AP Computer Science
Chapter 2 Notes (1)

Name: _____

ELEMENTARY PROGRAMMING

Algorithm: A method that describes how a problem is solved by listing the actions that need to be taken and the order of their execution.

Variable: A symbol that represents a value stored in the computer's memory.

- Variables need to be declared by type.
- Variables can either refer to primitive data types (`int, double, boolean`) or objects from a class.
- Every variable has a name, a type, a size, and a value

Variable Type		Sample Code

`String`	Used to store things in quotes, like "Hello World"	`public static void main(String args[])`
		`{`
		`  String s = "Hello cruel world";`
		`  System.out.println(s);`
		`}`

`int`	Used to store positive or negative integers (-3, -2, -1, 0, 1, 2, 3)	`public static void main(String args[])`
		`{`
		`  int age = 59;`
		`  System.out.println(age);`
		`}`

`double`	Used to store "floating point" numbers (decimal fractions). `double` means "double precision.	`public static void main(String args[])`
		`{`
		`  double d = -137.8036;`
		`  System.out.println(d);`
		`}`

<u>Declaring and Initializing</u>:

```
double x;       // declares a variable, there is no value stored in x

x = 1.6;        // initializes the variable, it stores a value inside x

int y = 5;      // simultaneous declaration and initialization


int num = 47.4;      // illegal, 47.4 is not an integer

double d = 95;       // legal, 95 turns into 95.0000...

int x, y, z;              // declares 3 variables of the type int
double m = 2.1, n =5.99; // declares and initializes 2 variables
```

Rules for Naming Variable:

Variable names must begin with a letter (or an underscore character) and cannot contain spaces. The only "punctuation" character permissible inside the name is the underscore ("_"). Variable names cannot be one of the reserved words that are part of the Java language.

Legal names	*Illegal names*
`Agro`	`139`
`D`	`139Abc`
`d31`	`fast One`
`hoppergee`	`class`
`hopper_gee`	`slow.Sally`
`largeArea`	`double`
`goldNugget`	`gold;Nugget`
	`hopper-gee`

Variable Naming Conventions:

Make sure that you choose descriptive names with straight forward meanings for the variables, constants, classes, and methods in your program. As mentioned earlier, names are case sensitive.

It is traditional (although not a hard and fast rule) for variable names to start with a lower case letter. If a variable name consists of multiple words, combine them in one of two ways:

`bigValue` jam everything together. First word begins with a small letter and subsequent words begin with a capital.

`big_value` separate words with an underscore.

Listed below are the conventions for naming variables, methods and classes.

- Use lowercase for variables and methods. If a name consists of several words, concatenate them into one, making the first word lowercase and capitalizing the first letter of each subsequent word.
- Capitalize the first letter of each word in a class name.

Named Constants: An identifier that represents a permanent value.

The value of a variable may change during the execution of a program, but a named constant, or simply constant, represents permanent data that never changes. Here is the syntax for declaring a constant:

```
final datatype CONSTANTNAME = value;
```

A constant must be declared and initialized in the same statement. The word `final` is a Java keyword for declaring a constant.

Reading Input from the Console:

To read input from the console, you need to use the `Scanner` class, which requires the folowing import statement:

```
import java.util.Scanner; // Scanner is in the java.util package
```

Additionally, you need to create a Scanner object that will read input from the keyboard:

```
Scanner input = new Scanner(System.in);
                          // System.in refers to an input device
                          // System.out refers to an output device
```

Methods for Scanner Objects:

Method	Description
`nextInt()`	Reads an integer of the int type.
`nextDouble()`	Reads a number of the double type.
`next()`	Reads a string that ends before a whitespace character.
`nextLine()`	Reads a line of text (i.e., a string ending with the Enter key pressed).

Program Example 1: Write a program that calculates the area of a circle when given the radius?

Program Example 2: Write a program that asks the user for three input values and displays their average.