Introduction to Programming

Scratch

Lesson 1

Goals

- Sequence of commands
- Scratch Interface
- Variables
- Conditional Statements
- Turtle Graphics
- Repetition

Sequence of statements

- A step by step process (Algorithm)
  - Instructions for making tea (Pseudocode)

```
Put water in kettle
Put on kettle
While water not boiling in kettle
    Wait
Put water in cup …
```

  - Recipe for baking bread (Pseudocode)

```
Put 4 dl water in bowl
Add 2 dl flour
While not dissolved
    Stir
Add salt ...
```

Overview of languages

- Pseudocode
- Interpreted (e.g. Perl)

  perl –e ’print ”Hello World\n;”’
- Compiled (e.g. Java)

```
public class HelloWorld {
        public static void main(String[] args) {
                System.out.println(“Hello World”);
        }
 }
```

- Assembly (e.g. x86 instruction)

  ADD …
- Machine code

  0100100101010101010 …

Scratch

- Scratch is available for download at http://info.scratch.mit.edu/Scratch_1.4_Download
- To run: Double-click the scratch icon (The downloaded Scratch file is usually saved on the desktop)

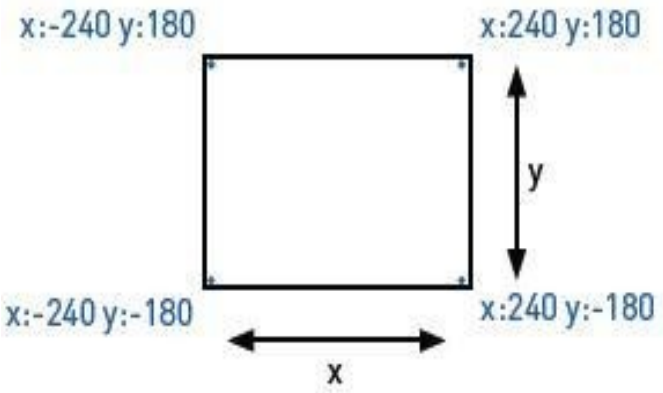
Scratch user interface

Scratch stage

STAGE

The **Stage** is where you see your stories, games, and animations come to life. Sprites move and interact with one another on the stage.

The stage is 480 units wide and 360 units tall. It is divided into an x-y grid. The middle of the stage has an x-coordinate of 0 and a y-coordinate of 0.



