

## Component 2: Implementation 2

### Design, write, test and refine Python 3 code

Term	Definition
Mathematical operators	Arithmetic functions (operators) are used with numeric values to perform common mathematical operations.
Comparison operators	Comparison operators are used to compare two values.
Logical operations	Logical operators are used to combine conditional statements

Mathematical Operator	Example	Same as
=	a = 5	a = 5
+=	a += 5	a = a + 5
-=	a -= 2	a = a - 2
*=	a *= 4	a = a * 4
/=	a /= 6	a = a / 6

Comparison Operator	Name	Example
==	Equal	a == b
!=	Not equal	a != b
>	Greater than	a > b
<	Less than	a < b
>=	Greater than or equal to	a >= b
<=	Less than or equal to	a <= b

Logical operator	Description	Example
AND	Returns TRUE if both statements are true	a < 4 AND b > 10
OR	Returns TRUE if one of the statements is true	a < 4 OR b < 7
NOT	Reverse the result, returns FALSE if the result is true	NOT ( a < 4 and b < 7)

### User Interfaces

Tkinter is the graphical user interface shipped with Python. Tkinter provides various controls, such as buttons, labels and text boxes used in a GUI application. These controls are commonly called widgets.

```
import Tkinter
top = Tkinter.Tk()
# Code to add widgets will go here...
top.mainloop()
```

This would create a following window -



### Data validation and verification

Term	Definition
Validation	Ensures that data entered is reasonable.
Verification	Ensures that data entered is consistent.

#### Validation

- Presence checks - used to check if a required field has been left blank
- Format checks - used to ensure that data matched a specific pattern such as a postcode, CF5 2YX
- Length checks - used to ensure that an input string is the correct length, a telephone number is 11 digits
- Type checks - used to ensure that data is numeric or alphabetic
- Range checks - used to ensure that data is in a specified range, greater than 0 and less than 10.

#### Verification

- Double entry - comparing two inputs
- Screen based / visual check - the user checks that the data entered matches a source document.

#### Layout of code

- When writing code, it is important to make effective use of white space and annotation so that another programmer will be able to understand the code and modify it if needed.