Lecture 1: Basic coding concepts

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10:45am - 11:35am

Some of the slides in this slide deck are adapted from Wells Santo (AI4ALL), Laura Biester & Jule Schatz (University of Michigan), Tom Sandell & Allie Lahnala (STEM Society, Univ. Michigan)

What is Computer Science?

Have you ever seen code? Written code?

What can you think of that uses computer science?

What is Programming?

- **Programming** is a way to tell your computer how to perform tasks

- Everything a computer does is done by using a **computer program**

Basic coding concepts we will cover:

- Variables

- Conditional Statements

- Loops

Variables

Just like in math, we can use variables to represent other values.

```python
x = 10
y = 2

print(x)
print(y)
```
✓ 0.3s   Python

```
10
2
```

Variables

- Our variables hold values, and we can overwrite those values

- Read the code on the right. What do you expect the *output* will be (in other words, what do you expect it to print)?

```python
x = 10
y = 2

x = x * 2

print(x)

x = "Hello"

print(x)
```
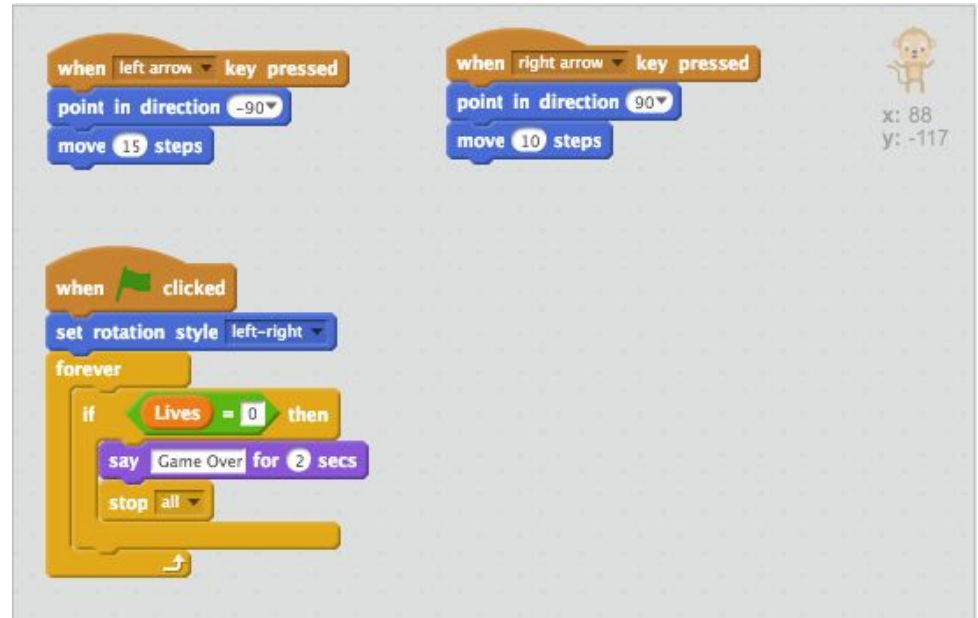✓ 0.2s   Python

Variables

Locate a variable in this code!

Types of Variables

Numbers

Integers:

     x = 10

     y = 2

Floats:

     x = 15.5

     y = 3.14

Strings

Sequence of *characters* surrounded by " " or ' '

Characters?

     x = 'b'

     y = 'a'

Strings?

     my_string = "Hello, World!"

     new_string = x + y

Conditional statements

Code that executes only when a certain condition is met

In English:

If there are apples, say "There are apples in the basket"

If there are apples in the basket, announce the number of apples.

Conditional statements

If there are apples in the basket, announce the number of apples.

What is the condition?

Conditional statements

<u>If</u> there are apples in the basket, announce the number of apples.

What is the condition? **There are apples in the basket**
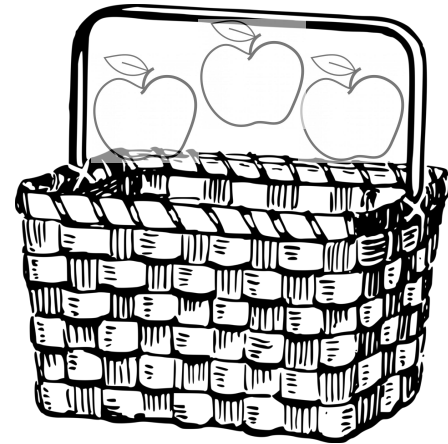
Conditional statements

If there are apples in the basket, announce the number of apples.

