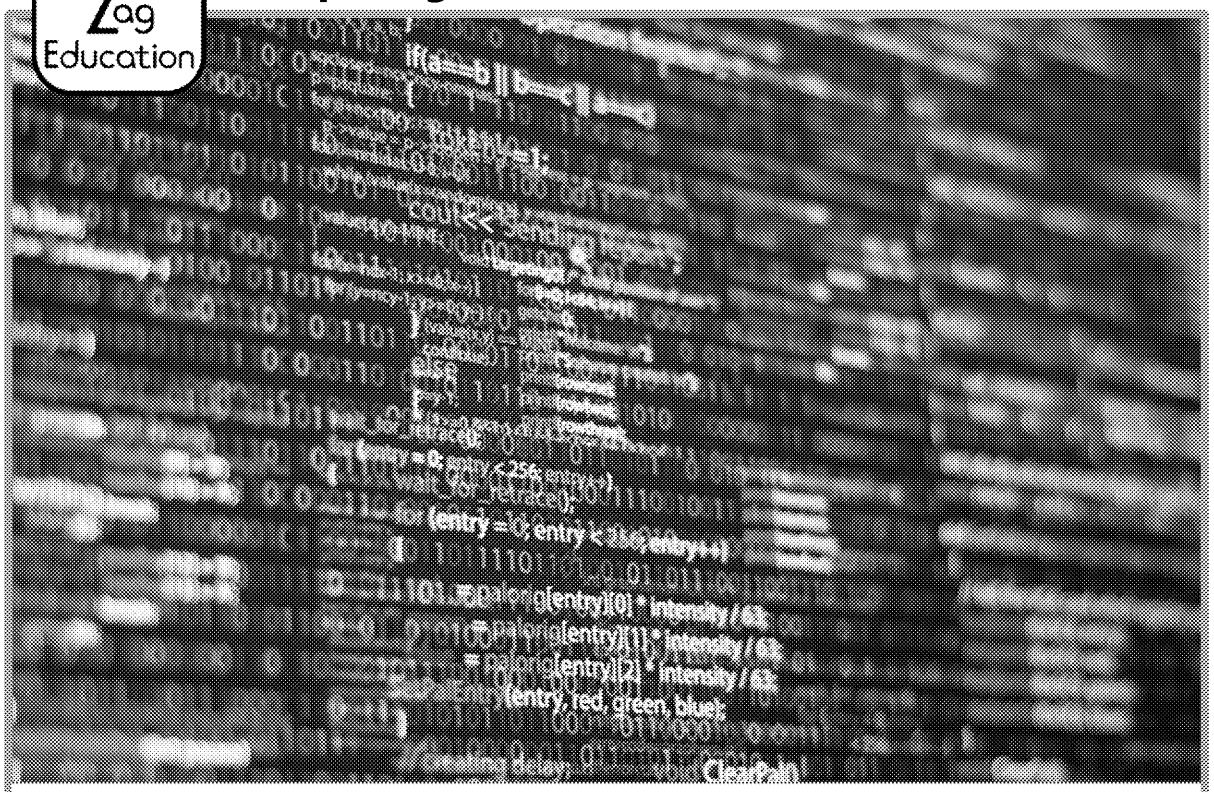
Zig Zag Education

Computing KS3



Python Programming for KS3

zigzageducation.co.uk

POD 8039

Contents

Teacher's Introduction

This resource is designed as an introduction to programming in Python, taking students from no knowledge to just below starting a KS4 course in Computer Science.

Each of the topics includes examples of the content and coding challenges which provide stretch and challenge for all students through repetition of the topic skills. Review questions have also been provided at the end of each topic which may be useful for plenary or starter activities. No marks have been provided in this booklet for these questions; teachers may choose to award marks and record individual student progress in addition to the coding challenges at the end of each topic section.

Review grids have been provided at the end of each topic so that students can record their progress from beginner to expert; these will also be useful for teachers to check the progress of individual students in their groups.

All solutions are provided for all exercises and review questions, together with copies of the examples used in each topic so that these can be viewed and discussed in a whole-class situation.

Python version used

All the examples shown in the resource were created in Python 3.4, both interactive (shell) mode and script mode, and will all work in the latest version of Python.

Python scripts (download)

A compressed folder containing all of the Python scripts used in this resource (including solutions to all challenges/tasks), can be downloaded from the following URL:

- **zzed.uk/pythonKS3-files**

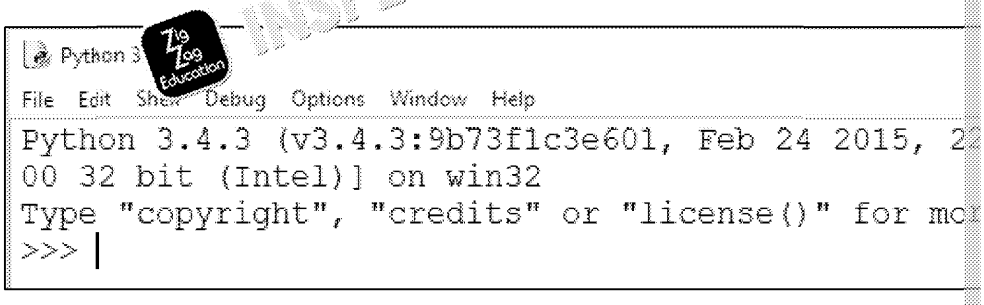
TOPIC 1: THE BASICS

The software you will use to write your programs is called IDLE; it will understand **providing** you type the code correctly.

IDLE has two modes we can use:

- Interactive or 'shell' mode gives us an immed[illegible] re[illegible]onse but code cannot
- Script mode does not give an immed[illegible] sp[illegible]se but allows the code to be

Here is IDLE in 'shell' mo[illegible]:



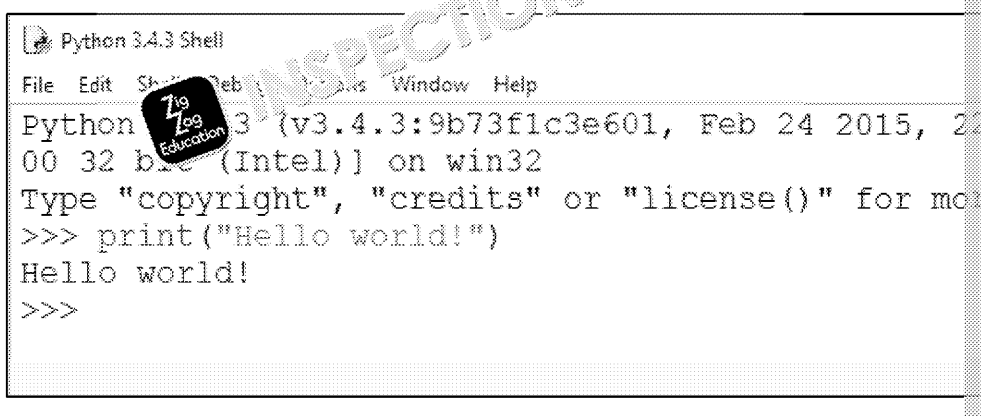
IDLE stands for **I**ntegrated **D**eve**L**opment **E**nvironment or **I**ntegrated **D**evelopmen[illegible] it's just a short name for the software we use to write Python code.

Your first program

Type this into your copy of IDLE (in 'shell' mode) and press the enter key:

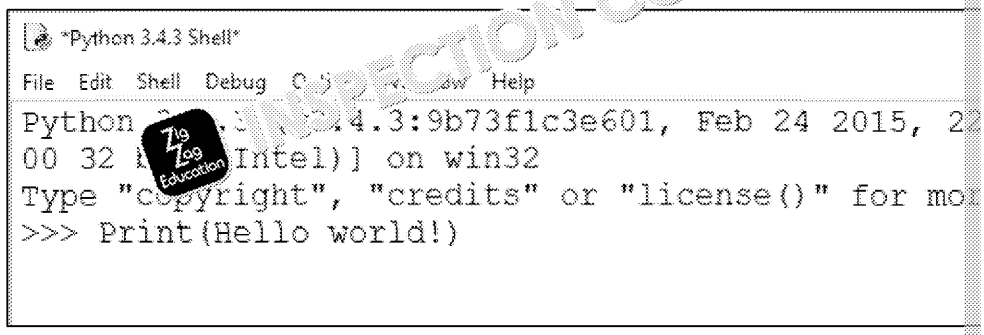
```
print("Hello world!")
```

You should get this:



Quick Question

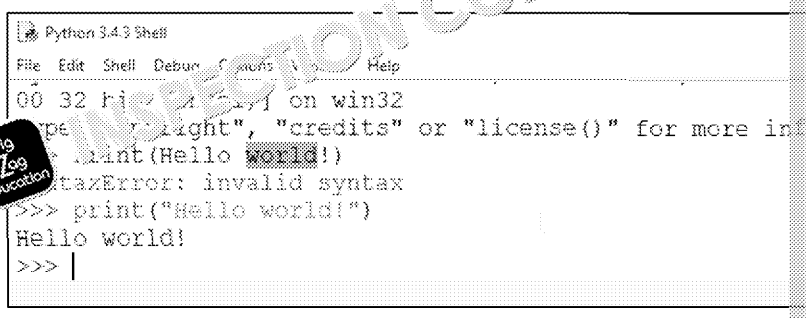
Study the screenshots above and below. What differen[illegible]s can you spot be



Correcting your work

When you are learning how to write programs in Python, you will make mistakes
Python commands incorrectly or use the wrong ***data types*** your code will not wo
Error messages for more help.

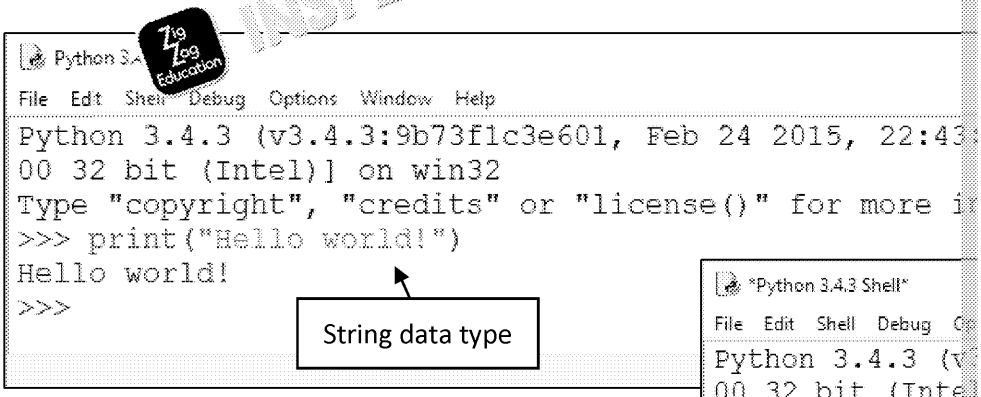
In the Python 'shell' you cannot go back and correct your err s AFTER you press
on the next line.

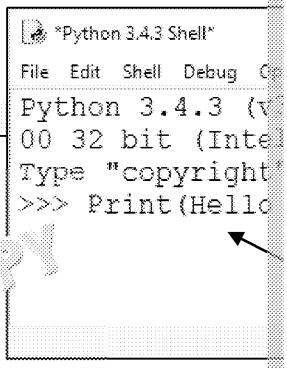


Bronze Challenge: Printing strings

1. Practise your skills in using the print command in the Python 'shell' to ou
text:

   a. Your name
   b. Your favourite subject
   c. Your favourite food
   d. What the weather is like today
   e. What day of the week it is
   f. What school you go to





- A strin s characters that are surrounded by quotation marks ch marks; (either " " or ' ').
- A character is any key you can type in using a keyboard.
- A string can have spaces and a string can be empty.

There are lots of things we can do with strings, and we will look at this later.

Key

In P
surr
a **da**

Python as a calculator

We can also use Python to do basic calculations; IDLE understands how to use ma
the symbols are slightly different. Look at this list:

Operators	Maths	
Addition	+	
Subtraction	–	
Multiplication	×	
Divisio	÷	

Example:

```
Python 3.4.3 Shell
File  Edit  Shell  Debug  Options  Window  Help
Python 3.4.3 (v3.4.3:9b73f1c3e601, Feb 24 2015,
tel)] on win32
Type "copyright", "credits" or "license()" for
>>> 15/3
5.0          <-- FLOAT
>>> 24+6
30
>>> print(28/7)
4.0
>>> print(16*4)
64           <-- INTEGER
>>> prin (9
75
>>>
```


> **Key Point**
> In Python programming, a whole number is a data type called an INTE
> with a fractional part is a data type called a FLOAT. There is more on d

Bronze Challenge: Basic calculator

Complete this exercise using the Pyth ll.

1. Practise your skills u e t command to complete these calculatio

   a. ul y 34
   b. ided by 3
   c. plus 23
   d. 56 minus 9
   e. 347 divided by 17
   f. 38 multiplied by 14

Review Questions 1: The Basics

Circle the correct answer to each of the questions below.