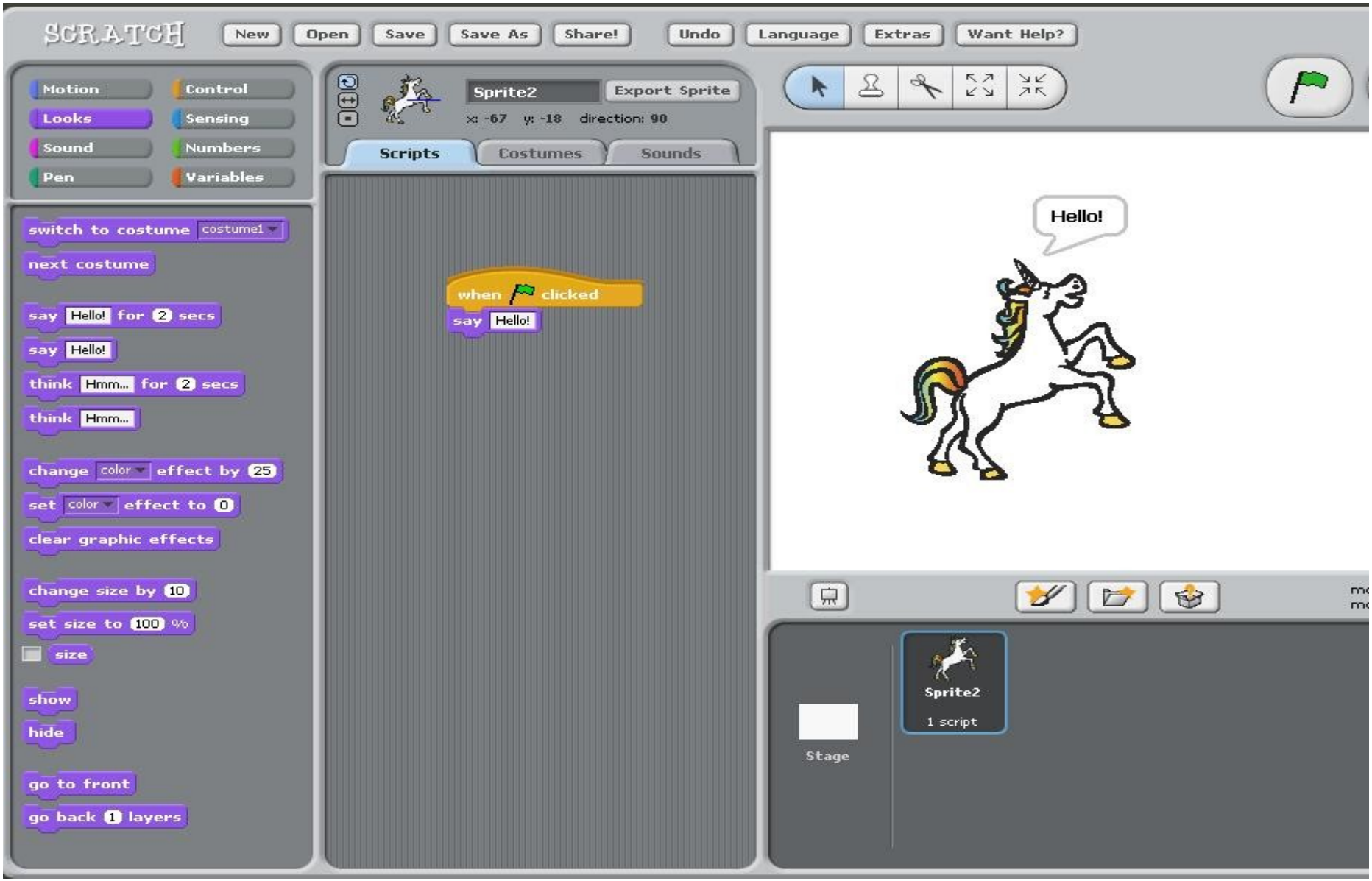
To find out x-y positions on the stage, move the mouse around and look at the **mouse x-y display** just below the stage, on the right.

Click the **Presentation Mode** button to see projects at full-screen size.
To exit Presentation Mode, press the Esc key.

Stage + Sprite

- **Exercise**:
  - Point your mouse to coordinate x=0, y=0
- **Exercise**:
  - Get a new sprite on the screen

