Shopping around : ISBNs

Description

Computer codes with check digits are widely used in the retail and banking sector. This activity focuses on one long-established code – the International Standard Book Number (ISBN).

Activity 1: How many books?

Activity 2: The check digit

Activity 3: Checking for errors

Resources

a selection of interesting mathematics books.

In How many books? pupils are introduced to the structure of ISBNs: the first and last field being of fixed length one but the publisher and book codes of variable length comprising eight digits when taken together. They are asked some questions which require place value thinking.
For example, if the book code has 5 digits, then100,000 books can be coded, counting from 00000 to 99999. This would represent 100 blocks of 1000 ISBNs.

The check digit introduces the weighted modulo 11 test which is used in constructing ISBNs. Pupils should be able to detect errors reasonably easily but moving to finding and, particularly, to explaining a method for calculating check digits is more demanding. They may want to use calculators or you might choose to introduce them to the test for divisibility by 11 – adding alternate digits and finding the difference between the two should produce zero. An extension question is to ask them to explain why this works.

Weighted modulo tests are good at detecting most inputting common errors. Checking for errors invites the pupils to explore when the test is effective and to uncover its limitations.

The mathematics

This set of activities requires pupils think about place value, divisibility and remainders. It also requires logical thinking.