Divisibility Rules Example

Test 4,752 for divisibility by 2 through 11

WORKED EXAMPLE

Divisibility rules use a number's final digits or digit sums to check divisibility without long division. This example applies the common rules to 4,752 and verifies each result with an exact quotient.

Problem

Which of the integers 2 through 11 divide 4,752 evenly?

KEY FACT	VALUE
Digit sum	4 + 7 + 5 + 2 = 18
Divisible by	2, 3, 4, 6, 8, 9, and 11
Not divisible by	5, 7, and 10

Step-by-step solution

1. Check the last digit

The last digit is 2, so 4,752 is even and divisible by 2. It ends in neither 0 nor 5, so it is not divisible by 5 or 10.

$$4752 \bmod 10 = 2$$

2. Check the digit sum

The digit sum is 18. Because 18 is divisible by 3 and 9, the number is divisible by both 3 and 9.

$$4 + 7 + 5 + 2 = 18$$

3. Check the final digits

The last two digits, 52, are divisible by 4. The last three digits, 752, equal 8 x 94, so the number is divisible by 8.

$$52 = 4 \times 13;\ 752 = 8 \times 94$$

4. Check 6 and 11

A number divisible by both 2 and 3 is divisible by 6. For 11, the alternating digit sums are equal: (4 + 5) - (7 + 2) = 0.

$$9 - 9 = 0$$

ANSWER

4,752 is divisible by 2, 3, 4, 6, 8, 9, and 11. It is not divisible by 5, 7, or 10.

Check

Exact quotients include 4,752/2 = 2,376; /3 = 1,584; /4 = 1,188; /6 = 792; /8 = 594; /9 = 528; and /11 = 432.