Skeleton Java program

```java
public class HelloWorld {
  public static void main(String[] args) {
    System.out.println("Hello world!");
  }
}
```

Printing to the screen

```java
System.out.println(str);  // str can be a String variable or literal
System.out.print(str);    // no new line at the end

// Example:
System.out.println("Hello world!");

// Printing without a new line:
System.out.print("Hello world!");
System.out.print("How are you?");
```

Variables

```java
// Common types: int, long, (float), double, boolean, char, String

// Declare a variable:
int myVarName;

// Declare and initialize a variable:
int myVarName = 5;

// (Re-)Assign to an existing variable:
myVarName = 10;

// Print a variable:
System.out.println(myVarName);
System.out.println("The value is: " + myValue);
```

Comments

```java
// Line comment

/* Block comment
   More lines
   Yet more lines. */
```

User input

```java
// goes at the top of the program
import java.util.Scanner;

// goes in main
Scanner scanner = new Scanner(System.in);

// Read a string
String str = scanner.nextLine();

// Read an integer
int num = scanner.nextInt();

// Read a double
double myDouble = scanner.nextDouble();

// Read a boolean
boolean bool = scanner.nextBoolean();

// To prompt the user for input, print the prompt
// then ask for input. For example:
System.out.println("What is your name? ");
String name = scanner.nextLine();
System.out.println("What is your age? ");
int age = scanner.nextInt();
```

Comparison Operators

```java
// Comparison operators evaluate to booleans (true/false values)

x == y        // test if x is equal to y
x != y        // test if x is not equal to y
x > y         // test if x is greater than y
x >= y        // test if x is greater than or equal to y
x < y         // test if x is less than y
x <= y        // test if x is less than or equal to y

// Comparison operators in if statements
if (x == y)
{
  System.out.println("x and y are equal");
}

if (x > 5)
{
  System.out.println("x is greater than 5.");
}
```

Math

```
// Operators:
+    Addition
-    Subtraction
*    Multiplication
/    Division
%    Modulus (Remainder)
()   Parentheses (For order of operations)

NOTE: Dividing one integer by another always results in an integer!
int x = 7 / 3;          // x is now 2.
double y = 7 / 3;       // Doesn't help: y is 2.
double z = 7 / 3.0;     // z is now 2.3333…
int w = 7 / 3.0;        // Careful! Truncated to integer!

// Examples
int z = x + y;
int w = x * y;

// Increment (add one)
x++;

// Decrement (subtract one)
x--;

// Shortcuts
x = x + y;          x += y;
x = x - y;          x -= y;
x = x * y;          x *= y;
x = x / y;          x /= y;

// More math:
Math.pow(a, b) returns a raised to the b power (as a double)
Math.random() returns a random floating-point number between 0 and 1
(as a double)

Math.abs(x) returns the absolute value of x
```

Casting: Convert from one variable type to another

```
Variable1 = (type)variable2;

// example:
double x = 2.9;
int y = (int)x;  // y is now 2
```

Booleans

```
// A boolean is either true or false
boolean myBoolean = true;
boolean anotherBoolean = false;

// Not operator
boolean x = !y;          // x gets the opposite of y

// And operator
boolean z = x && y;      // z is true if x and y are both true

// Or operator
boolean w = x || y;      // w is true if either x or y are true

// You can combine many booleans!
boolean boolExp = x && (y || z);
```

If Statements, If/Else, If/Else If/Else

```
// Plain "if":

if (Boolean expression)
{
    // code to execute if true
}

// Example:

if (x < 0)
{
  System.out.println("x is negative.");
}

// "if" with "else":

if (Boolean expression)
{
    // code if true
}
else
{
    // code if false
}
```

```java
// Example:
if (x % 2 == 1 || x % 3 == 0)
{
    System.out.println("x is odd or is divisible by 3");
}
else
{
    System.out.println("x is even and not divisible by 3");
}
```

// You can chain these together with "else if" (like Python's elif):

```java
if (condition_1)
{
    ...
}
else if (condition_2)
{
    ...
}
else if (condition_3)
{
    ...
}
else
{
    ...
}
```

// Nested ifs:

```java
if (condition_1)
{
    // this code runs if condition 1 is true
}
else
{
    // this code runs if condition 1 is false

    if (condition_2)
    {
        // this code runs if condition 2 is true
    }
    else
    {
        // this code runs if condition 2 is false
    }
}
```

For Loops

```java
for (initialization; test; increment)
{
    /* Code here */
}
```

// How it works:

```java
// Run initialization.  Then run the code in the loop while
// the test is true.  Run the increment after each time through
// the loop.

// Print numbers 0-9:
for (int i = 0; i < 10; i++)
{
    System.out.println(i);
}

// Print numbers 10 to 1:
for (int i = 10; i >= 1; i--)
{
    System.out.println(i);
}
```

While Loops

```java
while (boolean expression)
{
    /* Repeat code betweeen brackets while the
       boolean expression is true */
}

// Countdown from 15 to 11
int i = 15;
while (i > 10)
{
    System.out.println(i);
    i--;
}
```

Do-While Loops

```
do
{
    /* Repeat code betweeen brackets while
       'boolean expression' is true, but only begin
       testing the expression after the loop has run once.  */
} while (boolean expression);

// Example:
int x;
do
{
   x = scan.nextInt();
} while (x != 0); // avoids having to initialize x to a dummy value


// Can use "while true" loops like in Python:
while (true)
{
    // code
    if (condition)
    {
        break;
    }
}
```