1.	Which IDLE mode gives an immediate response?	script	
2.	Which data type is used for a whole number?	numeric	float
3.	What is the Python symbol for multiplying two numbers?	x	*
4.	What is the Python symbol for dividing two numbers?	/	x

Check Your Progress: The Basics

How confident are you on this topic? For each statement, tick the level that you t

The Basics		
Printing strings		
Basic calculator		

Targets for Level 2

1. .....

2. .....

3. .....

TOPIC 2: VARIABLES

What are they?

When we write programs, we may need the computer to remember the values we have entered to use in our program. This is what we use **variables** for. Computers store this data in temporary memory called RAM.

Think of these memory locations as lots of tiny boxes. Some contain data and some are empty. We give these memory locations useful names so our program can easily find and use the data we have stored while our program is running.

Quick Question 1

If something varies, what does it do?

How to create a variable in Python

When you name a variable in your program, make sure use a name that actually describes what is in it. This will help you and other people understand what your program does.

In the example below, one of my variable names has caused an error.

A **syntax error** occurs when Python does not understand the code as it does not follow the programming language. Python tells you by outputting an error message. See ***Top Tip*** for more information.

```
Python 3.4.3 Shell
File  Edit  Shell  Debug  Options  Window  Help
Python 3.4.3 (v3.4.3:9b73f1c3e601, Feb 24 2015,
tel)] on win32
Type "copyright", "credits" or "license()" for
>>> myPet = "Rover"
>>> my_name = "Hannah"
>>> days_in_week = 7
>>> best subject = "Computer Science"
SyntaxError: invalid syntax
>>>
```

Rules for variable names

1. Variable name must NOT have spaces, i.e.
   my name ☒ myName ☑ my name ☑ my_Name ☑
2. Variable name must **begin** with a letter (a–z, A–Z) or underscore (_)
3. Other characters can be letters, numbers or _

Keywords

What are they?

All programming languages have special, reserved words that cannot be used as v
have a special meaning in the language, such as print. You can find out what they
into the Python shell:

```
help("keywords")
```

```
File  Edit  Shell  Debug  Options  Window  Help
Python 3.4.3 (v3.4.3:9b73f1c3e601, Feb 24 2015, 22:43:
tel)] on win32
Type "copyright", "credits" or "license()" for more in
>>> help("keywords")

Here is a list of the Python keywords.  Enter any key

False               def                 if
None                del                 import
True                elif                in
and                 else                is
as                  except              lambda
assert              finally             nonlocal
break               for                 not
class               from                or
continue            global              pass
```

Quick Question 2

Open the Python shell and type in:

```
File  Edit  Shell  Debug  Options  Window  Help
Python 3.4.3 (v3.4.3:9b73f1c3e601, Feb 24 2015,
tel)] on win32
Type "copyright", "credits" or "license()" for m
>>>
>>> 12 = months_in_year
```

Look at the examples on the previous page. What do you think is wrong with th

```
Python 3.4.3 Shell
File  Edit  Shell  Debug  Options  Window
Python 3.4.3 (v3.4.3:9b73f1c3e601, Feb 24 2015, 22:43:
tel)] on win32
Type "copyright", "credits" or "license()" for more in
>>>
>>> 12 = months_in_year
SyntaxError: can't assign to literal
>>>
```

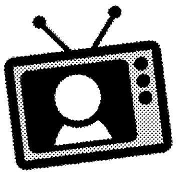
Bronze Challenge: Assigning strings to a variable

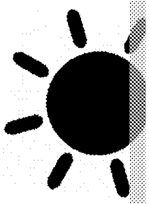
When we give a variable a value, this is called **assigning** a value to the variabl

1. Complete this exercise using the Python 'shell'. Create variables using th provided in the question, and **assign** a string value. The first has been do

```
File  Edit  Shell  Debug  Options  Window  Help
Python 3.4.3 (v3.4.3:9b7... 1...:601, Feb 24 2015, 2
tel)] on win32
Type "copyri... ...redits" or "license()" for m
>>>
>> ...m..r_month = "June"
>>>
```

a. summer month ✓
b. best friend
c. TV programme
d. colour
e. ideal pet
f. favourite meal

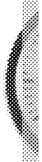




Silver Challenge: Assigning integers and floats to a varia

1. In this challenge you are going to **assign** an integ... a float to a variabl

a. shoe size
b. age
c. number of toe
d. h... s i
e. ...ut... clock time
f. ... of seven



2. In this part of the challenge you must decide on a suitable variable name Think of a name for a variable to:

a. store the name of the most highly paid Hollywood film actor (last ye
b. store the number of days until your birthday
c. store your dream holiday destination
d. store the distance between your home town and Paris, France

Review Questions 2: Variables

1. What symbol do we use to **assign** a value to a variable?

   .....

2. Identify which variables have been correctly assigned. Put a tick by the corre

   ```
   shoe size = 5.5                          ❑
   3 = topicTests                           ❑
   studentName = "                          ❑
   Best_                 Computer Science   ❑
   ```

3. In Python, how do we show the string data type is being used?

   .....

4. Write the code to output the message 'Hello Hassan', using the variable stu

   .....

   .....

5. What is a variable in programming? Put a tick by the correct answer.

A number	❑
A message entered by a user	❑
A location in the computer memory used to st	❑
A name	❑

Check Your Prog: Variables

How confid you on this topic? For each statement, tick the level that you

Variables		
What are they?		
How to create a variable		
Assigning strings to a variable		
Assigning integers and floats to a variable		

Targets fo 3

1. .....
2. .....
3. .....

TOPIC 3: DATA TYPES

What are they?

Data types are used in Python to tell the program:

- how much space the data needs in memory
- what Python can do with the data type

The data types you will learn about at KS3 are:

- String – a sequence of characters surrounded by speech marks (single or do
- Integer – a whole number
- Float – a number with a decimal part
- Boolean – True or False, 1 or 0

For example:

```
>>> myString = "1234ABC@#>?"
>>> whole_num =15
>>> decimal_num = 6.678
>>> bool_value = True
```

```
>>> name = "Harry"
>>> num_toes = 10
>>> shoe_size = 5.5
>>> using_Python = True
>>> name * num_toes
'HarryHarryHarryHarryHarryHarryHarryHarryHarryHarry
>>> num_toes * shoe_size
55.0
>>> name + using_Python
'Harry'
>>> shoe_size + using_Python
6.5
>>> name + shoe_size
Traceback (most recent call last):
  File "<pyshell#8>", line 1, in <module>
    name + shoe_size
TypeError: Can't convert 'float' object to str imp
```

In this example, Python knows it can:

- multiply a string by an integer
- multiply an integer by a float
- multiply a string by the Boolean value
- add a float to a Boolean value

As soon as we try a calculation it doesn't allowed, we get an error message.

Quick Question!

Open the Python 'shell':

- Write the code to print out your name six times with just one print comma times!)
- Write the code to print out 'Banana' but only use the letters 'an' once in th

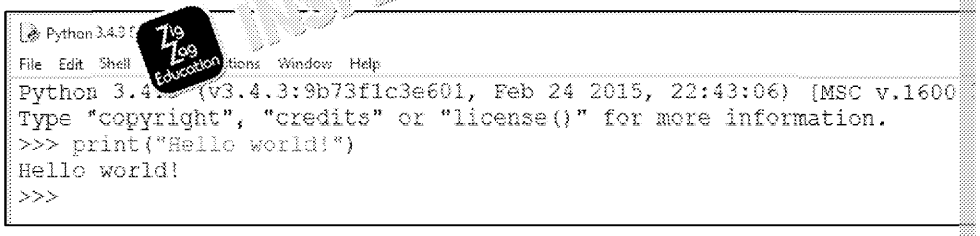
Using Python in script mode

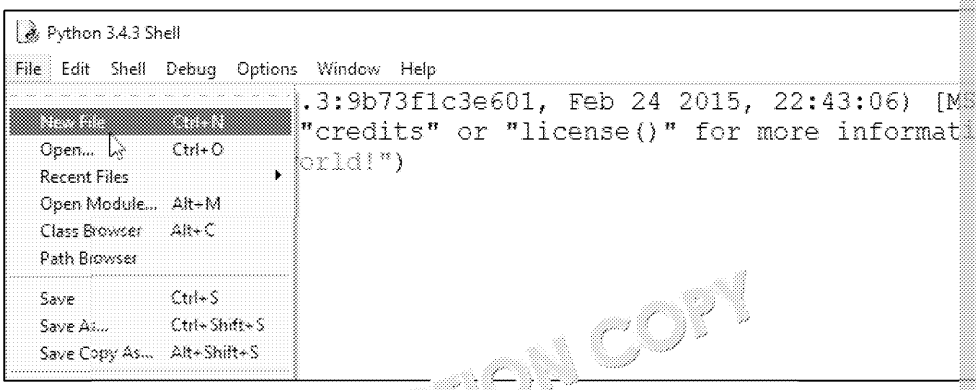
In the exercises so far we have used the Python 'shell', which gives an immediate
pressed. In all the following exercises you will use Python in 'script' mode, which
programs and edit any errors.

Example in the Python 'shell':

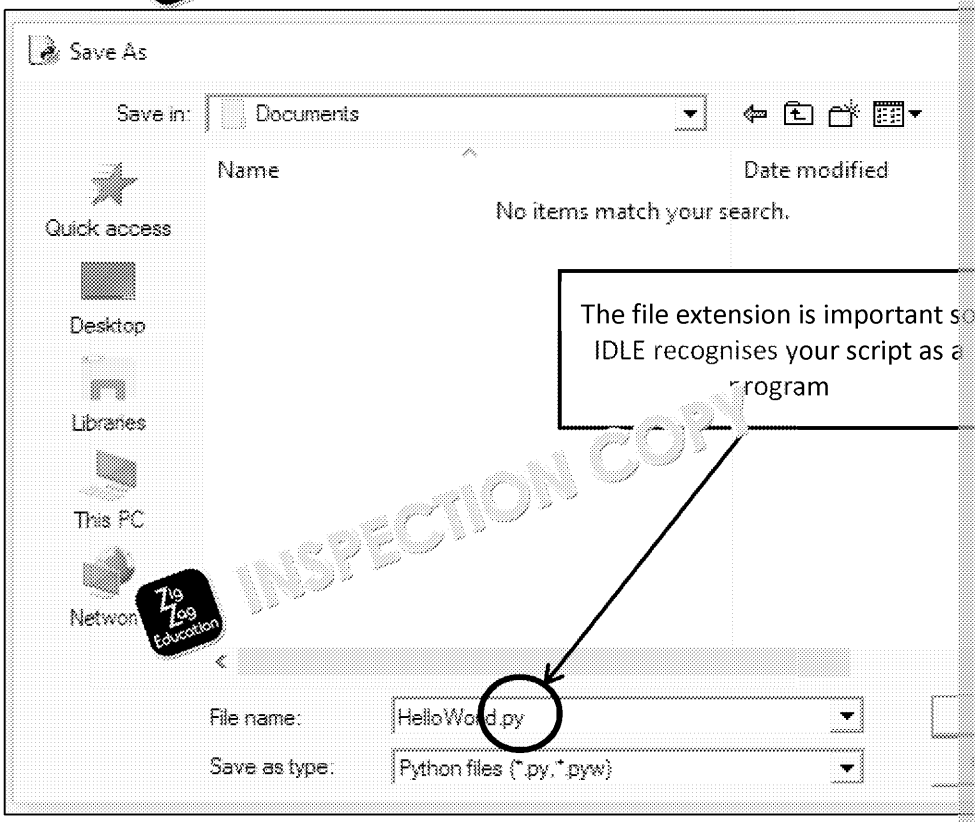
Step 1:

To create the same file in [illegible] and save your work, choose **File >> New File** from



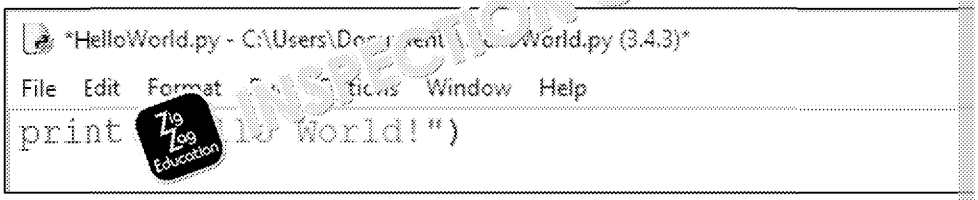


Step 2:
Save your n[illegible] with a suitable filename followed by the file extension **'.py'**.