What is the condition? There are apples in the basket

What happens when the condition is met?

Conditional statements

If there are apples in the basket, **announce the number of apples**.

What is the condition? There are apples in the basket

What happens when the condition is met? **Announce the number of apples in the basket**

Conditional statements

If there are apples in the basket, announce the number of apples.

What is the condition?

There are apples in the basket

What happens when the condition is met?

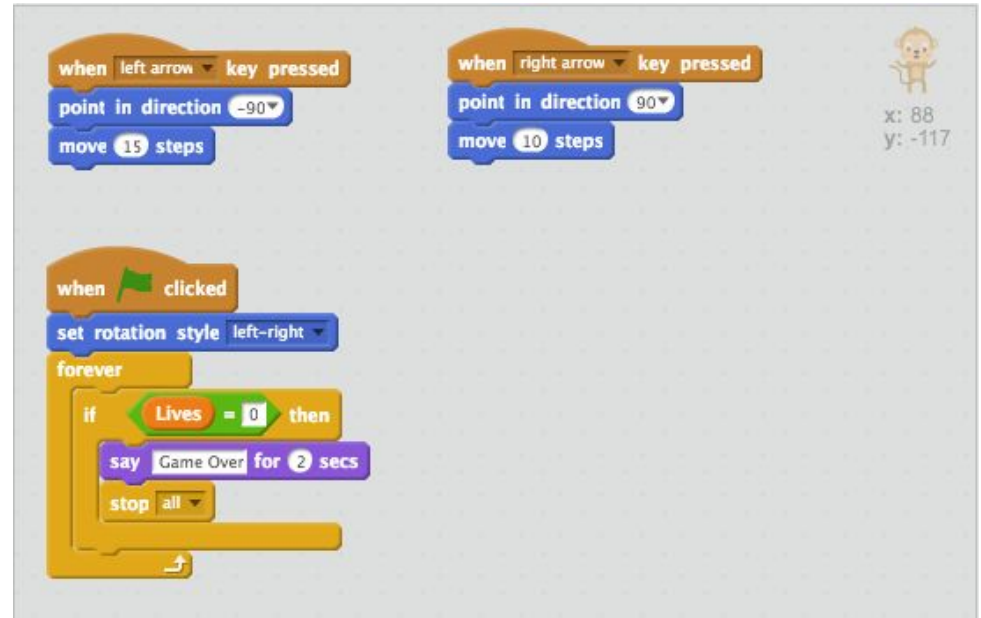Announce the number of apples in the basket

3 apples!

Conditional statements

Find a conditional statement in the code to the right.

What is the condition?

What does the code do if the condition is met?

when left arrow key pressed
point in direction -90
move 15 steps

when right arrow key pressed
point in direction 90
move 10 steps

x: 88
y: -117

when 🏳 clicked
set rotation style left-right
forever
  if Lives = 0 then
    say Game Over for 2 secs
    stop all

Loops

- Need to take apples out of a basket until it is empty?

- Need to give yourself one point for every 15 minutes of studying?

- Loops are used in coding for tasks that require repetition

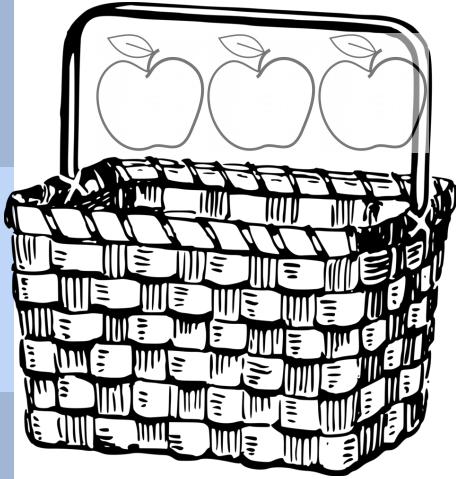- Loops use conditional statements!

