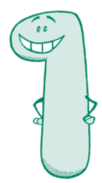
Divisibility Rules

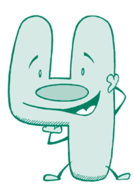
So, is there any way to tell whether a division problem is going to work out to a whole number? Yes, there is. There is a set of rules called Divisibility Rules that tell whether the answer to a division problem will be a whole number without actually having to do the long division.



Dividing by 1: If you divide any whole number by 1, you always get a whole number.

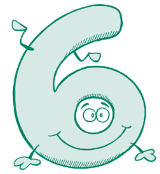
Dividing by 2: Even numbers "evenly" divide into 2. Odd numbers divide into 2 with an "odd one out."

Dividing by 3: Add up the digits (twice, if necessary); if the sum is divisible by 3, then the number is too. Let's say you need to divide 123: 1 + 2 + 3 = 6, which is divisible by 3, so 123 is divisible by 3. Another example: 678678. Add 6 + 7 + 8 + 6 + 7 + 8 = 42; 4 + 2 = 6, which is divisible by 3. That means 678678 is divisible by 3.

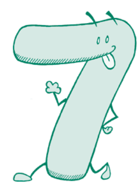


Dividing by 4: Look at the last two digits. If they are divisible by 4, the number is as well. For example, the last two digits of 2357924 are 24, which is divisible by 4. Therefore, 2357924 is divisible by 4.

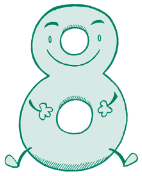
Dividing by 5: If the last digit is a 5 or a 0, then the number is divisible by 5. For example, 2357925 is divisible by 5, because the last digit is a 5.



Dividing by 6: If the number is divisible by both 3 and 2, it is divisible by 6 as well. For example, 2157924 is divisible by 6 because it is even (divisible by 2) and the digits add up to 30, which is divisible by 3.

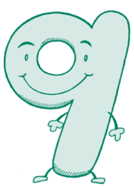


Dividing by 7: To find out if a number is divisible by 7, take the last digit, double it, and subtract it from the rest of the number without the last digit. If you get an answer divisible by 7 (including 0), then the original number is divisible by 7. If you don't know the new number's divisibility, you can apply the rule again. For example, 161 is divisible by 7 because 2 × 1 (the last digit) = 2 and 16 – 2 = 14, which is divisible by 7.



Dividing by 8: If the last three digits of a number are divisible by 8, then so is the whole number. How do you check the last three digits? If the first digit is even, and the last two digits are divisible by 8, the number is divisible by 8. If the first digit is odd, subtract 4 from the last two digits; the number will be divisible by 8 if the resulting last two digits are. For example:

- **2448:** Check the last three digits, 448. Here, 4 is even and 48 is divisible by 8, so 2448 is also divisible by 8.
- **192:** Here, 1 is odd, so you need to subtract 4 from the last two digits: 92 – 4 = 88; 88 is divisible by 8, so 192 is as well.



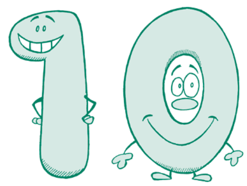
Dividing by 9: Add the digits. If they are divisible by 9, then the number is as well. For example: 52866 is divisible by 9 because 5 + 2 + 8 + 6 + 6 = 27, and 27 is divisible by 9.

WORDS2KNOW

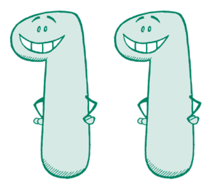
solidus: The slanted bar "/" used for fractions and division. During the Roman Empire, the solidus was a gold coin. On the reverse of the coin was a picture of a spear bearer, with the spear going from lower left to upper right. This spear became the symbol for fractions and division.

A Problem with No Answer

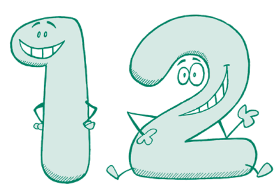
There is one case in which division is not allowed. Do you know what it is? Try the following problem: 2 ? 0. Since division is the opposite of multiplication, this is the same as asking, "What number times 0 will equal 2?" Any number multiplied by 0 is equal to 0, so it's impossible to have a number that, when multiplied by 0, will equal 2. That's why 2 ? 0 really does have no answer. Division by 0 is simply not allowed.



Dividing by 10: If the number ends in 0, it is divisible by 10.



Dividing by 11: Keep subtracting the last digit from the previous digits until you can tell if the resulting number is divisible by 11. For example: 645634 is divisible by 11 because 64563 – 4 = 64559; 6455 – 9 = 6446; 644 – 6 = 638; 63 – 8 = 55, and 55 is divisible by 11.



Dividing by 12: Check for divisibility by 3 and 4.