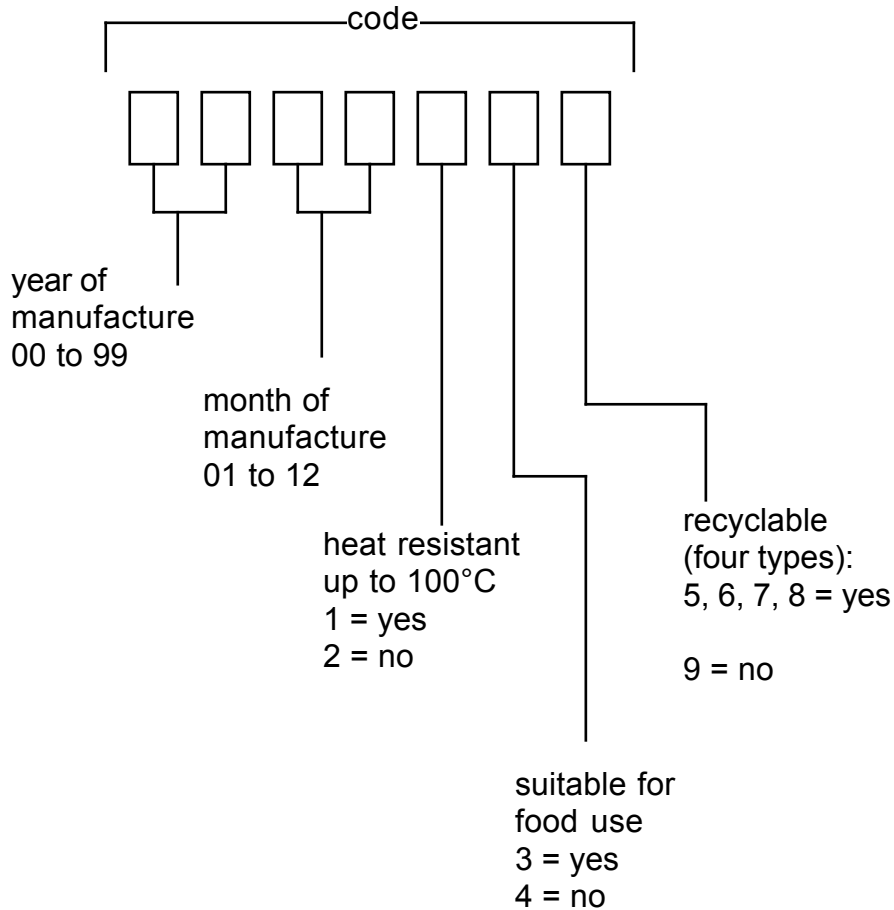


Data sheet

Plastic codes

A manufacturer of plastics marks a seven-digit number on all the different types of plastic produced. These seven digits are a code that identifies the date of production and properties of the material.



For example, a piece of plastic with the code

0 3 1 1 2 3 8

was manufactured in 2003, November; it is not heat resistant; it is suitable for food use and is recyclable.

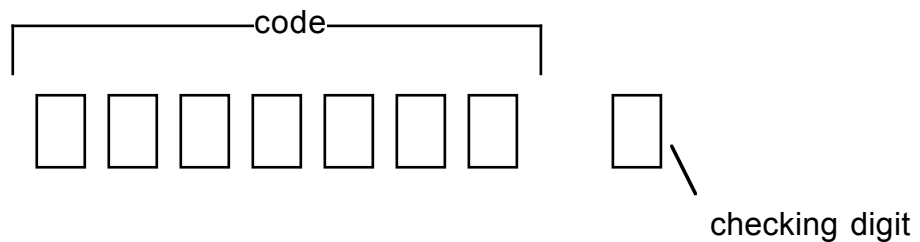
Checking digits

When you write down a long string of digits, it is easy to make a mistake – usually getting two digits next to each other the wrong way round. For example, in the previous code,

0 3 1 1 2 3 8 might be accidentally written as 0 3 1 2 1 3 8

This will give wrong information about the product.

A checking digit can be used to tackle this problem. This is an additional number at the end of the code.



One way to get a checking digit is to take the digits of the code and treat them as a whole number, divide it by 11, and use the remainder as the checking digit. If there is no remainder, the checking digit is '0'.

In the example given the code was 0 3 1 1 2 3 8. This is treated as 311,238

$$311,238 \div 11 = 28,294 \text{ remainder } 4$$

so '4' becomes the checking digit, and the full code, including checking digit is

0 3 1 1 2 3 8 4

A remainder of 10 is written as 'X', so that the checking digit is always a single digit or letter. For example, code 0 3 1 2 2 4 5 has a checking digit of X

How checking digits act as a check

If a code is copied incorrectly by writing two digits the wrong way round, the checking digit will not fit with the new number, so the mistake can be detected.

For example, as suggested above, 0 3 1 1 2 3 8 could be written incorrectly as 0 3 1 2 1 3 8, but this number would have a remainder of 2 when divided by 11, so,

0 3 1 2 1 3 8 4

indicates that the code has been incorrectly copied.

Questions

Plastic codes

1

List the date of manufacture and all the properties of a piece of plastic with the code

0 6 0 5 1 4 6 3

2

Here are two codes (without checking digits).

Explain why each one cannot be correct.

0 3 1 4 1 3 7 -----

0 5 0 5 2 3 3 -----

3

Underline the two codes in this list that do not match their checking digits.

0 1 1 1 1 4 5 9

9 9 1 2 2 3 9 7

0 0 0 7 1 3 8 X

0 4 0 2 2 4 7 1

4

Write the code and checking digit for some plastic manufactured on the 4th of September 2006, heat resistant up to 100°C, suitable for food use, type 5 recyclable.

5

A possible checking digit system is to use divisibility by 9 and make the checking digit the remainder after dividing by 9

Do you think this would detect a mistake in a coding due to digits next to each other being written the wrong way round?

Yes / No

Give an example to justify your answer.

