

## Book Number

ISBN, the International Standard Book Number, is a special code printed on most books, such as:

0-20-508005-7

1-234-56789-X

The first 9 digits are assigned by a book publisher, and the last symbol is computed from these previous digits by a "weighted sum" as follows.

**First sum the first digit, and  
2 times the second digit, plus  
3 times the third digit, plus  
etc, to  
9 times the ninth digit.  
Then divide this sum by 11 and if it is less than 10 then  
the remainder becomes the checksum; otherwise  
the checksum is the symbol "X".**

For example: in the above case

0205008005

$$\begin{aligned} \text{sum} &= 0 + 2*2 + 4*5 + 6*8 + 9*5 \\ &= 0 + 4 + 20 + 48 + 45 \\ &= 117 \end{aligned}$$

$$\begin{aligned} \text{check} &= 117 \% 11 \\ &= 7 \end{aligned}$$

Similarly in the second example:

1-234-56789

the check sum is 10, so the check symbol is 'X'.

If the computed check is not equal to the check symbol, then there has been an error in the digits.

This provides a form of error detection.