Programming for GCSE
Topic 3.1: If Statements in Python
Aims

• If statement basics
• Visualising ‘If’
  • Language
  • Boxes
  • Scratch
• Comparisons
  • Boolean expressions
• More complex ‘If’ statements
SIMPLE ‘IF’ STATEMENTS
Simple ‘If’ Statement

• Change the statements in a program

```python
age = int(input("How old?"))
if age > 21:
    print("Cool! A grown up")
```
VISUALISING ‘IF’

Indentation versus brackets
Boxes

• An 'if' statement has an inside

```python
if condition A:
    Only enter the box when 'A'
```
• An 'if' statement has an inside

```python
if condition A:
    Only enter this box when 'A'

else:
    Only enter this box when not 'A'
```
If in Scratch

- Scratch blocks make the ‘inside’ idea obvious

```
if Condition
  Inside
else
  Inside – condition true
  Inside – condition false
```
Other Languages

• Java uses
  • ( ) – condition in brackets; no colon
  • '{' – start of box
  • '}' – end of box

• Pascal
  • THEN instead of the colon
  • BEGIN – start of box
  • END – end of box
'If' Language

- Many instructions have 'if' language

Do not use this service if you are travelling within the next four weeks, or if you are applying from outside the UK

if travelling in next 4 weeks:
   print("Do not use this service")
elif applying from outside UK:
   print("Do not use this service")
else:
   print("Ok; use this service")
COMPARISONS

True and false expression – used in 'if'
True and False Expressions

- Comparisons
- Result can be 'True' or 'False'

<table>
<thead>
<tr>
<th>Operator</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>x &gt; y</td>
<td>x is greater than y</td>
</tr>
<tr>
<td>x &lt; y</td>
<td>x is less than y</td>
</tr>
<tr>
<td>x == y</td>
<td>x is equals to y</td>
</tr>
<tr>
<td>x != y</td>
<td>x is NOT equal to y</td>
</tr>
<tr>
<td>x &lt;= y</td>
<td>x is less than or equal to y</td>
</tr>
<tr>
<td>x &gt;= y</td>
<td>x is greater than or equal to y</td>
</tr>
</tbody>
</table>
Examples

• What are the values of the following?

<table>
<thead>
<tr>
<th>Expression</th>
<th>True or False?</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 &gt; 5</td>
<td></td>
</tr>
<tr>
<td>2 + 3 &lt; 10</td>
<td></td>
</tr>
<tr>
<td>10 != 11</td>
<td></td>
</tr>
<tr>
<td>10 &lt;= 10</td>
<td></td>
</tr>
<tr>
<td>10 &gt;= 11</td>
<td></td>
</tr>
</tbody>
</table>
Comparison of Strings

• Comparison operators work for strings
• Look at the following examples

```python
>>> "David" < "David Cameron"
True
>>> "Dave" < "David"
True
>>> "Tom" < "Thomas"
False
>>> "Bill" < "William"
True
>>> "AAA" < "AAB"
True
>>> "AAA" < "aaa"
True
>>> "aaa" < "AAA"
False
```
'=' and '=='

- Do not confuse

- Assignment
  - Operator =
  - Set variable to value (of expression)

- Equality
  - Operator ==
  - Compare two expressions
MORE COMPLEX CONDITIONAL STATEMENTS
Else and Else If

- 'If' statement with an alternative

```python
if condition:
    statement 1 – when condition true
else:
    statement 2 – when condition false
```

```python
if condition A:
    statement 1 – when condition A true
elif condition B:
    statement 2 – when A false and B true
else:
    statement 3 – when both A and B false
```
Compare these programs:

age = input("How old are you?")
if age < 22:
    print("Ah, youth!")
if age >= 22:
    print("Cool! A grown up")

age = input("How old are you?")
if age < 22:
    print("Ah, youth!")
else:
    print("Cool! A grown up")
Teaching Issue

- Strong understanding of statements within statements
  - Needed for loops too
- Only 'if' and 'if ... else' are essential
- Boolean expression: true and false as values
Summary

• 'If' allows statements in the program to vary
• Comparison operator create 'conditions' (also called 'boolean expressions')
• Python uses 'indentation' to inside the 'if' from outside
• 'Inside' versus 'outside' essential for next topic: loops