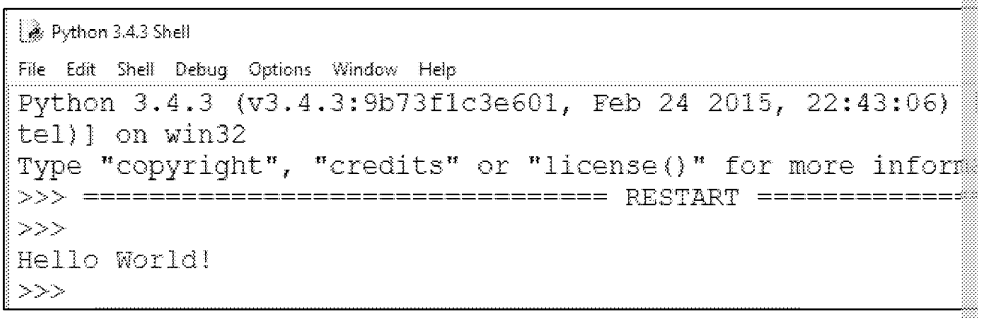


Step 3:
There are two ways to open your Python file to edit it:
1. Open the Python shell and choose **File >> Open** and navigate to the folder w
2. Open the folder where you saved the file, right-click on it and choose **'Edit w**

Step 4:
To see the result of your saved script, you need to choose **>> Run module**. T
appear in the Python 'shell' window.



The result appears in a new window:



Why is this better than just using the Python 'shell'?

- Editing and correcting errors is easi[er] than in the 'shell' you have to type out th
- Your work cannot be saved in the 'shell'.
- You can build bigger and more complex programs as you learn more skills.

Concatenating and casting

What is concatenating?

Concatenating means linking or combining things together when we print out me
We do this using the '+' symbol.

Example:

```
File  Edit  Format  Run  Options  Window  Help
shoe_size = 6.
name = "Ry
print(name+" buys size "+str(shoe_size)+" t
```

```
>>>
Ryan buys size 6.0 trainers
```

What is casting?

The variables have been 'joined together' inside the print statement using the + s
variable value that is not a string, the **data type** needs to be changed to a string. T
type of the variable is changed by surrounding it with str(variable).

Why do we need to change data types in a print statement?

Python will only print **string** data when we use **concatenation**. If you get this erro
you need to **cast** the numeric data to a string.

```
File  Edit  Format  Run  Options  Window  Help
shoe_size = 6.0
name = "Ryan"
print(name+" buys size "+shoe_size+" trainers")
```

```
>>>
Traceback (most recent call last):
  File "C:/Users/Sub/Dropbox/_KS3 Python Book/Exercises/C
cat_example1.py", line 3, in <module>
    print(name+" buys size "+shoe_size+" trainers")
TypeError: Can't convert 'float' object to str implicitly
>>>
```

Quick Question 2

In the screenshot above, why is the variable used on the second line [name = '
new data type?

Bronze Challenge: Casting a variable and concatenating

Create a new Python file, save it as **'BronzeChallenge_Casting.py'**, and comple exercises by creating a variable and **assigning** a value, using the print comma variable to a string. The first has been done for you. You can complete all the same file.

a. Days in a week: 7

```
File  Edit  Format  Run  Options  Window  H
days_in_week = 7
print("Days in a week: "+str(days_in_week)
```

```
>>>
Days in a week: 7
>>>
```

b. Sides in a hexagon: 6
c. Number of adult teeth: 32
d. Lessons per day: 5
e. Grades in music: 8

Silver Challenge: Casting variables and printing

Complete these exercises by saving your work as a Python script using the file **SilverChallenge_Casting.py**. The first has been done for you.

1. a. Create a variable called **HW_mark** and **assign** to it the value 8.
   b. Create a variable called **name** and **assign** to it the value 'Oscar'.

```
File  Edit  Format  Run  Options  Window  Help
#Exercise 1
HW_mark = 8
name = "Oscar"
print(name+" scored "+str(HW_mark)+" out of 10 in thi
```

   c. Print the message: 'Oscar scored 8 out of 10 in this week's homewo

```
>>>
Oscar scored 8 out of 10 in this week's
>>>
```

2. a. Create a variable called **coffee** and assign to it the value 0.75.
   b. Create a variable **cake** and assign a value of
   c. Print the message 'Please attend our cha it coffee break. Coffee co cake for just £1.75. All pro ec charity.'

3. a. Create a v h called name and assign to it the value 'Emily'.
   b. e variable called score and assign the value 3.
   c. he message 'Emily scored 3 goals in today's charity game agai

4. a. Create a variable called student and assign to it the value 'Zahid'.
   b. Create a variable called target and assign to it the value 75.0.
   c. Print the message 'Zahid was confident he could reach the exam tar

Gold Challenge: Casting variables, calculating and concat

Complete these exercises by saving your work as a Python script using the file
GoldChallenge_Casting.py. The first has been done for you.

1. a. Create a variable called charge and assign to it the value 3.50.
   b. Create a variable called washed and assign to it the value 7.
   c. Create a variable called total and assign it the value of charge × wash
   d. Calculate the total that Tom will earn if he washes all the cars, and
   cars will earn you £24.50.

```
File  Edit  Format  Run  Options  Window  Help
#Exercise 1
charge = 3.50
washed = 7
total = charge * washed
print("Washing "+str(washed)+ " cars will earn y
```

```
>>>
Washing 7 cars will earn you £24.50
>>>
```

2. a. Create a variable called pay_rate and assign to it the value £7.65.
   b. Create a variable called hours.
   c. Calculate and print out the following weekly wage payments for w
   example 'Sally worked 12 hours this week and has earnt £91.80.'
      i. Ahmed: 10 hours
      ii. Jamilla: 16 hours
      iii. David: 8 hours

3. a. Create a variable called cost_per_metre and assign to it the value 1
   b. Create a variable called length and assign to it the value 2.5.
   c. Create a variable called width and assign to it the value 3.0.
   d. Calculate and print out the cost of buying new carpet for a bedroo
   8.5 square metres in size and the carpet will cost £102.00.'

4. a. Create a variable called pizza_slice and assign to it the value 8, the number of slices in a 12-inch pizza.
   b. Create a variable called party_invites and assign to it the value 32.
   c. Each person at the party will eat 3 slices of pizza. Create a suitable variable.
   d. Calculate and print out how many 12-inch pizzas will be needed fo
   party. For example, 'For 32 people you will need to buy [X] pizzas.'

   Note: you cannot buy part of a pizza.

Review Questions 3: Data Types

1. How would I cast this variable to a string?
   a. teeth = 32

   .....

2. What are the two modes that we can use in IDLE

   .....

   .....

3. When I join a variable name to a string in the print command, what is this ca

   .....

   .....

4. What will be the result of running the code below?

```
days_in_week=7
hours_in_day=24
hours_in_week=days_in_week*hours_in_day

print("There are "+str(hours_in_week)+" hours
```

   .....

   .....

5. Compl missing code sections that print out this message:

```
print("Ba    na   "* )
```

```
>>>
Ban
>>>
```

   .....

   .....

Check Your Progress: Data Types

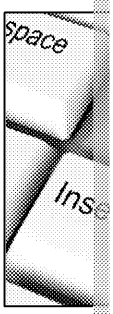
How confident are you on this topic? For each statement, tick the level that you

Data Types		
What are t		
How to use Python in 'script' mode		
What is concatenating?		
What is casting?		
Bronze Challenge		
Silver Challenge		
Gold Challenge		

Targets for Topic 4

1. .....
2. .....
3. .....

TOPIC 4: BASIC STRING OPERA



We have already used some ready-made code in Python: the print() function and the str() function. These are called built-in functions or methods.

Built-in functions are ready-made commands in Python that save you a lot of time; you can recognise them as they are always followed by two brackets.

We can use built-in functions to manipulate string data types.
An important point about a string is that when you have created it, none of these can change the original string – strings are known as IMMUTABLE.

len()

This finds the length of a string, including spaces.

```
myString = "Hello world!"

print(len(myString))
```

```
>>>
12
>>>
```

count()

This allows us to count how many times a character or substring appears in our string.

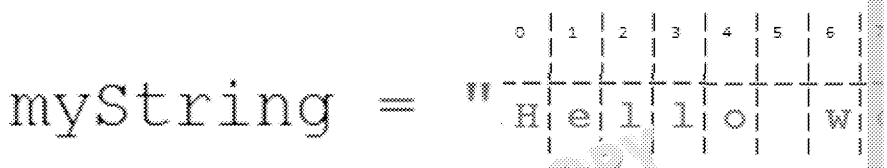
```
myString = "Hello world!"

print(myString.count('l'))
```

```
>>>
3
>>>
```

find()

Each character in the string will have an index value showing its position in the string.




```
myString = "Hello world!"

print(myString.find('w'))
```

```
>>>
6
>>>
```

Slicing strings

Now you know about index positions, you can create substrings by slicing using [#

```
myString = "Hello world!"


print (myString[0])      #get the first character of the string
print (myString[0:1])    #get the first character of the string
print (myString[0:3])    #get the first three characters
print (myString[:3])     #get the first three characters
print (myString[-3:])    #get the last three characters
print (myString[3:])     #get all but the three first characters
print (myString[:-3])    #get all but the three last characters
```

- myString.upper () – returns the string in upper case
- myString.lower () – returns the string in lower case
- myString.capitalize() – returns the string with the first letter of the s
- myString.title () – returns the string with the first letter of each word
- myString.replace(x, y) – returns the string with the characters repre characters represented by y

```
myString = "Hello world!"

print(myString.upper())
print(myString.lower())
print(myString.capitalize())
print(myString.title())
print(myString.replace('l','k'))
print()
print(myString)#the original value is still
```

```
>>>
HEL
hel
Hel
Hel
Hek

Hel
>>>
```

These escape characters can also be useful when you are using the print () functi

Escape Character	What it does
\n	ASCII linefeed – puts your text onto a new line in a print sta
\t	Horizontal tab (indents your text string by five spaces)

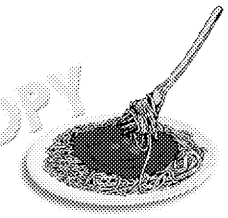
```
print("The next part of this sentence\nwill start on a new lin
print("\n\tThese examples will be tabbed across and on new lines
```

```
>>>
The next part of this sentence
will start on a new line

        These examples will be tabbed across and on ne
            example1
            example2
>>>
```

Bronze Challenge: String manipulation

Complete these exercises by saving your work as a Python script using the file
BronzeChallengeStrings.py.



1. Find the length of each of these strings:
   a. Sausages
   b. Bread and butter
   c. Cheesy chips
   d. Spaghetti bolognese

2. Co... v... the following quotes from famous films. You may ne...
   The ...e has been done for you.

   a. Houston, we have a problem. ✓

```
stringA ="Houston, we have a problem."
print("These are the vowels in "+stringA
print(stringA.count("a"))
print(stringA.count("e"))
print(stringA.count("i"))
print(stringA.count("o"))
print(stringA.count("u"))
```

   b. Keep your friends close, but your enemies closer.
   c. I feel the need – the need for speed!
   d. Nobody puts Baby in a corner.

Silver Challenge: String manipulation

Comple... e...ercises by saving your work as a Python script using the file
SilverCha...geStrings.py.

1. Print out the following by replacing substrings in the main string:
   a. Replace 'os' with 'yz'
      i. Keep your friends close, but your enemies closer.
   b. Replace 'b' with 'k'
      i. Nobody puts Baby in a corner.
   c. Replace 'eed' with 'o'
      i. I feel the need – the need for speed!
   d. Replace 'in' with 'yk'
      i. Wait a minute, wait a minute. You ain't hear... nothin' yet!

2. Find the index position of the letter '... in ... quotes:
   a. Bread and butter
   b. Sausages
   c. S... the ... ...ese

Gold Challenge: String manipulation

Complete these exercises by saving your work as a Python script using the file
GoldChallengeStrings.py.

1. The information on how many vowels appear in each quote needs to be
   Use your knowledge of concatenation and casting to make each answer
   like this:

```
>>>
The string: 'Houston, we have a problem.' has th
        a=2
        e=
        o=3
        u=1
```

2. Repeat the code from Q1 with this string: Spaghetti bolognese. In additi
   vowels in the string.

All quotes from Wikipedia: AFI's 100 Years...100 Movie Quotes

Review Questions 4: Basic String Operations

1. What symbols are used to print on a new line?

.....

.....

2. How would I print out 'Python' from a variable myString ='Python coding'?

.....

.....

3. What is the index value of 'o' in this string?

```
myString = "The cat sat on the m
```

.....

4. How do I print the length of the string variable: `myString = 'Coding is`

.....

.....

5. Write the code to make this variable print out 'Goodbye world!' without cha

```
myString = "Hello world!"
```

.....

.....

.....

Check Your Progress: Basic String Operations

How confident are you on this topic? For each statement, tick the level that you

String Operations		
What are st[illegible]?		
How to find the length of a string		
How to use count() in a string		
How to use find() in a string		
How to slice strings		
Bronze Challenge		
Silver Challenge		
Gold Challenge		

Targets for To[illegible]ic 5

1. .....
2. .....
3. .....

TOPIC 5: INPUTTING DAT

So far, we have assigned the values to our variables by typing them into our code write code that will **ask** for the data in our variables when the program is running.

We do this by using a special built-in function in Pyth... ...ec the `input()` fun...

Quick Question

Can you n... ...o other built-in functions that we have already used?

Using the input () command

When we use the `input()` command, Python will treat all the data entered as a number, we must **cast** the input to the correct data type at the same time.

