Values and Data Types: 1, 2 & 3

Lesson 1

Character Set

Character set is a **set of valid characters** that **a language** can **recognize**.

E.g.: A b c d are valid character set of English language. Special characters such as ? , . + - * etc and digits 0,1, 2,3 etc also valid characters of English language.

Computer Character Sets

Computer languages also have two character sets.These are **ASCII** and **Unicode**.

ASCII

The basic computer character set is **ASCII**. Full form of ASCII is **A**merican **S**tandard **C**ode for **I**nformation **I**nterchange. There are **256** characters in ASCII.

ASCII Characters and Values:

A	65	B	66	…	Z	90
a	97	b	98	…	z	122
0	48	1	49	…	9	57
space	32				

Other numeric values are for special characters and some symbols.

ASCII in Java

When a **character** stores into an **integer** variable it results its **ASCII number**.

E.g.:

```
int x = 'A';
System.out.println(x);
```

The output is **65**.

When an **integer** value stores into a **char** variable it results its **ASCII character**.

E.g.:

```
char y = 66;
System.out.println(y);
```

The output is **B**.

Write output:

```
int n='a';
char c=98;
int x='1';
System.out.println(n);
System.out.println(c);
System.out.println(x);
```

Output:

97

b

49

Unicode

The character set of **Java** is **Unicode**. It is a **two byte character code set**. It consists alphabets of English, Malayalam, Hindi, Tamil, German, Arabic etc. i.e., characters of almost all human languages. There are **65536** characters in Unicode.

Unicode is written by using **\u** followed by a four digit number in single quotes.

The Unicode for **A** is **'\u0041'**. The **System.out.println('\u0041');** results **A**.

The Unicode for **a** is **'\u0061'**. The **System.out.println('\u0061');** results **a**.

Write output:

System.out.println('\u0042');

System.out.println('\u0063');

Answer:

B

c

Answer the following:

1) ASCII value of 2
2) ASCII value of ' ' (space)

Answer:

1) 50
2) 32

Answer the following:

1) Number of characters in ASCII
2) Number of characters in Unicode

Answer:

1) 256
2) 65536

Not for exam; only for knowledge:

Use of ASCII

Programs are typed in English. To convert English into computer language, i.e, machine language (binary digits **0** and **1**) it requires some numbers. These numbers are **ASCII values** and **Unicode values**. The letter **A** is an **ASCII character** and **65** is its **ASCII value**. From this 65 the binary **1000001** is derived. (Reverse of remainders when **65** is divided by **2** till quotient becomes **0**).

Not for exam; only for knowledge:

Decimal to Binary Conversion of 'A':

To store **A** into computer memory

2	65	
2	32	1
2	16	0
2	8	0
2	4	0
2	2	0
2	1	0
	0	1

$65_{10} = 1000001_2$ (Binary of **A**)

Decimal to Binary Conversion of 'B':

To store **B** into computer memory

2	66	
2	33	0
2	16	1
2	8	0
2	4	0
2	2	0
2	1	0
	0	1

$66_{10} = 1000010_2$ (Binary of **B**)

Lesson 2

Tokens in General

The **smallest individual unit** in a program is known as a **token**. A token is formed by one or more valid characters. *(These are like words in English.)*

Keywords, **I**dentifiers, **L**iterals, **P**unctuators and **O**perators (**KILPO**) are the tokens in Java.

Valid combination of tokens is known as statements; in other words statements are formed with tokens. *(These are like sentences in English.)*

E.g.: int a=5, b=3; int s=a+b;

1. Identify the tokens in the statement given below:

int a=5,b=3;

Answer:

int   Keyword
a b   Identifiers
=   Operator
5 3   Literals
, ;   Punctuators / Separators

2. Identify the tokens in the following:

public class Sum
{
}

Answer:

public class   Keyword
Sum   Identifier *(name of the class)*
{ }   Punctuator / Separator

3. Identify the tokens in the following:

public static void main()

Answer:

public static void   Keywords
main   Identifier *(name of a method)*
()   Punctuator / Separator

4. Identify the tokens in the following:

System.out.println("Hello");

Answer:

System.out.println   Identifier *(Pre-defined method)*
"Hello"   Literal *(String literal)*
. () ;   Punctuators / Separators

5. Identify the tokens in the following:

String s="Aneena";

Answer:

String   Identifier *(Pre-defined class)*
s   Identifier *(User-defined variable)*
=   Operator
"Aneena"   Literal *(String literal)*
;   Punctuator / Separator

6. Identify the tokens in the following:

import java.util.*;

Answer:

import   Keyword
java.util   Identifier *(Pre-defined package)*
*   A symbol to represent the Scanner class
. ;   Punctuators / Separators

Lesson 3

Keywords

Keywords are words that convey **special meaning** to the compiler. They are **reserved** for **special uses**.

It should not be used as identifiers (class name, method name, variable name, object name etc.)

Keywords are used to describe identifiers. E.g.: **class Sum**. The **class** is a **keyword** and the **Sum** is an **identifier**. It describes that the **Sum** is a **class**.

The **class** is shortform of **classification** i.e, category, group etc.

The **int a** means (describes) that the type of variable **a** is **int** (int means **integer**)

Answer the following:

1. *Name the keyword to **determine that a class can be executed by other classes***

   public

2. *Name the keyword to **define a class***

   class

3. *Name the three essential keywords to **define the main() method***

   public static void

4. *Name the keyword used to **declare integer data type** variable to store up to 2 billion.*

   int

5. *Name the keyword to **declare real data type** variable to store up to 17 digits. (numbers with decimal point)*

   double

6. *Name the keyword used to **declare a character data type** for a variable.*

   char

Case Sensitivity

Case means uppercase (capital letters) and lowercase (small letters). Java considers capital letters and small letters are different. If we write a keyword as Public, as the P is capital letter Java cannot recognize it as a keyword. **Keywords should be always in small letters**.

Correct the errors:

Public class Sum
Int sum=5+3;
Double d=5*2;

Answer:

public class Sum //public is a keyword. The **p** should be in small letter
int sum=5+3;   //int is a keyword. The **i** should be in small letter
double d=5*2;   //double is a keyword. The **d** should be in small letter

Correct the errors:

String class="9 A";
int double=b*2;

Answer:

String Class="9 A"; //**C** of Class is capital. So it is not a keyword
int Double= b*2; //**D** of Double is capital. So it is not a keyword