Loops

In English:

While the basket of apples is not empty, take out an apple, and count it.
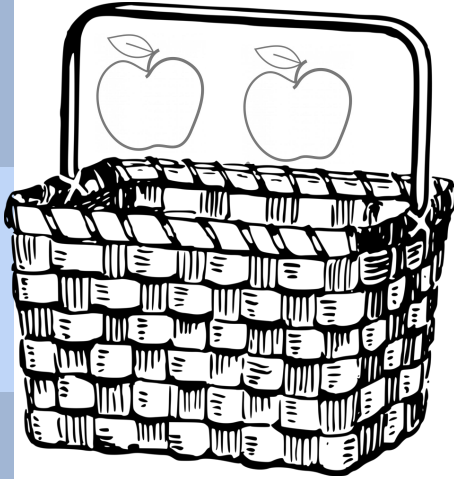
Loops

While the basket is not empty ✔

Loops
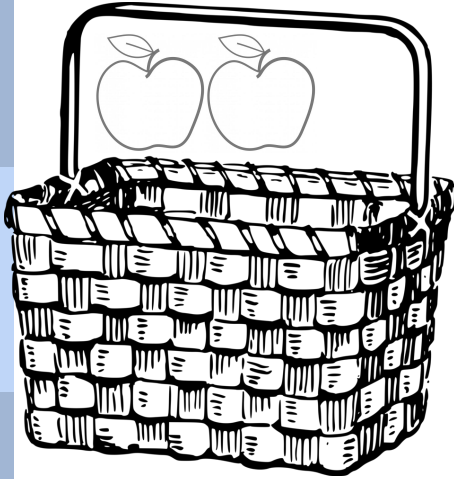
Take out an apple

Count the apple
(apples = 1)

Loops

While the basket is not empty ✓
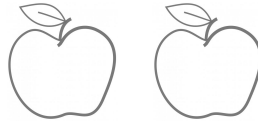
1 apple

Loops

Take out an apple

Count the apple
(apples = 2)

Loops

While the basket is not empty ✓
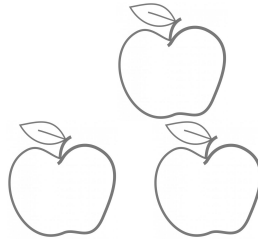
2 apples

Loops

Take out an apple

Count the apple
(apples = 3)

Loops

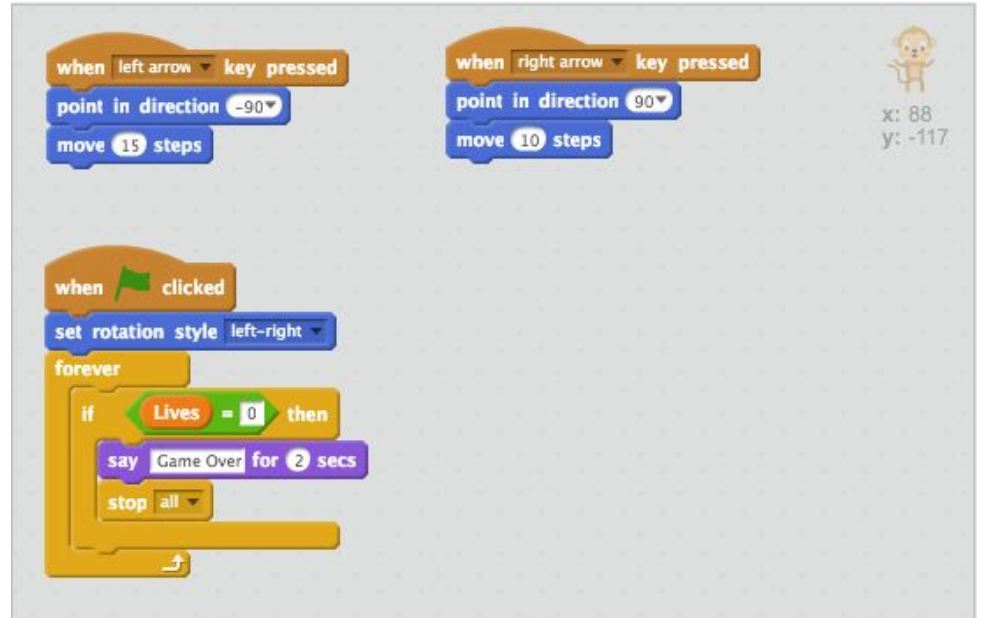While the basket is not empty

3 apples

Loops

Find a loop in the code to the right.

Hint: look for a conditional statement ;)

What does the code do?

Games!!

Your game!

We are halfway through creating a new monkey and banana game, but we can't find some bugs- help us fix these issues in a game!

1. The bananas are falling upwards instead of down!

2. The monkey doesn't move if the right arrow key is pressed!

3. The bananas are only going to the middle of the screen after they are caught!

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