First scratch program



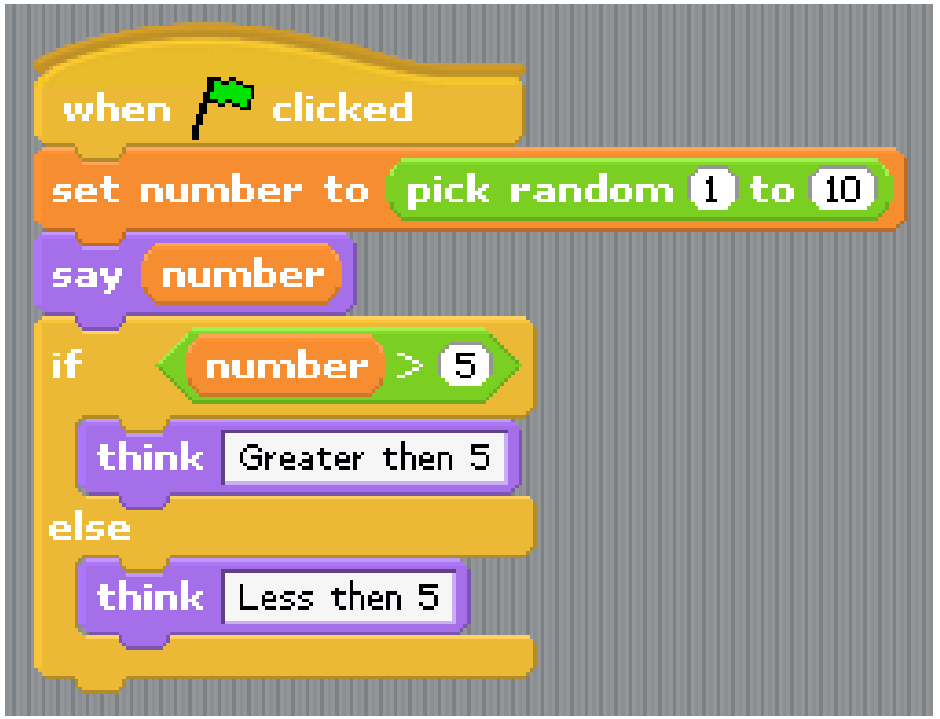
Variables

Exercise:
Say a random number

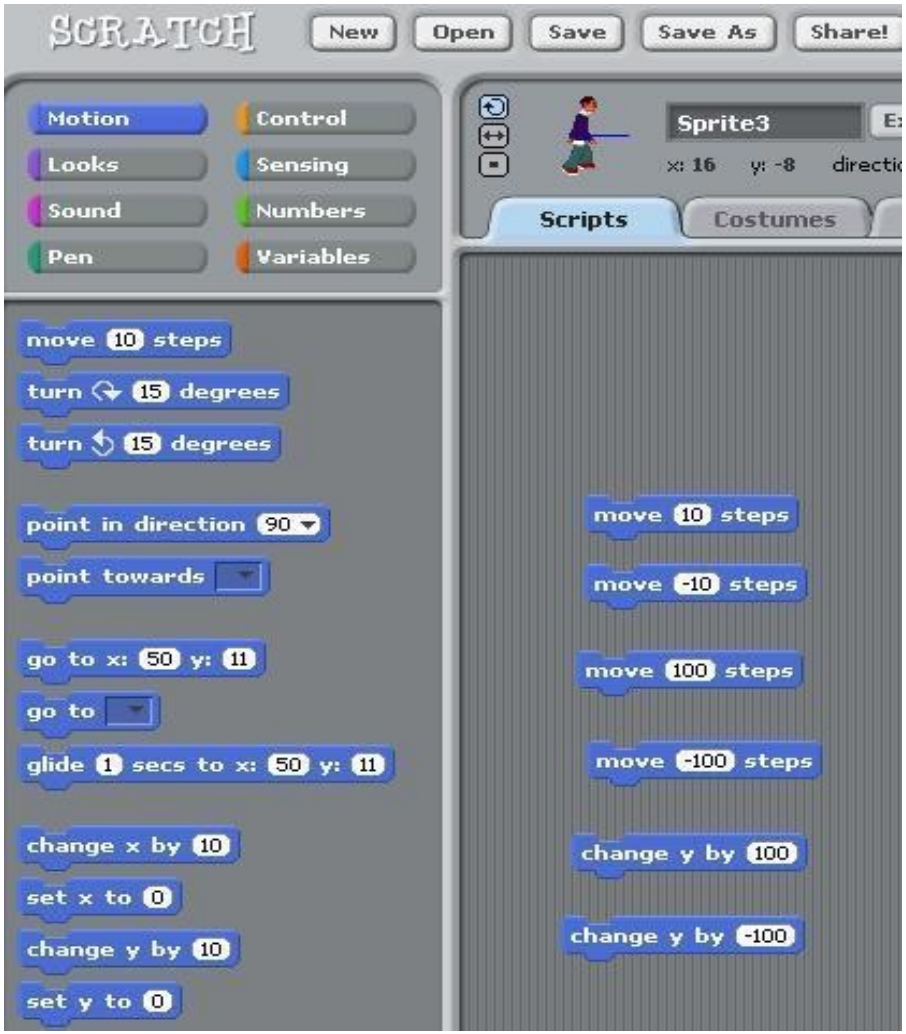
Conditions

Exercise:

- What does this code do?
- What are the errors in the code?



