Decision making with `if`

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Selection

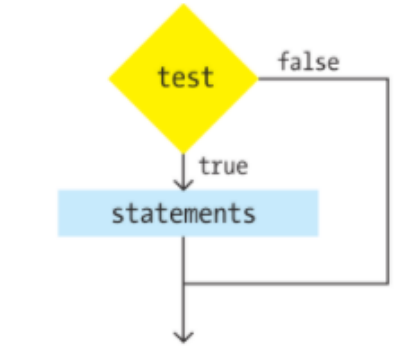
- A fundamental concept in programming
- We can perform a test and take different actions based on the result of the test
- We can do this using an `if` statement

The `if` statement in Processing

- Purpose: ask a yes/no or true/false question and specify different actions to be taken based on the result of this test

Simplest form

```
if (test) {
  statements
}
```



Meaning:

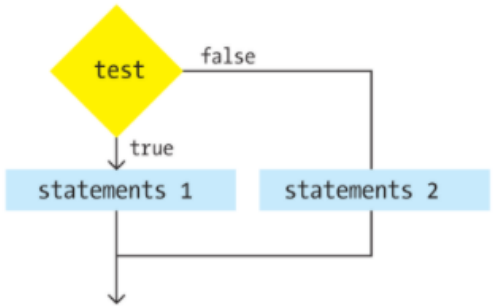
- Evaluate the test
- If the test is true, execute the statements between the curly braces

Example:

```
print(num);
print(" is ");
if (num <= 0) {
   print("not ");
}
print("positive");
```

`if` statement followed by `else`

```
if (test) {
  statements 1
} else {
  statements 2
}
```



Meaning:

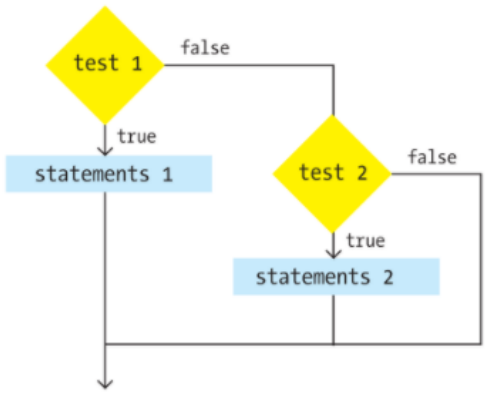
- If test is true, do first block of code
  - Skip `else` part
- If test is false, do second block of code
  - Skip `if` part

Example:

```
print(num);
print(“ is ”);
If (num > 0) {
    print(“positive”);
}
else {
    print(“not positive”);
}
```

More than 2 choices: `else if`

```
if (test 1) {
  statements 1
} else if (test 2) {
  statements 2
}
```



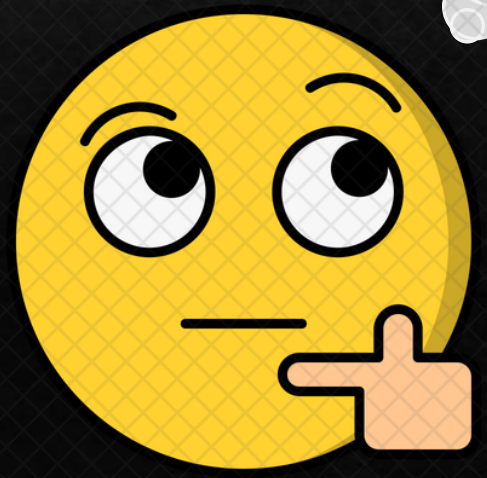
Example:

```
print(num)
print(“ is ”);
if (num > 0) {
    print(“positive”);
}
else if (num < 0 ) {
    print(“negative”);
}
else {
    print (“zero”);
}
```

Types of tests

- Comparisons – 6 operators:
  - Greater than >
  - Less than <
  - Greater than or equal to >=
  - Less than or equal to <=
  - Not equal to !=
  - Equal to ==

Why a double equal (==)? Remember that ONE equal sign is used to assign a value to a variable, so for a test of equality, we use two equal signs.



Example

- Write a Processing code block that prints the proper message indicating whether the value of an `int` variable named `year` is in the 21st century or came before the 21st century.
- Different messages should be printed based on the value of the variable `year` – use an `if` statement to perform a test, and print different messages based on the results of the test.

What do you think?

```
print(year);
    if (_____________________________) {
        print(“ is in the 21st Century”);
    }
    else {
        print(“ came before the 21st century”);
    }
```

How about this?

```
print(year);
    if (year > 2000) {
        print(“ is in the 21st Century”);
    }
    else {
        print(“ came before the 21st century”);
    }
```

Yes, the 21st century technically started in 2001, not 2000! Our calendar considers the first year of AD/C.E. to be 1, not 0, and each subsequent century has started in a year ending with 1. As someone who lived during the turn of the century/millennium, I can assure you that very few people cared about this technicality, and 2000 was celebrated with much greater fanfare than 2001.