Example using a string data type:

The user can enter anything and it will be saved in the variable **subject**.

```
File  Edit  Format  Run  Options  Window  ...
subject = input("What is your favourite ...
print("You entered: "+subject)
```

```
>>>
What is your favourite subject?
You entered: Computer Science
>>>
```

When the program is run, whatever string you have entered inside the brackets w... window. I have entered 'Computer Science'; the contents of the variable have th... following print statement:

```
File  Edit  Format  Run  Options  Window  Help
pi = 3.14
radius = int(input("Enter the radius of your circ...
print("The circle has an area of "+str(pi*radius*...
```

Example using the integer data type:

```
int( )
radius = input("Enter the radius of your cir
```

The built-in function to CAST t[illegible] data input to an integer is 'wrapped' around the

Remember

```
print("The circle has an area of "+str(pi*radius*
```

Casting to a Str[illegible]

When you use the print function to concatenate two different data types, e.g. str[illegible] type must be CAST to a string so it can be printed.

Bronze Challenge: Getting data input

Complete these exercises by saving your work as a Python script using the file[illegible] **BronzeChallengeInputs.py**

1. Write code to ask for the number of days in July using the input funct[illegible]
2. Write code to ask for the value of pi using the input function.
3. Write the code to ask for the exchange rate for Danish krone to pounds u[illegible] input function.
4. Write the code to ask for someone's shoe size using the input function.
5. Write the code to ask for the temperature today using the input function.

Silver Challenge: Getting data input and casting to print

Complete these exercises by saving your work as a Python script using the file[illegible] **SilverChallengeInputs.py**.

1. a. Create a variable and use the input function to ask for the person's fa[illegible]
   b. Print out what the person answered, e.g. 'Your favourite food is ga[illegible]

2. a. Create a variable and ask for the person's first number.
   b. Create a variable and ask for the person's second number.
   c. Print out a message like this: '15 multiplied by 4 = 60' using the valu[illegible] run.

Gold Challenge: Casting data input

Complete these exercises by saving your work as a Python script using the file
GoldChallengeInputs.py.

1. a. Create a variable and assign today's exchange rate for pounds to do
   b. Create a variable and use the input funct a k how much spend
   take on holiday to Florida.
   c. Calculate how many do ha ould be, and print the answer, e.g.

2. Imagin you elling by coach on a trip from your school to Disneyl
   The 0.621371192237 miles to a kilometre.
   a. Create a variable, and use the input function to ask how many miles
   your school to Disneyland, Paris. Hint: remember that this might inv
   with a fractional part.
   b. Calculate this in km and print a message, e.g. 'You are 810.9484416
   c. For extra credit, find out how to use floor division in Python to roun
   answer to an integer.

Review Questions 5: Inputting Data

1. What is the method for changing a data type in Python called?

.....

2. What is the name of the method used to link text and variables in a print statement below?

```
print("The circle has an area of "+str(pi*radius**2)+
```

.....

3. Write the code to ask for a person's age – use a variable called 'age'.

.....

4. Explain what is wrong with this code:

```
num = input("Enter your number of lessons a day: ")
print("In a week you have "+str(num *5)+" lessons")
```

.....

.....

5. What will be the result of running this code?

```
radius=input("Enter the circle radius:")
print("Your circle radius "+str(radius)+" has an area
```

.....

.....

.....

Check Your Progress: Inputting Data

How confident are you on this topic? For each statement, tick the level that you

Inputting Data		
What is dat[illegible]ut		
How to use input() with strings		
How to use input() with integers		
How to use input() with floats		
Bronze Challenge		
Silver Challenge		
Gold Challenge		

Targets for Topic 6

1. .....
2. .....
3. .....

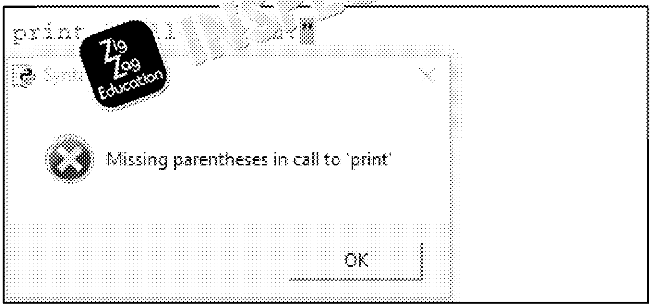
TOPIC 6: ERROR MESSAG

You will probably be starting to make mistakes in your code; everyone does, even w
Python shows you where the error is with a red block of colour. Here are some of t
them.

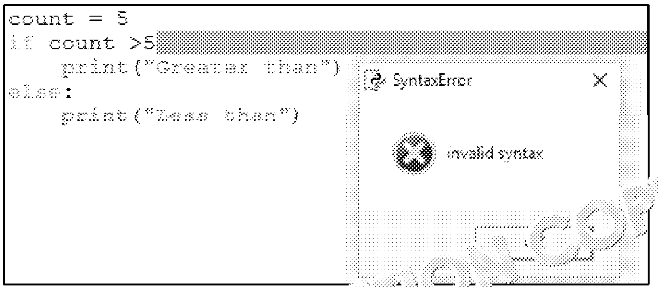
Syntax errors

This means that the code you have writt... n... follow the rules of how to co

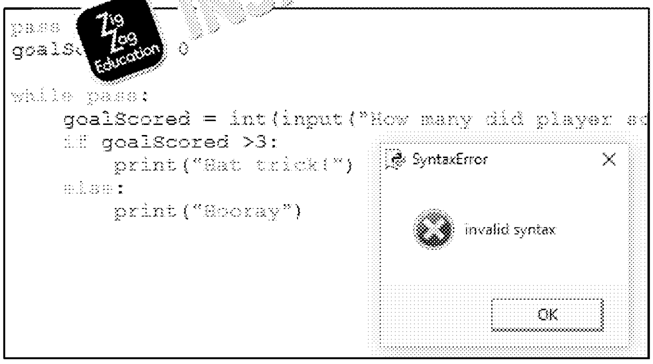
- forgotten the brackets (n... ith... ...) in a print statement



- forgotten the colon at the end of an if statement

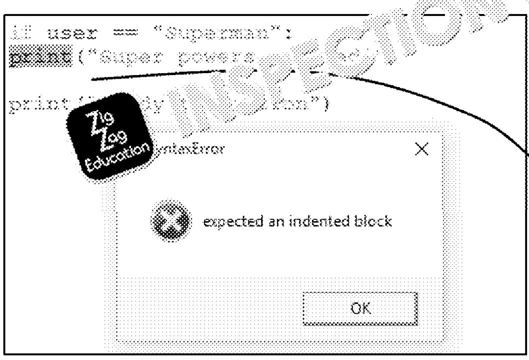


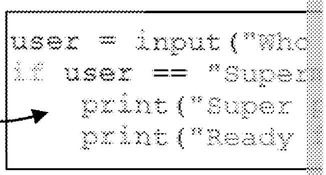
- used a Python key... ...s ... variable name



- IndentationError: expected an indented block

  This happens when your code is not properly ind... – this is the amount o
  selection statement or loop after a colon.



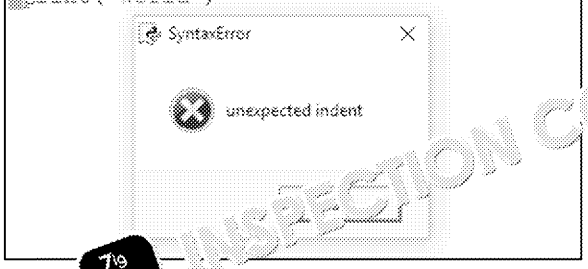


To get the right amount of
after the colon.

- IndentationError: unexpected indent

  This happens when you have incorrect indents in your code. Look at this sim

```
print("Hello")
 print("world")
```



NameError: global name '---' is not defined

This happens when you spell a variable name incorrectly or you use a variable nam

```
if user == "Superman":
    print("Super powers enabled!")
    print("Ready for action")
```

```
>>>
Traceback (most recent call last):
  File "C:/Users/KS3 Python Book/Exercises/Topic 6
  _Errors/ErrorExamples.py", line 24, in <module>
    if user == "Superman":
NameError: name 'user' is not defined
>>>
```

```
user = input("Who are you? ")
if usr == "Superman":
    print("Super powers enabled!")
    print("Ready for action")
```

```
>>>
Who are you? Superman
Traceback (most recent call last):
  File "C:/Users/KS3 Python Book/E
  /ErrorExamples.py", line 24, in
    if usr == "Superman":
NameError: name 'usr' is not defi
>>>
```

TypeError: Can't convert 'int' object to str implicitly

This happens when you are trying to print out a numerical value in a string witho
Look at this example from 'casting' in Topic 3: Concatenating and Casting. The va
string to print correctly.

```
shoe_size = 6.0
name = "Ryan"
print(name+" buys size "+shoe_size+" trainers")
```

```
>>>
Traceback (most recent call last)
  File "C:\Users\Sub\Dropbox\_KS3
Data Types\1_ConcatenationExample
    print(name+" buys size "+shoe
TypeError: Can't convert 'float'
>>>
```

You will also get this error if you try to add a string to an integer or float. See Topic 3: Data Types.

Error Challenges

In these challenges you can now test other people in your class to see whether t
mistakes.

Errors: Bronze Challenge

Save your work in a new Python file called **BronzeCha[illegible]e_Errors.py**. Write
your own or use examples from previous exer[illegible]se.

- Your program must contain two [illegible]RATE coding errors which you pu
- Use comments to exp[illegible] wh[illegible]he errors are.
- Now save yo[illegible] th[illegible]ne new filename BronzeChallenge_ErrorsGuess.
- Tes[illegible]ou[illegible]work on your classmates to see whether they can spot the
cod[illegible]

Errors: Silver Challenge

Save your work in a new Python file called **SilverChallenge_Errors.py**. Write a
which must include the following:

- At least one input request for numerical data (can be anything for any re
- At least one print statement
- At least two different calculations
- Two DELIBERATE syntax errors which you put in yourself, AND one other
- Comments to explain what the errors are

Now save your file with the new filename **SilverCh[illegible]ge_ErrorsGuess.py** an

Test out your work on your classmate[illegible]whether they can spot the erro

Errors[illegible] Challenge

Save your work in a new Python file called **GoldChallenge_Errors.py**. Write a
of your own which must include the following:

- Input requests for both string and decimal data
- At least two different calculations
- At least three print statements
- DELIBERATE errors which you put in yourself for all examples shown in th
- Comments to explain what the errors are.

Now save your file with the new filename **GoldChallenge_ErrorsGuess.py** and
Test out your work on your classmates to see whether they can spot the erro

Review Questions 6: Error Messages

1. What happens if I run this code and enter 5? Explain what the error is in this

```
num = input("Enter a number: ")
answer = num*3
print("Your number tripled is: "+str(answer))
```

.....

.....

2. How d... ho... show that an error has occurred when you try to run your

.....

.....

3. Explain how a TypeError can usually be solved.

.....

.....

4. Explain what the printed output will be when this code runs. What will happ... first variable to "Ha"?

```
a = 5
b = "Ho"
print(b*a)
```

.....

.....

5. What will happen when this code runs? Explain why this happens.

```
fav food = input("What is your favourite food
print("You like "+fav food)
```

.....

.....

Check Your Progress: Error Messages

Error Messages		
How the Python interpreter [illegible] using a red [illegible] of colour		
The main types of Syntax Error message		
How to correct an Indent Error		
What a NameError means in your code		
How to correct a TypeError by using the casting method		
Bronze Challenge		
Silver Challenge		
Gold Challe[illegible]		

Targets for Topic 7

1. .....

2. .....

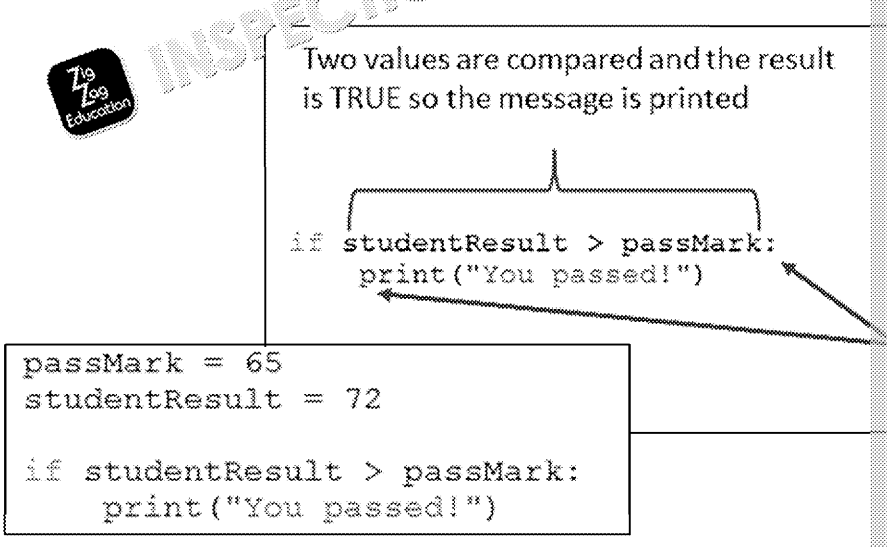
3. .....

