Python

KS3 Programming Workbook
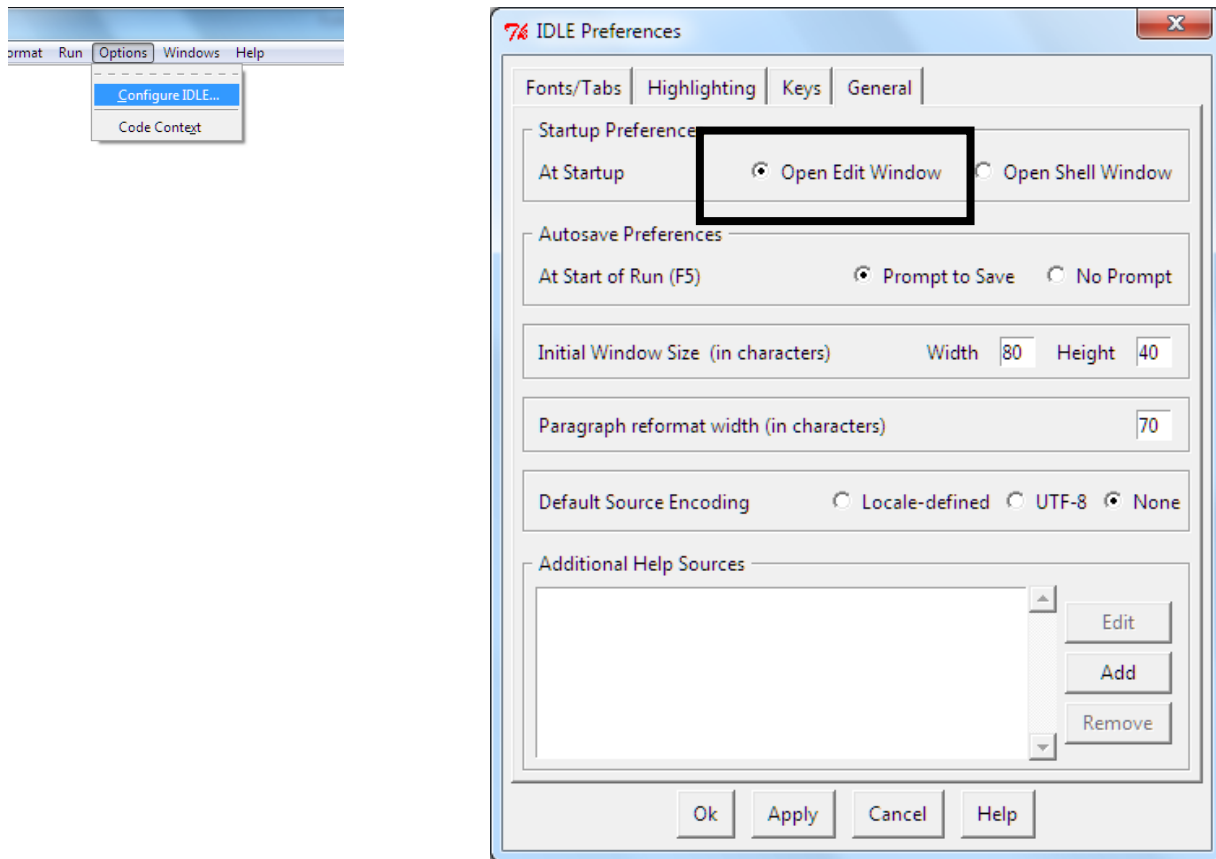
"Do you speak Parseltongue?"

Name_____

ICT Teacher _____Form_____

Welcome to Python

The python software has two windows that we will use. The main window is called the Python Shell and allows you to directly write in program lines and then a press of the return will execute them. This is good for testing one line of code.

The second window is the "Edit Window" which allows you to enter several lines of code, or a create a program, save it and then execute the code.

Opening the python software

Python and the Raspberry Pi

To create a new python program on the Pi, you can use a text editor called "Joe's Text Editor"

Type: joe (the name of your program).py

To run or execute the program type: python (the name of your program).py

 KEY WORDS

Code	
Program	
Variable	
Loop	
Else	
IF	
ELIF	
While	
For	

Your first program

"Hello World"

<u>TYPE</u>   Print "Hello There"

What does it do?

