

# How to Read a UPC (Universal Product Code) Bar Code

The **12 digits** of a UPC Bar Code include: a 6-digit manufacturer's code, a 5-digit product code, and a 1-digit "check digit"

The **Check Digit** is calculated as follows:

- Sum up the digits in the odd *positions*, giving "*a*", then multiply by 3 giving "*b*"
- Sum up the digits in the even *positions*, excluding the 12<sup>th</sup> (check digit) position, giving "*c*"
- Add:  $b + c = d$ . The check digit is the value added to "*a*" to reach the next multiple of 10 (if already at a multiple of 10, the check digit is a zero).

Example for bar code of: **0 1 2 3 4 5 6 7 8 9 0 5**

$$0 + 2 + 4 + 6 + 8 + 0 = 20 \quad 20 \times 3 = 60 \quad 1 + 3 + 5 + 7 + 9 = 25 \quad 60 + 25 = 85 \quad 90 - 85 = 5$$

A bar code is encoded as binary (1's are a line, 0's are a blank), as follows:

Left Start Code	First 6 digits	Center Code	Last 6 digits	Right Start Code
101	0 0001101 1 0011001 2 0010011 3 0111101 4 0100011 5 0110001 6 0101111 7 0111011 8 0110111 9 0001011	01010	0 1110010 1 1100110 2 1101100 3 1000010 4 1011100 5 1001110 6 1010000 7 1000100 8 1001000 9 1110100	101

Notice especially how the first 6 digits and the last 6 digits are encoded exactly opposite. This enables scanning to detect an "upside-down scan", since the left, center, and right start codes cannot help (because they read the same right-side-up and upside-down).

Make up the first 11 digits (for example, using your 9-digit Student ID and the last 2 digits of the year you began college). Calculate the check digit.

Digit #	1	2	3	4	5	6	7	8	9	10	11	12
Position	Odd	Even	Odd	Even	Odd	Even	Odd	Even	Odd	Even	Odd	CK DIGIT
Your #												

Encode it in the spaces below (don't forget the Left Start, Center, and Right Start Codes!) For a binary "1" shade in the space; for a zero, leave it blank:

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