TOPIC 7: SELECTION STATEM

A selection statement is also known as a conditional statement because it will ex
of some test or condition we have set in the selection statement is true.

Example of an IF statement:

If the condition set in the IF statement is tru... the next line of code will be e
colon meaning THEN and it will he... ...mber where it goes in the code.



Key Point

...ntationError: Remember the ... second line for you so you don't get er...

Comparison operators

Comparison statements use comparison operators. You have probably learnt abo...

Operator	What it means	
==	Equality operator: checks whether both values are the same	`>>> 7==6` `False`
!=	Not equal to	`>>> 8!=2` `True`
>	Greater than	`>>> 65>12` `True`
<	Less than	`>>> 21<12` `False`
>=	...ter than or equal to	`>>> 15>=12` `True`
<=	Less than or equal to	`>>> 34<=35` `True`

What happens if the comparison in the IF statement is not true?
We can extend the basic IF statement to do something else if the comparison ev...

Example:

```
passMark = 65
studentResult = int(input("Enter your mark: "))

if studentResult > passMark:
    print("You passed!")
else:
    print("You failed.Resit required")
```

```
>>>
Enter your mark: 52
You failed.Resit required
>>>
```

It is important that you get the structure of the IF/ELSE statement correct or you

What happens if the answer could be one of several possible correct answers o
We can add more conditions using an ELIF statement. Look at this example:

```
studentResult = int(input("Enter your mark: "))

if studentResult >=72:
    print("Grade A")
elif studentResult >=62:
    print("Grade B")
elif studentResult >=52:
    print("Grade C")
elif studentResult >=42:
    print("Grade D")
else:
    print("You failed.Resit required")
```

```
>>>
Enter your mark: 92
Grade A
>>> ========================
>>>
Enter your mark: 13
You failed.Resit required
>>>
```

When the program runs, each comparison is checked to see if the **studentResult** of code.

- When a mark of 13 is entered, none of the conditions matches the value ent code is printed.
- Alternatively, when 92 is entered this matches the first condition, so the me other options are ignored.

Logical operators

Sometimes we might want to check if two values are true in a selection statemen
AND operator.

Example:

```
password_entry1 = input("Enter your password: ")

password_repeat = input("Please enter your password: ")

if password_entry1 == password_repeat and len(password
    print("Passwords do not match")          #sausages
elif password_entry1 == password_repeat and len(passwo
    print("Must be 8 characters or more")    #cheese is
else:
    print("Password accepted")

# Password entered correctly both times and has 8 lett
```

When you create an account, most online systems will check that you have entered your password correctly by asking you to enter it again AND will tell you the password must be a certain length to be accepted.

Note: this is clearly a very bad password to use in real life!

```
>>>
Enter your passwo
Re-enter your pas
Must be 8 charact
>>> ============
>>>
Enter your passwo
Re-enter your pas
Passwords do not
>>> ============
>>>
Enter your passwo
Re-enter your pas
Password accepted
>>>
```

We can also use an OR operator when we are checking several conditions which

Example:

```
gamePlay = input("Confirm that you want to start: ")

if gamePlay =="Yes" or gamePlay == "YES"or gamePlay =="
    print("Game starting")
```

```
>>>
Confirm that you
Game starting
>>> ============
>>>
Confirm that you
Game starting
>>>
```

Bronze Challenge: Using if statements

In this challenge you will create some simple general knowledge quiz question
a new Python file called **BronzeChallenge_If.py**. You may need to check your a
Internet.

1. Who is the author of the Tracey Beaker books?
2. What do some atoms join together to make?
3. How many digits does the binary system use?
4. What are the basic building blocks of all animals and plants?
5. Which famous statues can be found in Trafalgar Square?
6. For each question, edit – add 1 to a score variable if the answer is correct, and print t

Silver Challenge: Using if and elif statements

In this challenge you will create questions where there are several possible an
work in a new Python file called **SilverChallenge_If.py**.

1. It can be difficult to decide what clothes to wear depending on the temp
   program that will ask the user for today's temperature and then give a su
   Hint: remember casting!

   a. Higher than or equal to 24°C
   b. Higher than or equal to 20 °C
   c. Higher than or equal to 16 °C
   d. Higher than or equal to 12 °C
   e. Higher than or equal to 8 °C
   f. Higher than or equal to 4 °C
   g. Higher than or equal to 0 °C
   h. Less than 0 °C

2. Create an age-appropriate greetings program – depending on the age of t
   suitable message. You could do an Internet search to find the age you ca
   become an MP, get married, etc.

   a. Create a variable to store the current year, e.g. `current_year = 2`

   b. Ask for the year the person was born, and calculate their age.

   c. Write a suitable message depending on their age:
      i. 18 or above – You can leave full-time education and apply for a
      ii. 16 or above – You can get a full-time job, get a licence to drive a
      iii. 13 or above – You can get a part-time job!

   d. Add three more age ranges of your choice with your own message fo

Gold Challenge: Using if and elif Statements

Save your work in a new Python file called **GoldChallenge_If.py**.

1. You are going to write a program to give advice for people going on holid
   a. Write the code to ask whether the perso[illegible] on holiday this ye
   print the message 'Maybe next year'
   b. If they are going on hol[illegible] as[illegible]hem where by displaying a menu li

```
Choose [illegible]estination from the list be
a...United Kingdom
b...Europe
c...Outside Europe
Enter a, b or c >>> a
```

   c. Then ask how they are travelling using a similar menu: by car, train o
      i. If they are going by car in the United Kingdom, print a suitable m
      enough fuel for the journey.
      ii. If they are going by train in the UK, remind them to book their t
      iii. If they are going by train in Europe, remind them to take their p
      iv. If they are flying in Europe, remind them to check their luggage
      v. If they are flying outside Europe, remind them to remember to
      right currency.

Review Questions 7: Selection Statements

1. What will be the result of running this code and why?

```
quiz1 = input("What is the capital of Italy ?")

if quiz1 =="rome" or "Rome":
print("Correct")
    else:
    print("I
```

.....

.....

2. What punctuation symbol completes the comparison part of an IF statement

.....

3. What is the Python symbol for 'not equal to'?

.....

4. Explain what is wrong with this code:

```
answer = input("Please enter Y
if answer =="Y":
    print("You ente
else:
    print("You entered N")
```

```
>>>
Please enter Y
You entered N
>>>
```

.....

.....

.....

5. What will be the result of running this code, and why?

```
weather = "sunny"
temp = 72

if weather == "Sunny"
    print("Let's
else:
    print("Too cold for ice cream")
```

.....

.....

.....

Check Your Progress: Selection Statements

How confident are you on this topic? For each statement, tick the level that you

Selection Statements		
What is a selection statement?		
What are comparison operators?		
What are logical operators?		
Bronze Challenge		
Silver Challenge		
Gold Challenge		

Targets for Topic 8

1. .....

2. .....

3. .....

TOPIC 8: USING LISTS

Sometimes when we create variables, we may want to store a group of items und one name, just like the items on a shopping list.

A list is a **data structure** that allows us to save many items using just one variable name.

Key Point

In progra[illegible] a **data structure** holds a collection of items or elemen[illegible]me data structures can grow or shrink as the program runs; these are called **dynamic** or **mutable** data structures. Those that cannot are called **static** or **immutable** data structures.

- Lists are **mutable** because you can add, edit, delete and move the elements in the list.
- We know that strings are **immutable**; the original data cannot be changed without creating a new string.

Creating a list

- Choose a suitable variable name.
- Enclose the list items in square brackets.
- Separate each item by a comma.

Make sure that you open and close speech marks around each string element in a

```
shoppi[illegible]st = ["Bread","Milk","Coffee","Sugar"]

numList = [5,67,3.4,98,2,18]

myList = ["Harry",5.8,"Sara",5.2,"Johnny",5.7]
```

Each element in the list has an index value, so we can access individual items and like the strings in Topic 4.

Example:

```
shoppingList = ["Bread","Milk","Coffee","Sugar"]

print(shoppingList[1:3])
```

```
>>>
['Milk', '
>>>
```

Remember each element in the list has an **index** value which starts counting print out the list elements starting at index position 1 up to **but not including** inc

Things we can do with lists

There are a number of **different built-in functions** we can use with lists. These ar

- list.append(element) adds an item to a list
- list.remove(element) removes the first instance of the ite
- list.sort() sorts a list into ascending order
- list.sort(reverse=True) reverses t[illegible] of the list into de
- list.insert (index, element) in[illegible]em into the list in the ind

We can also use other built-in [illegible]ctio[illegible]s we have already learnt about, e.g. len() a

Examples:

Append

```
numList = [5,67,3.4,98,2,18]
newNum=float(input("Enter a new number: "))
numList.append(newNum)
print(numList)
```

```
Enter a nev
[5, 67, 3.4
>>>
```

Remove

```
removeNum = float(input("Enter number to be removed: "))
if removeNum in numList:
    numList.remove(removeNum)
    print("\nThe number "+str(remove[illegible]) has been removed fro
else:
    print("Number not in
```

```
Enter number to be removed

The number 2.0 has been re
[5, 67, 3.4, 98, 18]
>>>
```

```
Enter numbe
Number not
>>>
```

Sort

```
numList = [5,67,3.4,98,2,18]
numList.sort()
print("\nThe list has n[illegible]e sorted into ascending
```

```
The list has now been sorted i
[2, 3.4, 5, 18, 67, 98]
>>>
```

Sort (reverse=True)

```
numList = [5,67,3.4,98,2,18]
numList.sort(reverse=True)
print("\nThe list has now been sorted in descending
```

```
The list has now been sorted
[98, 67, 18, 6, 3.4, 2]
>>>
```

Insert

```
numList = [5,67,3.4,98,2,18]
newNumInsert = float(input("Enter a new number: "))
listIndex = int(input("Enter the index position for this number: "))
numList.insert(listIndex,newNumInsert)

print("\nThe number "+str(newNumInsert)+" is now in index position "+str
```

```
The number 5 appears 1
There are now 7 items
>>>
```

Count() and len()

```
numList = [5,67,3.4,98,2,18,5.7]
print("The number 5 appears "+str(numList.count(5))+

#Using the len() built-in function
print("There are now "+str(len(numList))+" items in
```

```
Enter a new number: 36
Enter the index position

The number 36.0 is now in
[5, 67, 3.4, 36.0, 98, 2,
>>>
```

Quick Question

Why have I cast the data input to a float to append a new number to my list?

Bronze Challenge: Creating Lists

In this challenge you will create and print some simple lists. Save your work in a file called **BronzeChallenge_Lists.py**.

1. Create a list of five friends using a suitable variable name, sort the list into
2. Create a list of the shoe sizes of 10 people in your group, sort it into order have size 4.5 shoes.
3. Create a list of 10 items of shopping, and print out the first five items after the list.

Silver Challenge: Getting data input and appending it to li

In this challenge you will ask for data to add to your list. Save your work in a n
called **SilverChallenge_Lists.py**.

1. Create the list shown here:

```
shoppingList = ["Bread","Milk","Coffee","Su
```

   a. Write the code to ask for a n… m …be added to the list, sort the
   print it.
   b. Write the co… …k whether the list contains both 'Bread' AND
   …If …, print 'Toast for breakfast!'
   …not, print 'Just coffee please'.

2. Create a list for items you need for a beach holiday. Add these items to t
   a. sunglasses
   b. beach towel
   c. phrase book
   d. sunscreen
      i. Write the code to ask for and add a new item to your list.
      ii. Write the code to check whether the list has 'beach towel' or 'fl
      iii. If it does, print ' Day at the beach'.
      iv. If not, print 'Sightseeing today'.

Gold Challenge: Getting data input and …e…ting it into a

In this challenge you will ask for data a… …er …at data into a specific place
Save your work in a new Pytho… …a **GoldChallenge_Lists.py**.

1. Create an em… …ta…ed animals.
   a. …th …ode to append the following three animals to the list:
      i. …neetah
      ii. marmoset
      iii. tiger

   b. Write the code to ask for the name of another animal.
      i. If the animal name is greater than 'tiger',
         - find the index value of 'tiger' [*hint:* `* myList.index (i`
         - insert the new animal in the next index value (add 1 onto t

      ii. If the animal name is greater than 'marmoset' and less than 'tig
         - find the index value of 'marmoset'
         - insert the new animal in the next index value

      iii. If the animal name is greater than 'chee… …and less than 'mar
         - find the index value of 'che…al'
         - insert the new ani… …he next index value

      iv. If the ani… …s less than 'cheetah'
         - …e index value of 'cheetah'
         - remove 'cheetah'
         - insert the new animal in the index value of 'cheetah'
         - insert 'cheetah' into the next index value after the new an

      v. Print the final list *(which SHOULD be sorted if you have written*

Review Questions 8: Using Lists

1. How do I print the names Holly and Katie from the following list?

```
myList = ["Justin,Holly,Katie,Robbie,Chris,Za
```

.....

.....

2. Name [illegible] data types I can use inside one list.

1 .....

2 .....

3 .....

