility Rule for 7: *An integer is divisible by 7 if and only if the difference between the number made by the other digits of the integer and twice the last digit of the integer is divisible by 7.*

To determine if a number is divisible by 7, follow these steps:

1. Double the last digit of the integer.
2. Subtract the number you obtained in Step 1 from the number made by the other digits.
3. Determine if the resulting number you obtained in Step 2 is divisible by 7. If the resulting number is divisible by 7, then the original number is divisible by 7.

Example 1: Is 294 divisible by 7?

1. *Double the last digit of the integer.*

The last digit of 294 is 4. Now, let's double 4: 4 × 2 = 8

2. *Subtract the number you obtained in Step 1 from the number made by other digits.*

The number we obtained from Step 1 was 8. The number made by the other digits is 29. We subtract 8 from 29: 29 - 8 = 21

3. *Determine if the resulting number you obtained in Step 2 is divisible by 7. If the resulting number is divisible by 7, then the original number is divisible by 7.*

21 is divisible by 7 since 21 divided by 7 is 3 and it has no remainder. Hence, 294 is divisible by 7.

Divisibility Rule for 8: *An integer is divisible by 8 if and only if its last three digits are divisible by 8.*

To determine if a number is divisible by 8, get the last three digits of the given number and then divide it by 8. If the result has no remainder, then the original number is divisible by 8

Example 1: Is 1192 divisible by 8?

The last three of the given number are 192. Dividing 192 by 8 will give you 24 and it has no remainder. Therefore, the original number which is 1192 is divisible by 8.

Divisibility Rule for 9: *An integer is divisible by 9 if and only if the sum of its digits is divisible by 9.*

To determine if a number is divisible by 9, just add the digits of the given number. Afterward, divide the resulting number by 9. If the result has no remainder, then the original number is divisible by 9.

Example 1: Is 3294 divisible by 9?

Add the digits of the given number: 3 + 2 + 9 + 4 =18

Divide the resulting number by 9: 18 ÷ 9 = 2. There's no remainder.

Therefore, 3294 is divisible by 9.

BONUS: Division by Zero (0).

How about 0?

Which numbers are divisible by 0?

There's no such number that is divisible by 0 because **division by 0 is undefined**. For example, there's no number in the set of **real numbers** that can answer 2 divided by 0.

Any number divided by 0 is undefined. Meanwhile, if you divide 0 by itself or 0 divided by 0, the answer is indeterminate.