Save your program as *Hello*

Now Try These:

- ❐ Write a program to write your name on the screen   *Save as MyName*

- ❐ Write a program to write the words to your favourite song   Save as *Song*

Inputs

"Your Favourite"

You can use Python to enter in data, this is called an INPUT. The data that is entered is stored inside a VARIABLE.   A variable is like a box that can be used to store a piece of information. We can put different information into the box and open the box at any time

<u>START A NEW PROGRAM AND TYPE IN THIS CODE:</u>

```
Print  "welcome"
x=raw_input ("What is your name?")
Print x
```

1. The variable is called x, this is like calling the box 'x
2. The <u>raw_input</u> allows the user to enter any symbol or letters.
3. The <u>input</u> allows the user to enter numbers

Now see if you can complete these:

- ❐ Write a program that asks for your favourite food and then returns the statement, I like x as well. *Save as FavFood.* (Use commas to separate the 'I like' and 'as well'

- ❐ Write a program that asks for 2 of your friend's names and then states which friend is the best friend. S*ave as BestFriends*

- ❐ Make up one of your own

Working with numbers

Python is also a powerful calculator, go back to the shell mode and type in 1+1

EQUATION	ANSWER	What does it do?
2+5		
67/34		
20**5		
30*4		
3==6		
3!=5		
39==39		
range(100)		
range(46,100)		
range(100, 1000, 7)		

In the text editor window you have to type the command to print range ( ). Can you create a program that list all the numbers starting from 100 to 10000, going up in intervals of 9?

You can also float numbers as in create a decimal. Return to the text editor window.

TYPE IN

```
x = 3
print(x)
y = float(x)
print(y)
```

A SIMPLE PROGRAM TO WORK OUT HOW MANY CALORIES YOU CAN EAT IN A DAY

```
print "Welcome"
c=input("How many calories have you eaten today?")
s=2000-c
print "You can eat", s, "calories today"
```

Now see if you can complete these:

- ❒ Jennifer wants to carpet her new room with pink carpet, Create a program that will work out the area of any sized room, (l x w), *Save as Square*

- ❒ Create a program that will work out the area of any triangle, (h x w), *Save as Triangle*

- ❒ Write a program to work out how many days you have been alive for? *Save as Age*

What do you need to work out?

IF all ELSE fails

If and Else are powerful features where you can create different outcomes IF certain criteria or numbers are met. Else the programme will do something ELSE.

START A NEW PROGRAM AND TYPE IN THIS CODE:

```
if 10==10:
    print "hello"
```

Notice the : at the end of the first line, this tells the computer to do whatever is on the next line, the second line sis also indented to show that it is related to the first line.

AFTER : YOU SHOULD USE TAB THE NEXT LINE

Now change one of the 10s to a different number, what happens?

WHY?

Now we want the program to feedback and different answer depending on the size of a number. See if you can create the program to ask the users to Input a number and then if the number is bigger than 500 state big number ELSE print small number,

ANSWER OVER THE PAGE:

Explain in your own words what a variable is?

What have you enjoyed so far?

What have you found difficult?

What would help?

ANSWER

```
x=input("Please enter a number")
if x >500:
    print "Big number"
else:
print "small number"
```

The Christmas ELIF

What about three responses the number of calories that are entered. For example, less than 250, less than 500, more than 500? You can use the ELIF function, this means else if.

START A NEW PROGRAM AND TYPE IN THIS CODE:

```
x=input("Please enter a number")
if x >500:
    print "Big number"
elif x > 250:
    print "medium number"
else:
    print "small number"
```

Calorie Counter Part 2

- ❐ Load the calorie counter program you made earlier, can you now create the program so that it asks if you are male or female and then calculate the calories based on your gender. *Save as Calorie2*

(HINTS: Place all the variables at the top of the page, watch the indents)

More than words

The length function, what does it do? Try these two examples.

```
 x="frank"
print len(x)

a=('cat')
print a, len(a)
```

What does the len() command do?