3. Write the code to check whether `myList` contains the word 'Hello', and pri
does not.

.....

.....

.....

4. Write the code to put the number 14 in the [illegible] position in `numList` (or

```
numList = [7,9,[illegible],24,27,33]
```

.....

.....

.....

5. What is the difference between using `len()` and `count()` with `numList`

.....

.....

.....

Check Your Progress: Using Lists

How confident are you on this topic? For each statement, tick the level that you

Using Lists		
What is a li		
How to create a list		
How to append to a list		
How to remove an item from a list		
How to sort a list		
How to insert an item into a list using the index position		
Bronze Challenge		
Silver Challenge		
Gold Chall		

Targets for Topic 9

1. .....

2. .....

3. .....

TOPIC 9: LOOPS AND REPETI

You may have played this type of 'whack-a-mole' game before. The idea is that th
appearing in random holes and you try to hit them with the mallet.

This is an example of an **indefinite loop** – the game w... ti...ue for as long as yo
repeatedly 'whack' the moles as they appea... ...d ...ill have a life left (shown b
this image).

Indefini...pping

Python uses indefinite loops called **while** loops, to continue running some code u
in the code is no longer true.

Look at this example:

```
1  reply = 'n'
2
3  while reply != 'y':
4      reply = input("Are we there yet? Enter y
5
6  print("We're there!")
7
```

```
>>>
Are we there yet? E
Are we ...here yet? E
...y ...here yet? E
...e we there yet? E
We're there!
>>>
```

Line 1: the ... **reply** is given the value 'n'.

Line 3: the **condition** that controls the while loop is set: while the value of **reply** i

Line 4: this code is the 'body' of the loop. Everything inside the body is repeated u
while loop is **no longer** true.

Line 6: when the value of the variable reply is changed to 'y', the condition set in t
the loop ends and line 6 is printed.

Try the exercise on the next page to check your understanding of how this loop w

While loop exercise

```
1  menu = [1,2,3,4]
2  incorrectChoice = True
3  print("Choose\n\t1 One Player\n\t2 Two Player\n\t3 Settings
4  userChoice = input("Enter your choice from 1,2,3 or 4 t
5
6  while incorrectChoice == True:
7      if userChoice in menu:
8          incorrectChoice = False
9          print("You chose option "+str(userChoice))
10     else:
11         userChoice = int(input("Enter your choice from 1,2,
12
13 print("Please wait")
```

Questions	
1. Identify the line where the variable used to control the while loop is set.	
2. Explain how the print statement on Line 3 will look when it runs out.	
3. Why is the data input on Line 4 cast to an integer?	
4. What is being checked on Line 7 of the code?	
5. Explain why Line 8 is important.	
6. What happens if the user enters a number that is not in the menu?	

Quick Question

What do you think will happen if I run this code? You could try the code yourse
sure that the condition in the while loop will no longer be true?

```
num = 1
while num <= 10:
    print(num)
```

Infinite loops

It is importa heck your code carefully or you could write code that never st
example abc As you can see here, the value of the variable num stays at 1 so t
never leaves the while loop.

The code needs to be amended to add 1 to the value of the variable num each ti
is run.

```
num = 1
while num <= 10:
    print(num)
    num = num+1
```

```
>>>
1
2
3
4
5
6
7
8
9
10
```

TIP: if this h s t d, press CTRL + c to exit the infinite loop.

'Breaking' out of a while loop

Sometimes we may want the program to continue until a certain key is pressed o
keyword 'break', which allows the program to break out of the while loop even t
remains true. Look at this example:

```
1  total = 0
2  while total != 20:
3      num = int(input("Please enter a number bet
4      if num <=0 or num > 5:
5          print("Incorrect input")
6          break
7      else:
8          total+=num
9
10 print("Your total i t(total))
```

Line 1: The variable tot t with a starting value of 0.
Line 2: The ior the while loop is set.
Line 3: The input is requested.
Line 4: The program checks whether the number is less than or equal to 0 or grea
Line 5: If true, an error message is printed.
Line 6: The loop will **break** here (as the number is NOT between 1 and 5) and go s
Line 8: If the integer entered is between 1 and 5, it is added to the total here. Loo
adding: **+=**. We can also use **-=** if we are subtracting.

Definite looping

A **definite loop** means that we know how many times the code is going to repeat next line of code.

In Python, definite loops are called **for** loops. We can use a for loop to loop through items in a list or numbers in a defined range.

Here are some examples:

1. Combining the for loop with the built-in function range() to print out numbers

   In these examples I have used the variable 'x' to keep track of where Python is up to as it counts out the numbers – I could use any sensible variable name.

   The numbers will be printed on a new line underneath each other.

```
for x in range(10):      # prints numbers from 0 to
    print(x)

for x in range(1,11):    # prints numbers from 1 to
    print(x)

for x in range(0,11,2): # prints numbers 0 to 10 i
    print(x)
```

2. Using the for loop to print out the individual letters in a string. Again each letter

```
shoppingList = ["Bread","Milk","Coffee","Suga

for each in shoppingList:
    print(each)

myString = "programming"
for letter in myString:
    print(letter)
```

Key Point

Looping is commonly known as **iteration** in programming. There are two types of **iteration**: definite and indefinite.

Definite loops

You know how many times the loop will run, e.g. the number of items in a list.

Indefinite loops

The loop will run while the condition which is set in the while loop remains true, e.g. waiting for the user to enter 'y'.

Bronze Challenge: Definite loops

In this challenge you will create some simple loops using ranges of numbers, s
Save your work in a new Python file called **BronzeChallenge_Loops.py**.

1. Print out the numbers from 20 to 30.
2. Print out the numbers from 0 to 30 in steps of
3. Print out the numbers from 2 to 20 in steps of 2.
4. Create a variable 'fav_food' and assign a string of your favourite food. Pri
on a new line.
5. Cre st of your favourite artists/singers/groups using a suitable vari
on a ne.

Silver Challenge: Definite and indefinite loops

In this challenge you will create some more complex loops using ranges of nu
lists. Save your work in a new Python file called **SilverChallenge_Loops.py**.

1. Print out the numbers from 20 to 1, i.e. going backwards by -1 each time
2. Print out the numbers from 100 to 0 in steps of 10.
3. Create an empty list, called 'numberList'; create a variable called coun
   a. While count is less than 10...
   b. Add the value of count to the list numberList *(Note: remember in*
   c. Print out each number in th a new line.
4. Using a suitable va e, create a list of school subjects, which mu
'Com r ' or example.
   a. ut each subject on a new line.
   b. If the subject is 'Computer Science' (or your favourite subject) your p
'My favourite subject is' with the name of the subject after it.

Gold Challenge: Definite and indefinite loops

In this challenge you will be using lists, while loops and for loops to create a si
game. Save your work in a new Python file called **GoldChallenge_Loops.py**.

1. The game is a number guessing game with six attempts to guess the num
   a. Create a variable called 'number' and gi[illegible] va[illegible]e between 1 and 2
   b. Create a variable called 'co[illegible]' set the value at 0.
   c. Create an em[illegible]ed 'incorrect'.
   d. [illegible] t[illegible] count is less than or equal to 5,
      [illegible]sk users to guess the number
      ii. If the guess is too low,
         - print out a suitable message
         - add the guess to the list of incorrect guesses
      iii. If the guess is too high,
         - print out a suitable message
         - add the guess to the list of incorrect guesses
      iv. If the guess matches the value in the variable 'number',
         - print a message saying how many guesses were taken to c
         - break out of the loop
   e. If the count is greater than 5 and the guess does not match the 'num
      i. print a 'sorry, you lose' message
      ii. tell the user what the number was
      iii. tell the user what they gues[illegible]d, ea[illegible]. guess must be printed on
2. In this challenge yo[illegible] re[illegible]e a simple quiz with four questions about c
   a. [illegible]e [illegible] countries for the quiz.
   b. [illegible]e a list of the capital cities of those countries. Make sure these
      both in the same order and use capital letters.
   c. Create a variable count and set the value at 0.
   d. Create a variable score and set the value at 0.
   e. While the count is less than the length of the capitals list,
      i. ask for the capital of the *first country*
         Hint: Concatenate the first item in the country list, e.g. `countr`
      ii. If the answer matches the first item in the capital list, i.e. it is c
         the count
      iii. If the answer does NOT match,
         - print a suitable message
         - add 1 to the count
   f. Finally, print out [illegible]essa[illegible] telling the person what they scored.
3. a. [illegible]d [illegible] quiz by adding more countries and capitals (use the Inte
   b. [illegible]en printing the score, print out a message depending on the scor
      20 capitals and the person scores 20/20, then display the message 'G

Review Questions 9: Loops and Repetition

1. What is the Python name for a definite loop?

.....

2. What is the name of the keyword that can be used to exit any loop?

.....

3. What do you think will happen when this code runs?

```
count = 1
while count != 100:
    print(count)
    count += 2
```

.....

.....

4. Correct the code in Question 3.

.....

.....

5. a. How many times will the program below ask the user for a number?

.....

b. What does the code on Line 4 do?

.....

.....

```
1 total = 0
2 for x in range(5):
3     number = int(input("Type in a numb
4     total += number
5 print("The total is: "+str(total))
```

Check Your Progress: Loops and Repetition

How confident are you on this topic? For each statement, tick the level that you

Loops and Repetition		
What is a l		
What is an indefinite loop?		
How to code an indefinite loop		
While loop exercise		
What infinite loops are, and how to avoid them		
How to break out of a while loop		
What is a definite loop?		
How to code a definite loop		
Bronze Cha		
Silver Challenge		
Gold Challenge		

Targets for improving overall

1. .....

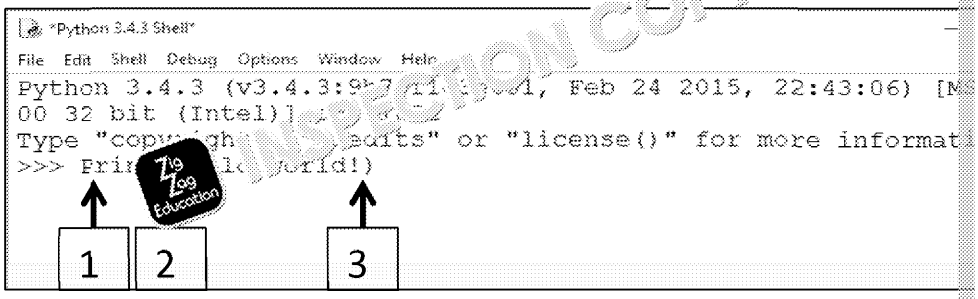
2. .....

3. .....

ANSWERS

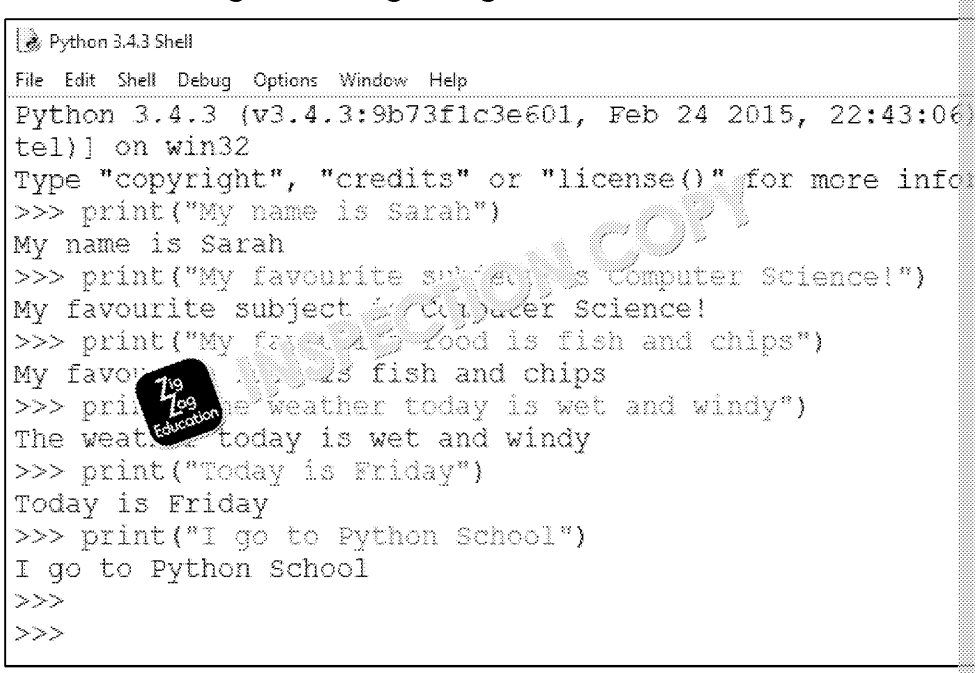
Topic 1

Quick Question

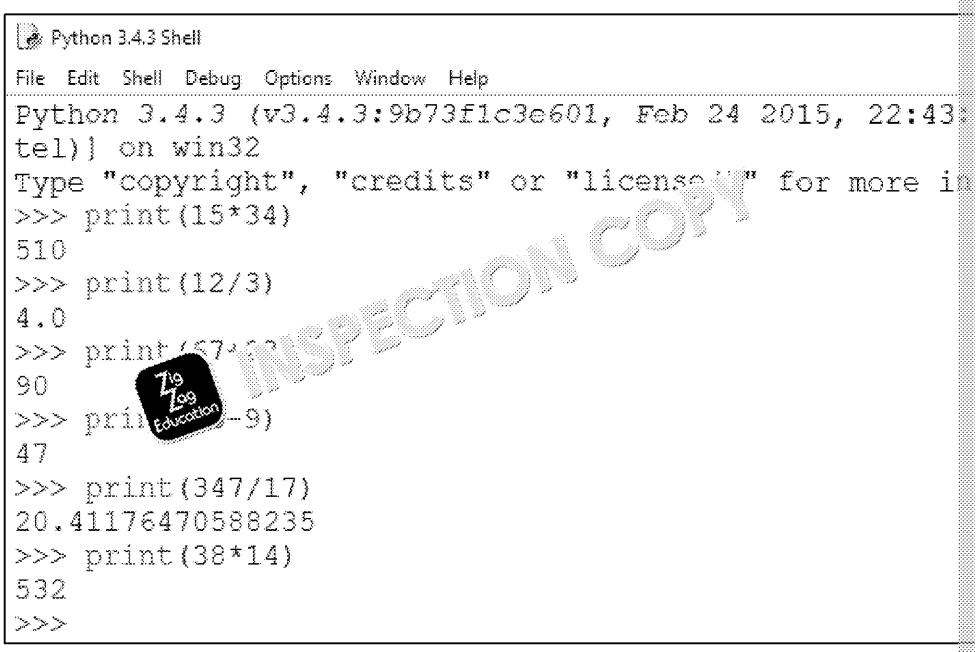


1. Capital P should be lower case
2. Speech marks are missing between (and H.
3. Speech marks are missing between ! and).