Motion statements



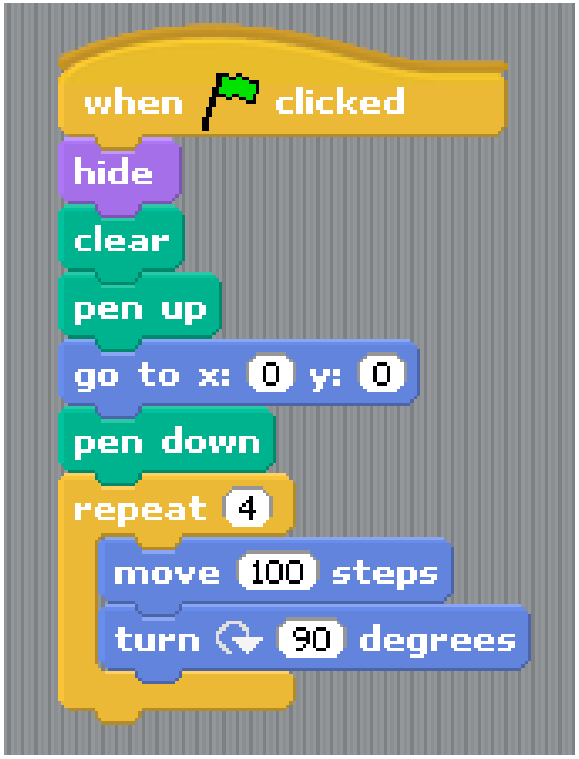
- Move Right
- Move Left
- Big Steps
- Small Steps
- Move Up
- Move Down
- **Exercise**:

  Double-click on the blocks to see what happens

More motion action

- **Exercise**
  - Make the sprite go to x=0, y=0
- **Exercise**
  - Make the sprite move 100 steps and turn 90 degrees
- **Exercise**
  - Make the sprite go in a square pattern
- **Exercise**
  - Draw a line after the sprite

Iteration

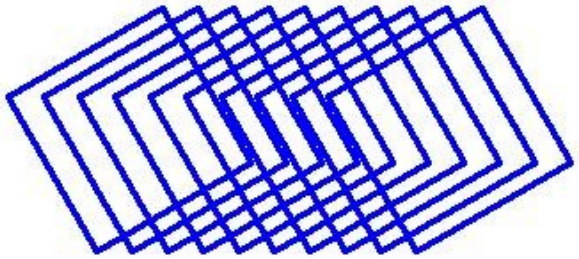


- Repeat statements
- **Exercise**:

  Guess what this code does
- Test your guess

Loop exercises

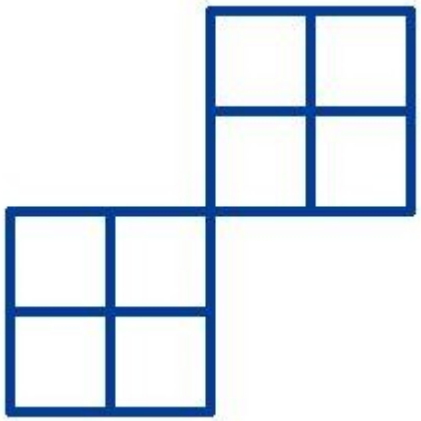
- **Exercise**: Draw this (10 diamonds)



- **Exercise**: Try to write your programs with as few statements as possible

More repeating exercises

- **Exercise**: Draw this in any colour



- **Exercise**: Change the colour of each square
- **Exercise**: Draw a triangle, a pentagon a hexagon and a circle.