What is a program?

A program is a sequence of instructions that manipulate data.

The data can be numbers, text, images, music, etc...

A program inputs data, rearranges it, and outputs the results.

Basic Components

Variables - containers for storing data.

Expressions - ways of combining data to compute new values.

Statement - a single line of code, containing one instruction

Comment - an explanatory note that has no effect on operation

Examples:

Input numbers in a spreadsheet, compute means and variances, output a graph.

Input an audio file, compute volume and EQ adjustments, output sound to speakers.

Input joystick controls, compute movement of game pieces, output 3D video.
Basic Components

**Assignment** - transferring data between variables

**Conditionals** - testing and branching

**Loops** - doing things multiple times

**Methods** - chunks of re-usable code.

Advanced Components

**Objects** - structured data with associated methods

**Inheritance** - extending objects to add functionality

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**The BlueJ Debugger**

Click in margin to insert a break point.

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**The BlueJ Debugger**

Select “Show Debugger” in View Menu.

Run code.
The BlueJ Debugger

Watch variables here.

Control execution

Executing line is highlighted

An Example

```java
public void drawSquare(int sideLength) {
    // put the pen down
    setPenDown(true);
    // draw four sides
    move(sideLength);
    rotate(90);
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    move(sideLength);
}
```
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```

```java
public void drawPolygon(int numberOfSides, int sideLength) {
    if (numberOfSides < 3) {
        System.out.println("Impossible!");
    } else {
        int angle = 360 / numberOfSides;
        for (int i = 0; i < numberOfSides; i++) {
            move(sideLength);
            rotate(angle);
        }
    }
}
```
public void drawPolygon(
    int numberOfSides, int sideLength) {
    if (numberOfSides < 3) {
        System.out.println("Impossible!");
    } else {
        int angle = 360 / numberOfSides;
        for (int i = 0; i < numberOfSides; i++) {
            move(sideLength);
            rotate(angle);
        }
    }
}
public void drawSpiral(int length) {
    while (length > 0) {
        move(length);
        rotate(90);
        length = length - 2;
    }
}

Example 3

Example 3

Example 3

public void drawSpiral(int length) {
    while (length > 0) {
        move(length);
        rotate(90);
        length = length - 2;
    }
}

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public void drawSpiral(int length) {
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