Adding Strings

A string is a block of text. It could be a single word, a sentence or an entire paragraph. In Python we use the term "str" to mean a string.

```
start = "Hello, "
name = input("What is your name? ")
end = ". How are you today?"
sentence = start + name + end
```

Looping, For

Sometimes you want something to keep happening, this is called a loop. There are several types of loop, the FOR loop and the WHILE Loop. Try te example below and save as *ForExample*

```
a = ('cat', 'dog', 'frog')
for x in a:
    print x, len(x)
```

What is the **for** command doing?

What does the x do?

The **for** command is useful if you want to hide a word, like a password, which should be kept secret.

Now see if you can complete these:

- ❐ Create a program that coverts the variable "apples are nice" into zeros.   Save as *Zeros*

- ❐ Create a program that has a variable called p which is the password, then the program prints the letters as * to hide the real password. Save the file as *Password.*

What do you notice about the way it displays the characters?

What happens if you place a comma after the print "*",

Using letters instead of numbers

In the Python shell we can show how letters or variables can be used with values / numbers assigned. These can then be used with mathematical functions.

TRY THIS

```
>>>    h=156453737
>>>    print h*h*h
```

While statements

Like the For Loop the While Loop will do something while a condition is being met, **While** I am feeling hungry, eat food. Once the while condition has been met the program stops the loop, once you are not hungry, stop eating

TRY THIS

```
x=1
while x==1:
    print "EPIC FAIL"
```

Explain what the program lines doing?

Countdown

You can create a countdown by taking away 1 from the variable number each time, ie x = 5, x-1, so now x =4, x-1, so now x=3 and so on. The code is x =x-1,

- ❐ Change the x variable value to 10, the while should be changed so that the while the x value is **greater** than 1. Finally add x = x-1 to the last line of the program. *Save as Countdown*

Pausing

The program runs very fast and all the instructions are completed very quickly. To slow down the instructions or pause between them we can use the **sleep** function. The sleep function is storedin the time module, so we first have to import the time module.

TRY THIS USING YOUR COUNTDOWN PROGRAM,

- Add the codes i**mport time** to the first line of your program (This imports the time features)

- Add the code, **time.sleep(2)** after the print x feature ?

What does it do?

Now see if you can complete these:

- ❐ Create a program that asks the user to enter a number of times that a sentence will be displayed, and then displays it that many times. Save as

- ❐ Create a program that asks the user to enter a number of times that a the sentence, (You asked me to display this,? times) and counts down each time. Saves as *Number of times*

- ❐ Create a program that asks the user to enter a number of seconds until countdown. The program counts down in one second intervals and when it reaches 0 states "BLAST OFF". Save as *Blastoff*

Random Numbers

If you are going to create a simple game you require the program to automatically select a random number. This requires the use of the **random** module.

```
import random
x = random.randrange(100)
print x
```

The **randrange(100)** selects any number from between 1 and 100, had it been (500) it will select any number between 1 and 500

ASSIGNMENT

- Using all the command you have learnt so far, create a game below, save as *GuessingGame*

ACTION	HINTS
Welcomes the user to the game	PRINT
Picks a random number	RANDOM
Asks the user to guess the number	INPUT
If the number user number matches the random number state you win!	IF
If the number the user number is higher than the random number state your number is too high	ELIF
If the number the user number is lower than the random number state your number is too low	ELSE
The program loops until the user guesses correctly	WHILE LOOP

EXTENSION

- The user only gets 5 turns to guess the correct number, HINT you will need to use the break function to stop the program from running.
- Create a new game that asks 10 questions, if they get the answer correct it adds points to the score, if they answer incorrectly no score is added. The game reports the score at the end of the session.

Extension BONUS: Writing to a file

Python can be programmed to write and read from files. You made need to try this at home due to the security settings at the school system

TRY THESE, WRITING TO A FILE

```
fob=open('C:/folder/folder/Documents/file.name.txt', 'w')
fob.write('This is the test to write to the document')
fob.close()
```

EVALUATION

What have you enjoyed so far?

What have you found difficult?

What would help?

What are your strengths in Python programming?

What do you need to do next?