

# Iterative Control (Repetition)

# Three Forms of Control

- Sequential
- Selection
- Iteration (Repetition)

# Iterative Control: Example 1

“I will continue to call you until you are home.”

In programming, we would structure this as,

```
call friend  
while not answer phone  
    wait 15 minutes  
    call again
```

## Iterative Control: Example 2

“Keep driving to the eighth traffic light, and you will see the restaurant on the right.”

In programming, we would structure this as,

repeat 8 times

    drive to next traffic

    restaurant on the right

## Example 1 an Indefinite Loop

```
call friend  
while not answer phone  
    wait 15 minutes  
    call again
```

This is called an **indefinite loop**. That is, cannot say exactly how many times it will loop. It depends on when the person gets home. Thus, it will loop an *indefinite* number of times.

## Example 2 a Definite Loop

repeat 8 times

    drive to next traffic light  
    restaurant on the right

This is called a **definite loop**. The loop will always execute eight times (a *definite* number of times)

## Problem: Summing Up to a Given Value

Suppose we wanted to know how many of the first  $n$  integers adds up to a given value. For example, the first three integers add up to 6:

$$1 + 2 + 3 = 6$$

We need to use an *indefinite* loop to do this.

# Program Structure

```
sum = 0    initialization  
num = 1    initialization
```

```
targetValue = 1045
```

```
while sum < targetValue  
    sum = sum + num  
    num = num + 1
```

```
print 'The sum of the first', n, 'numbers is'  
print 'greater than or equal to', targetValue
```



## Problem: Summing Up the First 10 Numbers

Suppose we wanted to sum up the first 10 integers.

We need to use an *definite* loop to do this.

# Program Structure

```
sum = 0    initialization  
num = 1    initialization
```

```
repeat 10 times  
    sum = sum + num  
    num = num + 1
```

```
print 'The sum of the first 10 numbers is', sum
```

## Question

If we were to write a program that allowed a user to enter *any number of integer values* and display the resulting sum, we would use:

- (a) An indefinite loop
- (b) A definite loop

What would the condition of the loop be?

## Question

If we were to write a program that allowed the user to enter *any ten integer values* and display the resulting sum, we would use:

- (a) An indefinite loop
- (b) A definite loop

# Demo Using Scratch

- Summing up to a given value.
- Summing up the first ten integers.