Working with ASCII code in Java

- **Characters in a programming language**
  - **Characters**:
    - **Characters** (a.k.a. **character *constants***) are **denoted** using **single quotes**:

```
'A'   'B'   'C'    '1'    '2'   ...
```

    - The **type** of a **character** is:

```
char
```

    - The ***value*** of a **character** is:
      - The **value** assigned by the **ASCII code** to that **character**
  - **Example:**
    - **'H'**:
      - The **data type** of the **character constant** `H` is: `char`
      - the ***value*** of the **character constant** `H` is: 72_{10} (or `01001000` in binary)
  - **Quiz 1**:
    - **Consider** the following **program**:

```
char c;

c = 'H';
```

Question:

- What is the **bit pattern** stored in the **variable** `c` ?

- **Answer:**

```
01001000
```

- **Quiz 2**:

- **Consider** the following **program**:

```
byte c;

c = 72;
```

Question:

- What is the **bit pattern** stored in the **variable** `c` ?

- **Answer:**

```
01001000
```

- **Note:**

- The **difference** between:

  - The **character constant** `H` that is **represented** by the binary pattern `01001000`
  - The **unsigned value** 72_{10} that is **represented** by the **same** binary pattern `01001000`

  is:

- The **data type** !!!

  (**Remember** the **Java compiler** use the **data type** as ***context*** to **interpret (= decode)** the **values** !!!)

- **Strings**
  - **String:**
    - **String** = a **sequence** of **characters**

- **Casting between character type and integer type**
  - In **Java**, we can **cast** between `char` and `byte` (or `short` or `int`) data types:

```
byte b;

char c;

b = (byte) c;     // Casts character value in c to byte type

c = (char) b;     // Casts byte value in b to char type
```

  - **What** happens in a **cast operation** between **character data type** and **integer data type**:
    - The **bit pattern** is ***copied***

    - The ***type*** is **changed** !!!

  - **Example 1:**

```
char c;
byte b;

c = 'H';            // c contains: 01001000  type: char
b = (byte) c;       // b contains: 01001000  type: byte

System.out.println(b);  // Prints 72
                        // Because it's the decimal representation for
```

```
                                    // the 2's complement code 01001000
```

Example Program: (Demo above code) 

- Prog file: click here

How to run the program:

- **Right click** on link(s) and **save** in a scratch directory
- To compile: `javac CastingChar1.java`
- To run: `java CastingChar1`

- **Example 2:**

```
char c;
byte b;

b = 72;              // b contains: 01001000  type: byte
c = (char) b;        // c contains: 01001000  type: char

System.out.println(c);  // Prints 'H'
                        // Because it's the symbol representation for
                        // the ASCII code 01001000
```

Example Program: (Demo above code) 

- Prog file: click here

How to run the program:

- **Right click** on link(s) and **save** in a scratch directory
- To compile: `javac CastingChar1.java`
- To run: `java CastingChar1`

- **Quiz:**

- What is the output of:

```
char c;
byte b;
```

```
c = 'H';
b = (byte) c;
b++;
c = (char) b;

System.out.println( c );      // ???????
```

Answer:

```
I
```
