

Steps into Numeracy

Rules for Dividing Whole Numbers

This guide illustrates some rules concerning the division of whole numbers. It gives a starting point to help you to develop division strategies, for example long division and cancelling down. These rules only concern whole numbers.

Introduction

There are four basic skills in numeracy, adding, subtracting, multiplying and dividing. If you are comfortable with each of these your confidence will improve and your level of numeracy will increase. Out of the four, dividing is thought of as the most difficult – you may remember **long division** from school. However being able to divide two numbers is a crucial skill and many divisions can be performed without long division. Also a good understanding of division helps to give a good understanding of **fractions**. This study guide gives useful strategies to help you decide whether or not a number can be divided by another number to give a whole number. In mathematics the word **divisible** is used to describe whether a number can be divided by another number to give a whole number result. For example, 10 is divisible by 2 (giving 5) but not by 3 (which has remainder 1).

Numbers divisible by 2:

A number is divisible by 2 if the final digit of the number itself is divisible by 2. This means that all numbers ending in either 2, 4, 6, 8 or 0 are divisible by 2. In other words all the **even** numbers are divisible by 2.

Numbers divisible by 3:

A number is divisible by 3 if the sum of all the digits in the number is divisible by 3.

Example: Is the number 3627 divisible by 3?

Adding the digits of 3627 gives $3 + 6 + 2 + 7 = 18$. As 18 is divisible by 3, 3627 is also divisible by 3. ($3627 \div 3 = 1209$)

Numbers divisible by 4:

A number is divisible by 4 if the number formed by the last two individual digits of the number is divisible by 4.

Example: Is the number 3628 divisible by 4?

The last two digits of 3628 are 28. 28 is divisible by 4, so the number 3628 is divisible by 4. ($3628 \div 4 = 907$)

Numbers divisible by 5:

A number is divisible by 5 if the last digit of the number is 0 or 5.

Numbers divisible by 6:

A number is divisible by 6 if it is divisible by both 2 *and* 3. You can use the rules above to determine if a number is divisible by 2 or 3.

Example: Is the number 31254 divisible by 6?

As 31254 is an even number it is divisible by 2. Adding the digits, $3 + 1 + 2 + 5 + 4 = 15$; 15 is divisible by 3, so 31254 is divisible by 3. As 31254 is divisible by both 2 and 3 it is divisible by 6. ($31254 \div 6 = 5209$)

Example: Is 9518 divisible by 6?

9518 is an even number, so it is divisible by 2. $9 + 5 + 1 + 8 = 23$, which is not divisible by 3. So 9518 is NOT divisible by 3 and therefore cannot be divided by 6. ($9518 \div 6 = 1586$ remainder 2)

Numbers divisible by 7:

To determine if a number is divisible by 7, take the last digit off the number, double that digit and subtract it from the remaining number. If the result is divisible by 7 then the number is divisible by 7. If you are looking at a long number this process may need to be repeated several times.

Example: Is 3101 divisible by 7?

$$\begin{array}{r} 310 \\ - 2 \\ \hline 308 \end{array}$$

- remove the last digit of the number which was 1
- double the removed digit and subtract it from 310
- repeat the process by taking off the 8

$$\begin{array}{r} 30 \\ - 16 \\ \hline 14 \end{array}$$

- this leaves 30
- double the removed digit, 8, and subtract it
- the result is 14 which is a multiple of 7

so 3101 is divisible by 7. ($3101 \div 7 = 443$)

Numbers divisible by 8:

A number is divisible by 8 if the number formed by the last three individual digits is divisible by 8. This requires a good knowledge of your 8 times table. However, here is a short-cut. If the result of dividing the number by 2 twice is an even number then the *original* number is divisible by 8 so you can apply *this* rule to your last three digits.

Example: Is the number 8624 divisible by 8?

You need to determine if the last three digits of 8624 are divisible by 8. Using the second technique, divide the last three digits by 2: $624 \div 2 = 312$. Now divide this result by 2: $312 \div 2 = 156$. As 156 is an even number it follows that 624 is divisible by 8 and so is 8624. ($8624 \div 8 = 1078$)

Numbers divisible by 9:

A number is divisible by 9 if the sum of all its individual digits is divisible by 9. If the result of addition is a large number and you are not sure if it is divisible by 9, the process can be repeated on this result.

Example: Is the number 4653 divisible by 9?

Add the digits of 4653 to give $4 + 6 + 5 + 3 = 18$. As 18 is divisible by 9 so is 4653. ($4653 \div 9 = 517$)

Numbers divisible by 10:

A number is divisible by 10 only if the last digit of the number is 0.

Numbers divisible by 11:

A number is divisible by 11 if the alternating sum of its digits is either 0 or divisible by 11. To find the alternating sum you write the first digit of the number, subtract the second digit, add the third digit, subtract the fourth digit and so on. Be careful as this method may involve negative numbers.

Example: Is 1364 divisible by 11?

The alternating sum for 1364 is $1 - 3 + 6 - 4 = 0$ which tells you that 1364 is divisible by 11.
($1364 \div 11 = 124$)

Want to know more?

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