Bronze Challenge: Printing strings



Bronze Challenge: Basic calculator



Review Questions 1

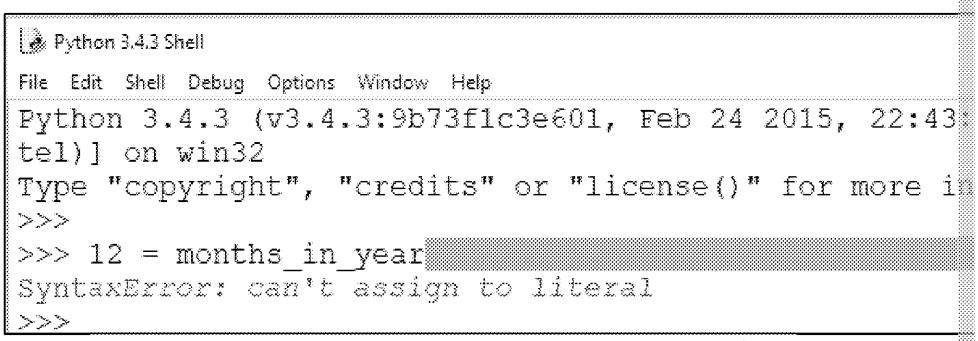
1. shell or interactive
2. integer
3. * (star symbol)
4. / (forward slash symbol)

Topic 2

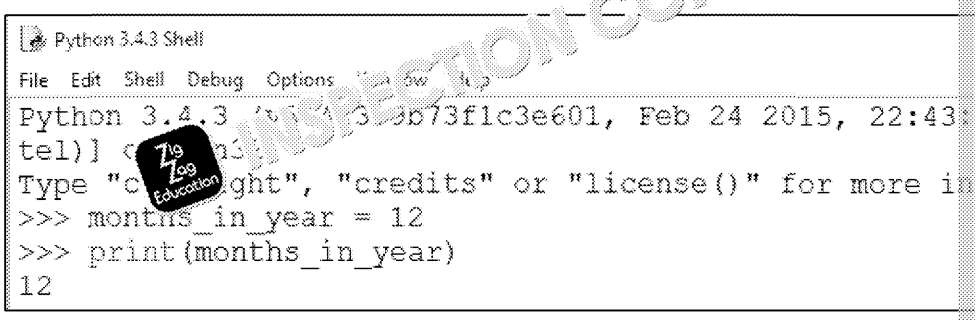
Quick Question 1

If something v it r an change. For example, a program could ask you what the w answer in a v alled t_weather. Each time you run the program the weather could be

Quick Question 2



When assigning a value to a variable, the variable name mu ten on the left befo



Correct assignment of 12 to the variable: `months_in_year`

Bronze Challenge: Assigning strings to a variable

The key is ensuring that each of the variable names is one word. This can be achieved wi
CamelCase.

```
File  Edit  Shell  Debug  Options  Window  Help
Python 3.4.3 (v3.4.3:9b73f1c3e601, Feb 24 2015, 22:43:
tel)] on win32
Type "copyright", "credits" or "lic...()" for more i
>>> summer_month = "June"
>>> best_friend = "Harry"
>>> tv_programme = "X Factor"
>>> colour = "blue"
>>> ideal_pet = "hamster"
>>> favourite_meal = "Pizza"
>>>
>>>
>>> summerMonth = "June"
>>> bestFriend = "Harry"
>>> tvProgramme = "X Factor"
>>> colour = "blue"
>>> idealPet = "hamster"
>>> favouriteMeal = "Pizza"
>>>
```

Silver Challenge: Assigning integers and floats to a variable

```
File  Edit  Shell  Debug  Options  Window  Help
Python 3.4.3 (v3.4.3:9b73f1c3e601, Feb ... 2015, 22:43:
tel)] on win32
Type "copyright", "credits" or "...ense()" for more i
>>> shoe_size = 5.5
>>> age = 13
>>> number_of_... = 10
>>> hou..._day = 24
>>> comp..._clock_time = 15.23
>>> half_of_seven = 3.5
```

CamelCase is also acceptable, as shown above.
Any suitable variable name is acceptable providing it meets the rules for variable names.

```
>>> TopPayActor_2016 = "Ben Affleck"
>>> Days_2_birthday = 192
>>> MyDreamHol = "Greek Islands"
>>> Home_2_ParisDistance = 502
>>>
```

Review Questions 2

1. Equals symbol (=)
2. `shoe size = 5.5` ☒
   `3 = topicTests` ☒
   `studentName = "...n` ☑
   `Best_...t = Computer Science` ☑
3. By surrounding the characters with single/double quotes / speech marks

4.
```
>>> studentName = "Hassan"
>>> print("Hello "+studentName)
Hello Hassan
>>>
```

5. A location in the computer memory used to store data

Topic 3

Quick Question 1

```
>>> print("name"*6)
namenamenamenamenamename
>>> print("B"+("an"*2)+"a")
Banana
>>>
```

Quick Question 2

The data type used in the variable name is already a string (because it has quotation mar
needs to be cast to a string data type for printing.

Bronze Challenge: Casting a variable and concatenating

```
#a)
days_in_week = 7
print("Days in a week: "+str(days_in_week))

#b)
hexagon_sides = 6
print("Sides in a hexagon: "+str(hexagon_sides))

#c)
adult_teeth = 32
print("Number of adult teeth: "+str(adult_teeth))

#d)
lessons_day
print("Less    day: "+str(lessons_day))

#e)
music_grades = 8
print("Grades in music: "+str(music_grades))
```

Silver Challenge: Casting variables and concatenating

```
#Exercise 1
HW_mark = 8
name = "Oscar"
print(name+" scored "+str(HW_mark)+" out of 10 in this week's homewor
#
#
#Exercise 2
coffee = 0.75
cake = 1.75
print("Please attend our charity Coffee Break,       costs £"+str(co
      "p per cup. Add a slice of cake for    "+str(cake)+
      ". All proceeds to charity.")
#
#
#Exercise 3
name = "Emil
score = 3
print(nam     red "+str(score)+" goals in today's charity game agai
#
#
#Exercse 4
student = "Zahid"
target = 75.0
print(student+" was confident he could reach the exam target of "+str
```

Gold Challenge: Casting variables, calculating and concatenating

```
#Exercise 1
charge = 3.50
washed = 7
total = charge * washed
print("Washing "+str(washed)+ " cars will earn you £"+str(total)+"0")
#
#
#Exercise 2
pay_rate = 7.65
hours_ahmed =10
hours_jamilla =16
hours_david = 8
total_a =pay_rate*hours_ahmed
total_j = pay_rate*hours_j
total_d = pay_rate*hou    d

print("Ahm      ed "+str(hours_ahmed)+" hours this week and earned £"+str(to
print()
print("Jami     ked "+str(hours_jamilla)+" hours this week and earned £"+st
print()
print("David worked "+str(hours_david)+" hours this week and earned £"+str(to
#
#Creating a calculation like this str(pay_rate * hours_ahmed) in place of str
#

#Exercise 3
cost_per_metre = 14.0
length = 2.5
width = 3.0
room_area = length*width
carpet_cost = room_area*cost_per_metre

print("The bedroom is "+str(room_area)+" sq. metres in size and the carpet wi
#
#
#Exercise 4
pizza_slice = 8
per_person = 3
party_invites = 32
total_slices= per_person * party_invites
pizzas=total_slices/pizza_slice
print("For "+str(party_invites)+" people you wi    e to buy "+str(pizzas)+"
```

Review Questions 3

1. str(teeth)
2. Interac   ell' OR script mode
3. Concatenation
4.

```
>>>
There are 168 hours in each week
>>>
```

5. This is the expected answer:

```
print("Ba"+"nana"*4)
```

This version would also work:

```
print("Ba"+"na"*4)
```

Bronze Challenge: String manipulation

```
#Q1
print(len("Sausages"))
print(len("Bread and butter"))
print(len("Cheesy chips"))
print(len("Spaghetti Bolognese"))


#Q2
print()
stringA = "Houston, we have a problem."
print("These are the vowels in "+stringA)
print(stringA.count("a"))
print(stringA.count("e"))
print(stringA.count("i"))
print(stringA.count("o"))
print(stringA.count("u"))
print()
stringB= "Keep your friends close, but your enemi
print("These are the vowels in "+stringB)
print(stringB.count("a"))
print(stringB.count("e"))
print(stringB.count("i"))
print(stringB.count("o"))
print(stringB.count("u"))
print()
stringC= "I feel the need for speed!"
print("These are the vowels in "+stringC)
print(stringC.count("a"))
print(stringC.count("e"))
print(stringC.count("i"))
print(stringC.count("o"))
print(stringC.count("u"))
print()
stringD= "Nobody puts Baby in a corner."
print("These are the vowels in "+stringD)
print(stringD.count("a"))
print(stringD.count("e"))
print(stringD.count("i"))
print(stringD.count("o"))
print(stringD.count("u"))
print()
```

Silver Challenge: String manipulation

```
#Q1
stringA = "Keep your friends close, but your enemies clo
print(stringA.replace("os","yz"))
print()
stringB = "Nobody puts Baby in a corner"
print(stringB.replace("b","k"))
print()
stringC ="I feel the need—the need f- speed!"
print(stringC.replace("ee","-"))
print()
stringD = "Wait a minute, wait a minute. You ain't heard
print(st  D.replace("in","yk"))
print()

#Q2
string1 = "Bread and butter"
print(string1.find('e'))
string2 = "Sausages"
print(string2.find('e'))
string3 = "Spaghetti Bolognese"
print(string3.find('e'))
```

Gold Challenge: String Manipulation

```
#Q1
stringA ="Houston, we have a problem."
print("The string: '"+stringA+"' has the followin
print("\ta="+str(stringA.count("a")))
print("\te="+str(stringA.count("e")))
print("\ti="+str(stringA.count("i")))
print("\to="+str(stringA.count("o")))
print("\tu="+str(stringA.count("u")))
print()
stringB= "Keep your friends close, but your enemi
print("The string: '"+stringB+"' has the followin
print("\ta="+str(stringB.count("a")))
print("\te="+str(stringB.count("e")))
print("\ti="+str(stringB.count("i")))
print("\to="+str(stringB.count("o")))
print("\tu="+str(stringB.count("u")))
print()
stringC= "I feel the need—the need for speed!"
print("The string: '"+stringC+"' has the followin
print("\ta="+str(stringC.count("a")))
print("\te="+str(stringC.count("e")))
print("\ti="+str(stringC.count("i")))
print("\to="+str(stringC.count("o")))
print("\tu="+str(stringC.count("u")))
print()
stringD= "Nobody puts Baby in a corner."
print("The string: '"+stringD+"' has the followin
print("\ta="+str(stringD.count("a")))
print("\te="+str(stringD.count("e")))
print("\ti="+str(stringD.count("i")))
print("\to="+str(stringD.count("o")))
print("\tu="+str(stringD.count("u")))
print()

#Q2
myString ="Spaghetti Bolognese"
countA = myString.count("a")
countE = myString.count("e")
countI = myString.count("i")
countO = myString.count("o")
countU = myString.count("u")
total = countA+countE+countI+countO+countU
print("The string: '"+myString+"' has the followi
print("\ta="+str(countA))
print("\te="+str(countE))
print("\ti="+str(countI))
print("\to="+str(countO))
print("\tu="+str(countU))
print("The string has a total of "+str(total)+" v
```

