Check Digit Schemes Name :_____ Per.___

ISBN 10 (International Standard Book Number) Codes

ISBN 10 codes have numbers of the form

$$a_1a_2a_3a_4a_5a_6a_7a_8a_9a_{10}$$

where $a_1,a_2,a_3,a_4,a_5,a_6,a_7,a_8,a_9$ are digits and a_{10} is either a digit or an X which denotes a 10.

The first term a_1 denotes the **language** (sometimes both a_1a_2 are needed) and is zero for all books in English.

Then $a_2a_3a_4a_5a_6a_7a_8a_9$ or $a_3a_4a_5a_6a_7a_8a_9$ are used by the **publisher** to identify the publisher with the first few digits and the book with the remaining ones.

For example, 0-471- $a_5a_6a_7a_8a_9a_{10}$ is the format for books published in English by John Wiley & Sons.

The check digit relationship which must be satisfied is that

$$(10,9,8,7,6,5,4,3,2,1)\cdot(a_1,a_2,a_3,a_4,a_5,a_6,a_7,a_8,a_9,a_{10}) \equiv 0 \pmod{11}$$

NOTE: This system uses 10,9,8,7,6,5,4,3,2,1 instead of the 3,1,3,1,3,1,3,1,3,1 pattern used in UPC codes. Also, this system uses **mod 11** instead of mod 10.

Example

The old Algebra 3/4 Teacher's Edition has an ISBN 10 of 0-03-052224-2

So the check digit product is:

0	0	3	0	5	2	2	2	4	2	ISBN Code
10	9	8	7	6	5	4	3	2	1	
0	0	24	0	30	10	8	6	8	2	Multiplication
									88	Sum
									≡ 0	Mod 11

This ISBN 10 code is correct because we get 0 mod 11.

Note that just like with UPC codes, if any of these numbers are changed then the system will not work.

You try:

Obtain the ISBN 10 code from two different books available in the classroom. Check and see if these codes work correctly.

1.

										ISBN Code
10	9	8	7	6	5	4	3	2	1	
										Multiplication
										Sum
										Mod 11

2.

										ISBN Code
10	9	8	7	6	5	4	3	2	1	
										Multiplication
										Sum
										Mod 11

Fill in the missing numbers from the following hypothetical ISBN 10 Codes:

3. 6 46 113572 __

4. 4 5__ 002932 6

Check Digit Schemes

ISBN 13 (International Standard Book Number) Codes

ISBN 13 codes have numbers of the form

$$a_1a_2a_3a_4a_5a_6a_7a_8a_9a_{10}a_{11}a_{12}a_{13}$$

The check digit relationship which must be satisfied is that

$$(1,3,1,3,1,3,1,3,1,3,1,3,1)\cdot(a_1,a_2,a_3,a_4,a_5,a_6,a_7,a_8,a_9,a_{10}\ a_{11,}\ a_{12,}\ a_{13}) \equiv 0 \textbf{ (mod 10)}$$

NOTES:

- This system is newer than ISBN 10
- This system uses the 1,3,1,3,1,3,1,3,1,3,1,3,1 pattern, which is very similar to the pattern used for UPC codes (**UPC pattern starts with a 3 instead of a 1**).
- This system uses mod 10, just like UPC codes.

Example

The Algebra 5/6 text book has an ISBN 13 code of 978-0-558-20908-7

So the check digit product is:

9	7	8	0	5	5	8	2	0	9	0	8	7	ISBN Code
1	3	1	3	1	3	1	3	1	3	1	3	1	
9	21	8	0	5	15	8	6	0	27	0	24	7	Multiplication
												130	Sum
												≡ 0	Mod 10

This ISBN 13 code is correct because we get 0 mod 10.

You try:

Obtain the ISBN 13 code from two different books available in the classroom. Check and see if these codes work correctly.

1.

													ISBN Code
1	3	1	3	1	3	1	3	1	3	1	3	1	
													Multiplication
													Sum
													Mod 10

2.

													ISBN Code
1	3	1	3	1	3	1	3	1	3	1	3	1	
													Multiplication
													Sum
													Mod 10

Fill in the missing numbers from the following hypothetical ISBN 13 Codes:

3. 763 9 500 32813 __

4. 361 5 201 0__253 7