

Divisibility

When we talk about the “divisibility” of a whole number, we’re just talking about the whole numbers that divide evenly into it. As an example, 5 divides evenly into 15 three times, since $15 \div 5 = 3$, which means we can say that 15 is “divisible” by 5.

If we want to be technical, 15 is divisible by 5 because when we do the division $15 \div 5$, the answer we get (3) is a whole number. That’s the technical definition of divisibility: The result of the division must be a whole number.

Another way to say this is that we must get a remainder of 0. Since we often think of 0 as “nothing,” we sometimes say that there’s **no** remainder when the remainder is 0. So a third way to say that one whole number is divisible by another is that we don’t get a remainder when we do the division.

Here’s a counterexample. Is 9 divisible by 4? If we divide 9 by 4, we know 4 goes into 9 two times, and that gets us up to 8, but then we have a remainder of 1. In other words, because we have a remainder (other than 0), our answer isn’t a whole number. We get a whole number as the answer for $8 \div 4$ (the answer is the whole number 2), and we get a whole number as the answer for $12 \div 4$ (the answer is the whole number 3), but we don’t get a whole number as the answer for $9 \div 4$. Therefore, we can say that 9 is not divisible by 4. But as we just saw, 8 and 12 are both divisible by 4.



The following list of divisibility rules are a shorthand way of determining if a particular integer is divisible by another, without actually performing the division.

Divisible by 2 if the last digit is 0, 2, 4, 6, 8

Divisible by 3 if the sum of the digits is divisible by 3

Divisible by 4 if the last two digits are divisible by 4

Divisible by 5 if the last digit is 0, 5

Divisible by 6 if divisible by 2 and 3

Divisible by 7 if $5 \times \text{last digit} + \text{rest of the number}$ is divisible by 7

Divisible by 8 if the last three digits are divisible by 8

Divisible by 9 if the sum of the digits is divisible by 9

Divisible by 10 if the last digit is 0

Example

Is 56 divisible by 8?

If we do the division, we get $56 \div 8 = 7$. Since 7 is a whole number, we can say that 56 is divisible by 8.

