

1. a) unsigned integer.

123:

$\left\{ \begin{array}{l} \text{binary: } 01111011 \\ \text{hexadecimal: } 0x7B. \end{array} \right.$

$$\begin{array}{rcl} 30 \div 2 & = & 15 \dots 0 \\ 15 \div 2 & = & 7 \dots 1 \\ 7 \div 2 & = & 3 \dots 1 \\ 3 \div 2 & = & 1 \dots 1 \\ 1 \div 2 & = & 0 \dots 1 \end{array}$$

b). two's complement.

$\left\{ \begin{array}{l} \text{binary: } 1000101 \\ \text{hexadecimal: } (85)_{16} \end{array} \right.$

c). BCD

$\left\{ \begin{array}{l} \text{binary: } 000100100011 \\ \end{array} \right.$

d): ASCII

00001010 00110001 00110010 00110011 00001010

2. -123.

Binary: 01111011

a).

-123 is a signed integer. So it can't be expressed as unsigned integer.

b). 2's Complement

$\left\{ \begin{array}{l} \text{Binary: } 01111011 \rightarrow 123. \\ \quad \downarrow \\ \quad 1000101 \rightarrow -123. \end{array} \right.$

hex : (85)<sub>16</sub>.

C). BCD:

the signed integer can't be expressed as BCD

D). 00101101 00110001 00110010 00110011 00001010

3). 56789.

a). unsigned integer.

{ binary: 1101 1101 1101 0101  
hex: DDDS.

two's complement.

b). { binary: 1101 1101 1101 0101  
hex: DDDS.

C). BCD:

0101 | 0110 | 0111 | 1000 | 1001 |

4. a). int x

b). int \* x

c). int x[10]

d). int \* x[10]

5. Vals[0] = 4;  
Vals[1] = 3;  
Vals[2] = 2;  
Vals[3] = 5;  
Vals[4] = 1;  
Vals[5] = 32767

6. Registers: Registers are faster than memory to access, so the variables which are most frequently used in a C program can be put in registers using register keyword. the keyword register hints to compiler's choice to put it in a register or not.

Static: in the C programming language, static is used with global variables and functions to set their scope to the containing file. In local variables, static is used to store the variable in the statically allocated memory instead of the automatically allocated memory.

Volatile: the volatile qualifiers is applied to a variable when we declare it. it is used to tell the compiler that the value may change at any time.

7. 20

8. 30.

9. the reason might be that the dynamically allocate has a fixed memory space. However, in our case, if the memory keep increasing, the space won't be enough.