

Check digit: credit card, IMEI, ISBN, UPC

Visa and MasterCard Check Digit

Follow this procedure to determine if a Visa or MasterCard card number is of the valid format. If a number fits the format, it is assignable, but not necessarily assigned. In this example, a made-up card number is used: 4711 0302 7911 8335.

Separate the digits in odd positions (1st, 3rd...) from those in even positions (2nd, 4th...), and put the last even-position digit (which is the card's check digit) in parentheses:

4 1 0 0 7 1 8 3
7 1 3 2 9 1 3 (5)

Add the digits in odd positions, and double the total:

$$4 + 1 + 0 + 0 + 7 + 1 + 8 + 3 = 24 \quad 24 \times 2 = 48$$

To this new total, add the quantity of odd-position digits that are higher than 4:

4 1 0 0 7 1 8 3: two digits (7 and 8) are higher than 4. $48 + 2 = 50$

To this, add the digits in even positions, except the last one:

$$50 + 7 + 1 + 3 + 2 + 9 + 1 + 3 = 76$$

If the last digit of the result is 0, then the check digit is 0. If the last digit is not 0, round the number up to the next multiple of 10, and find the difference between the two numbers; that difference is the check digit.

From 76, we round up to 80. $80 - 76 = 4$, so the check digit is 4.

If the check digit matches the last digit of the credit card number, then the credit card number is of the valid format. If they don't match, the card number can't be legitimate.

4 doesn't match 5, so the example card number can't be valid. (However, if we substitute 4 for 5 in the last position, the card number would fit the valid format because the check digit would then match.)

IMEI / MEID Check Digit

An IMEI contains 14 digits. An MEID contains 15 digits: the IMEI with the check digit appended.

Calculating the check digit of IMEI
Luhn algorithm [\[Wiki\]](#)

IMEI: ✕

3	1	5	7	4	8	5	8	4	5	8	4	4	5
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1. Compute the sum of all digits on odd places.

3		5		4		5		4		8		4		=	33
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2. Replace the digits on even places by the formula:
0=>0, 1=>2, 2=>4, 3=>6, 4=>8, 5=>1, 6=>3, 7=>5, 8=>7, 9=>9 and summarize them.

	1		7		8		8		5		4		5		
	2		5		7		7		1		8		1	=	31

3. Summarize the two results.

33	+	31	=	64
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4. In case the sum of digits ends in 0, 0 is the check digit. Otherwise, the checksum is equal to the number that needs to be added to the result to get the next highest "round" number.

Check digit	6	+	64	=	70
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3	1	5	7	4	8	5	8	4	5	8	4	4	5	6
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Direct link:

https://sndeep.info/en/tools/checksum_calculator?imei=31574858458445Copy

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ISBN Check Digit

ISBN-13

1. Multiply each of the first 12 digits in turn: the first by 1, the second by 3, the third by 1, the fourth by 3, and so on: 1, 3, 1, 3, 1, 3, 1, 3.
2. Sum the 12 products.
3. Divide the sum by 10.
4. If the remainder is 0, then the check digit is 0. Otherwise, subtract the remainder from 10; that difference is the check digit.

ISBN-10

1. Multiply each of the first 9 digits in turn: the first by 1, the second by 2, the third by 3, and so on: 4, 5, 6, 7, 8, 9.
2. Sum the 9 products.
3. Divide the sum by 11.
4. If the remainder is 0, then the check digit is 0. Otherwise, subtract the remainder from 11; that difference is the check digit (unless the difference is 10, in which case the check "digit" is X.)

UPC

1. Sum the digits in the odd-numbered positions
2. Multiply the sum by 3.
3. To that, add the sum of the digits in the even-numbered positions (except the last one).
4. Divide the result by 10. If the remainder is 0, the check digit is 0. If not, subtract the remainder from 10; that difference is the check digit.