

shifting

shift left <<

shift right >>

101011 << 2

101011 >> 3

0xA5 << 1

A5 10100101

answer 1 101001010

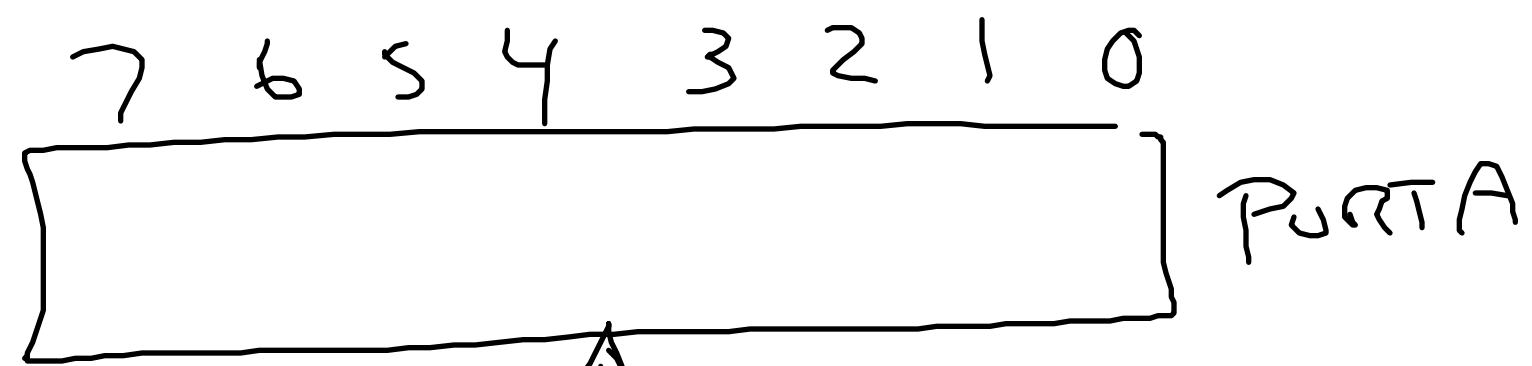
2 01001010

(if result is more than 8 bit)

(" . " 8 bits)

10101100

101



↑
 set to 1
 (don't change other bits)

$$PORTA = PORTA$$

$$\left\{ \begin{array}{l} 0b00010000 \\ 0x10 \\ 16 \\ 1 \ll 4 \end{array} \right.$$

Set bit 6 to 0

$$PORTA = PORTA \&$$

$$\left\{ \begin{array}{l} 0b10111111 \\ 0xBF \\ 191 \\ \sim 0b01000000 \\ \sim (1 \ll 6) \end{array} \right.$$

255
 64
 ───
 191

Programming Languages

C - designed "to do work"

C#

Python

C++

Java (script)

Go

ALICE

C constants

- integer
- float
- double

rules for integer constants

- may begin with + or -
- must contain at least 1 digit
- range -2 billion to +2 billion (approx) (signed)
0 to 4 billion (approx unsigned)
- requires 4 bytes (32 bits)
- may not contain spaces, commas, or decimal pt
- valid 0 +0 +234 59 -2109123456 -0
- invalid 3.14 6. 1,000 24_126

Prefixes may be added to an integer to denote a different base

↙ hexadecimal
0x123

↙ binary
0b101110 (may not work in VS 2019)

↙ Leading 0 (zero means octal)
0642

in ATmel studio

you may

0b1011_1000

double constants

may begin with + or -

must contain at least 1 digit

must contain exactly one decimal point

range $10^{\pm 308}$

15 - 16 digits of precision

takes 8 bytes

no spaces, commas, etc

may have suffix e integer meaning $\times 10^{\text{integer}}$

valid

3.14159 0.0 -0.0 +6.2

6.023e23 1.609e-19

float constants

- Same as doubles except
 - range $10^{\pm 38}$
 - takes 4 bytes
 - 7-8 digits of precision
 - must have an f suffix
(before e if e is used)

6.023fe23

+35.123f

Variables - name for a memory location

- rules for variable names

- must start with A-Z, a-z or _

↙ not recommended

- remaining characters A-Z, a-z, 0-9, or _

↙ OK

- examples GrossPay, hours-work, x, i
hourlyRate, Item628

- upper/lower case different

ECE ece Ece EcE