

Topics: Parts of a Java program; types; variable, declaration and assignment; DrJava demo
Reading: (**Java text**) Chapter 2; *optional* reading: Chapter 1

Java Program Structure

In the Java programming language:

- A program is made up of one or more *classes*
 - A class contains one or more *methods*
 - A method contains program *statements*
- A Java application always contains a method called **main**

```
// Our first Java program (What does it do?)

public class Mystery {

    public static void main(String[] args) {

        System.out.print( (12-32)*5/9.0 );

    }

}
```

Comments

```
// this comment runs to the end of the line

/* this comment runs to the terminating
   symbol, even across line breaks */

/* Here is a nicer looking (?) comment format
 * that many programmers use.
 */
```

Type

A type is a set of **values** along with a set of **operations** on those values. E.g., the set of *integers*
 {..., -2, -1, 0, 1, 2, ...}
 along with the arithmetic operations

+ - * / %

Primitive Data: 8 types

Four types of integers: **byte**, **short**, **int**, **long**

Two types of floating point numbers: **float**, **double**

One character type: **char**

One logical type: **boolean** (only two valid values: **true**, **false**)

We will use four primitive types most of the time: **int**, **double**, **char**, **boolean**

Integer Division and Remainder Operator

If both operands to the division operator `/` are integers, the result is an integer.

The remainder operator `%` is an arithmetic operator that returns the remainder after dividing the second operand into the first.

Variable, Declaration, Assignment

- A variable must be *declared*: specify variable's *name* and *type* of information that will be held in it
- Multiple variables can be created in one declaration statement
- In an assignment statement, the expression on the right is evaluated and the result is stored in the variable on the left
- Can declare a variable and assign an initial value to it in one statement.

```
int total;           // declaration
int count, tmp, result;
total= 200;         // assignment
int sum= 0;         // combine declaration and assignment
int base=32, max=149;

final int MIN_HEIGHT = 149; // declare a constant and assign its value
```

Data Conversion

Arithmetic promotion: operators in expressions convert their operands

Casting: explicit conversion by specifying the type desired

Assignment conversion: a value of one type is assigned to a variable of another type

Widening conversions are safe: go from small data type to larger one (e.g., a **short** to an **int**).

Narrowing conversions can lose information: go from large data type to smaller one (e.g., an **int** to a **short**).

The Math class

A collection of basic mathematical functions, most of which return a value of type **double**. All the examples below return **doubles**.

```
double tmp = Math.exp(1);
tmp = 3*Math.sin(2);
tmp = Math.floor(3*Math.sin(2));
tmp = Math.random(); // in [0, 1)
```

Which statement(s) below will give you a random integer in [1..6] with equal probability?

```
int r= Math.floor(Math.random()*6+1);
int r= (int) Math.random()*6+1;
int r= Math.ceil(Math.random()*6);
```

The boolean type

Represent conditions or states *true* or *false*. There're only two valid values for **boolean** type: **true**, **false**.

Relational operators: `<`, `>`, `<=`, `>=`, `==`, `!=`

Logical operators: `&&`, `||`, `!`