Review Questions 4

1. \n

2.
```
myString = "Python coding"
print(myString[0:6])
```

3. 12

4.
```
myString = "Coding is cool"
print(len(myString))
```

5.
```
myString = "Hello world!"
print(myString.replace("Hello","Goodbye"))
```

Topic 5

Quick Question

print(), str(), upper(), lower(), capitalise(), title(), replace(x,y), len()

Bronze Challenge: Getting data input

```
days_in_july = int (input("How many days are in July?
pi=float(input("Enter the value of Pi( to 5 places): "
dk_pound = float(input("Enter todays rate to convert
shoe_size=float(input("Enter you shoe size: "))
temp_today = int(input("Enter todays temperature: "))
```

Silver Challenge: Getting data input and casting to print

```
#Q1
fav_food = input("What is your favourite food?")
print("Your favourite food is "+fav_food)

#Q2
num1 = int(input("Enter your first number :"))
num2 = int(input("Enter your second number :"))
print(str(num1)+" multiplied by "+str(num2)+" = "+st
```

Gold Challenge: Casting data input

```
#Q1

pound_D = 1.29
spends = int(input("How much spending money do you want to t
print("You will get $"+str(spends * pound_D)+" at today's ra

#Q2
miles_km = 0.621371192237
how_far = float(input("How many miles are you from Disneylan
print("When you get there, you will have travelled "+str(how_
print("Now rounded down to "+str(how_far//miles_km)+" kms")
```

Review Questions 5

1. Casting
2. Concatenation
3.
```
age = int(input("Enter your age: "))
```
4. The input is not being cast to an integer. It should be:
num = int(input("Enter your number of lessons a day: "))

```
num = int(input("Enter your number of lesson
print("In a week you have "+str(num *5)+" le
```

5. The code will not run and will display a Syntax Error message when Python reaches the closing bracket is missing.

   - input missing second closing bracket
   - print does not correctly cast the radius to string – spelling error
   - print statement is missing a closing bracket after calculation

   Corrected code:

```
radius=int(input("Enter the circle radius:"))
print("Your circle radius "+str(radius)+" has an area of "
```

Topic 6

Errors: Bronze Challenge

```
HW mark = 8      #The variable has a space in the name, will cause a Syntax Error

name = Oscar     #The string is not surrounded by speech marks, this will c

print(name+" scored "+str(HW mark)+" out of 10 in the test")
```

Errors: Silver Challenge

```
numi = int(input("Enter your 1st number: ") #Closing bracket missing Syn
num 2 =int(input("Enter your 2nd number: "))# Space in the variable name

print("Multiplying your numbers = "+str(numi*num2))# NameError - no vari
```

Errors: Gold Challenge

```
name = input("Enter your name: ")
print("Hello "+name)
class = "Mrs Green's"
#Python keyword used as variable name

 shoe_size = float(input(" What is your shoe si
#unexpected indent

print("Your name*shoe size is "+str(name*age))
# NameError- Python does not know about age varia

age = int(input(How old are you?))
# no quotes around string- Syntax Error

print name+" your shoe size * age is "+(age*shoe
# brackets missing and calculation not cast to a
```

Review Questions 6

```
#Q1
#num = input("Enter a number: ") # cast the input to an int
num = int(input("Enter a number: "))
answer = num*3
print("Your number tripled is: "+str(answer))


#Q2
#Python shows an error by displaying a bl... of red colour wher
#is AND by displaying an error mes... .

#Q3
#A TypeError is ... caused by trying to print a numerical v
# concate... in a print statement. It is solved by casting th
# to a st... inside the print statement.

#Q4
a = 5
b = "Ho"
print(b*a) #Changing a to "Ha" will rsult in a TypeError

#Q5
fav food = input("What is your favourite food? ")#The variable
print("You like "+fav food) #fav_food
```

5. The code will not run and will display a 'Syntax Error' message as soon as Python fin

Topic 7

Bronze Challenge: Using if statements

```
#Q1
score=0 # create the variable to keep score
answer =input("Who is author of the Tracey Beaker book
if answer == "JACQUELINE WILSON":
    print("Correct!")
    score+=1 # add 1 to the score
else:
    print("Too bad :(")

#Q2
answer =input("What do some atoms join together to ma
if answer == "MOLECULES":
    print("Correct!")
    score+=1 # add 1 to the score
else:
    print("Too bad :(")
```

```
#Q3
answer =input("How many digits does the binary system use? ").upper()
if answer == "2" or answer == "TWO":
    print("Correct!")
    score+=1 # add 1 to the score
else:
    print("Too bad :(")
#Q4
answer =input("What are the basic building blocks of all animals and
if answer == "CELLS":
    print("Correct!")
    score+=1 # add 1 to the score
else:
    print("Too bad :(")

#Q5
answer =input("What animals can be found in Trafalgar Square? ").uppe
if answer == "LIONS":
    print("Correct!")
    score+=1 # add 1 to the score
else:
    print("Too bad :(")
print("You scored "+str(score)+" out of 5")
```

Silver Challenge: Using if and elif statements

```
#Q1
temp = int(input("Enter todays temperature in Celsius: "))
if temp >=24:
    print("It's hot-wear shorts and t-shirt")
elif temp >=20:
    print("It's warm-wear a t-shirt")
elif temp >=16:
    print("It's mild-you don't need a coat")
elif temp >=12:
    print("It's cool-wear a jacket")
elif temp >=8:
    print("It's getting cold-you need a coat and gloves")
elif temp >=4:
    print("It's quite cold-wear a woolly hat and scarf")
else:
    print("It's freezing-wear thermals!")

#Q2
current_year = 2017
birth_year = int(input("Enter the year you were born: "))
print("You are "+str(current_year-birth_year)+" years old")
if (current_year-birth_year)>=66:
    print("You can retire!")
elif (current_year-birth_year)>=21:
    print("You can drive a train and apply to adopt a child")
elif (current_year-birth_year)>=18:
    print("You can become an MP,change your name and have a tattoo")
elif (current_year-birth_year)>=16:
    print("You can get a full-time job; get a licence to drive a moped and
elif (current_year-birth_year)>=13:
    print("You can get a part-time job!")
else:
    print("You're still young- have fun!")
```

Gold Challenge: Using if and elif statements

```
holiday = input("Are you going on holiday this year? Enter Y or N ").upper

if holiday == "N":
    print("Maybe next year")
elif holiday =="Y":
    print("\nChoose your destination from the list below")
    print("a...United Kingdom\nb...Europe\nc...Outside Europe\n")
hol_choice = input("Enter a,b or c : ").lower()
travel_method = input("How are you travelling by\na...car\nb...train\nc...ai
if travel_method == "a" and hol_choice=="a":
    print("Make sure you fill up before you go!")
elif travel_method == "b" and hol_choice =="a":
    print("Make sure you book your tickets early!")
elif travel_method == "b" and hol_choice =="b":
    print("Remember your passports")
elif travel_method == "c" and hol_choice =="b":
    print("Check your luggage allowance")
else:
    print("Make sure you take the right currency")
```

Review Questions 7

1. The code will result in an error as the indentation is incorrect in two places.

```
#Correct code
quiz1 = input("What is the capital of Italy ? ")

if quiz1 =="rome" or "Rome":
    print("Correct")
else:
    print("Incorrect")
```

2. Colon :
3. !=
4. The answer code changes the input to lower case but compares the answer to upper .lower() to .upper() or change the "Y" to "y".
5. The weather variable spells 'sunny' with a lower-case 's' but compares it to 'Sunny' w Change the > symbol to >= or "Too cold for ice cream" will always print out.

Topic 8

Quick Question

Because the list numList contains numerical values only, casting the data input to a float means numbers with a decimal part will be accepted.

Bronze Challenge: Creating lists

```
#Q1
myFriends = ["Justin","Ariane","Lia","Ray","Bradley"]
myFriends.sort()
print(myFriends)
#Q2
shoe_sizes = [4,4,4,4.5,3,4,4.5,5]
shoe_sizes.sort()
print("There are "+str(shoe_sizes.count(4.5))+" people with size 4.5 s

#Q3
shopping = ["bread","butter","eggs","juice","potatoes","tea","sugar",
            "cereal","soap","toothpaste"]
print(shopping[1:6])
```

Silver Challenge: Getting data input and appending it to lists

```
#Q1
shoppingList = ["Bread","Milk","Coffee","Sugar"]
listItem = input("Enter new shopping list item: ").tit
shoppingList.append(listItem)
shoppingList.sort()
print(shoppingList)
if "Bread" in shoppingList and "Butter" in shoppingLis
    print("Toast for breakfast!")
else:
    print("Just coffee please")

#Q2
holidayList = ["sunglasses","beach towel","sunscreen",
newItem = input("Add another item to the holiday list:
holidayList.append(newItem)
if "beach towel" in holidayList or "flip flops" in hol
    print("Day at the beach")
else:
    print("Sightseeing today")
```

Gold Challenge: Getting data input and inserting into a list

```
#Q1
animals = []
animals.append("cheetah")
animals.append("marmoset")
animals.append("tiger")


newAnimal = input("Enter the name of another ani

if newAnimal == "tiger":
    newIndex = animals.index("tiger")
    animals.insert(newIndex+1,newAnimal)
elif newAnimal > 'marmoset' and newAnimal < 'tig
    newIndex = animals.index('marmoset')
    animals.insert(newIndex+1,newAnimal)
elif newAnimal > 'cheetah' and newAnimal < 'marm
    newIndex = animals.index('cheetah')
    animals.insert(newIndex+1,newAnimal)
elif newAnimal < 'cheetah':
    newIndex = animals.index('cheetah')
    animals.remove('cheetah')
    animals.insert(newIndex,newAnimal)
    animals .insert(newIndex+1,'cheetah')

print(animals)
```

Review Questions 8

1. All strings in a list must have speech marks around each separate item, so this is a li
   If each name in the list was a separate string, separated by commas, then we could u

2. Any three of the following:
   string
   integer
   float
   Boolean

3.
```
if "Hello" in myList:
    print("Yes")
else:
    print("No")
```

4.
```
numList = [7,9,12,16,19,24,27,33]
numList.insert(3,14)
```

5.
   - len() will count the number of items (the length) of the list.
   - count() will count how many times a specified item appears in the list.

While loop exercise

1. Line 6

2.
```
Choose
        1 One Player
        2 Two Player
        3 Settings
        4 Quit
```

3. Because the [illegible] menu list are integers, and they need to be the same data t see wh[illegible]n has been chosen.

4. Line 7 checks that what the user has entered is in the variable called 'menu'.

5. Line 8 is used to stop the while loop continuing as the condition 'incorrectChoice' w the 'menu' list is entered.

6. If they enter a number that is not in the menu, the question on Line 11 is asked aga

Quick Question

```
num = 1
while num <= 10:
    print(num)
```

The value of num needs to be increased by 1 each tim[illegible] while loop 'loops'.

```
num = 1
while num <= 10:
    print(num)
    num = num+1
```

Bronze Challenge: Definite loops

```
#Q1
for x in range(20,31):
    print(x)
#Q2
for x in range(0,31,5):
    print(x)
#Q3
for x in range(2,21,2):
    print(x)
#Q4
fav_food = "fish and chips"
for letter in fav_food:
    print(letter)
#Q5

artists = ["[illegible]Perry","Pharrell","Justin Beiber",
for each[illegible] artists:
    pri[illegible]ch)
```

Silver Challenge: Definite and indefinite loops

```
#Q1
for x in range(20,0,-1):
    print(x)
#Q2
for x in range(100,-1,-10):
    print(x)
#Q3
numberList = []
count = 0

while count <10:
    numberList.append(count)
    count = count+1
for each in numberList:
    print(each)
#Q4
subjects = ["Maths","Science","History","Geography","Food
            "Computer Science","R.S.","English","Art"]

for each in subjects:
    if each == "Computer Science":
        print("My favourite subject is "+each)
    else:
        print(each)
```

Gold Challenge: Definite and indefinite loops

```
#Q1
number = 7
count = 0
incorrect = []

while count <=5:
    count +=1
    guess = int(input("Guess a number between 1 and 25:
    if guess < number:
        print("Too low")
        incorrect.append(guess)
    elif guess > number:
        print("Too high")
        incorrect.append(guess)
    elif guess == number:
        print("You guessed the number in "+str(count)+
        break
if count >5 and guess != number:
    print("\nSorry, you lose!")
    print("The number you were looking for was "+str(n
    print("Your guesses were: ")
    for x in incorrect:
        print(x)
```

```
#Q2

capitals = ["COPENHAGEN","CANBERRA","ATHENS","BERLIN"]

countries = ["DENMARK","AUSTRALIA","GREECE","GERMANY"]
count = 0
score = 0

while count < len(capitals):
    answer = input("What is the capital of "+countries[count
    if answer == capitals[
        print("Correc
        count+=1
        
    else:
        print("Sorry, that's wrong")
        count+=1

print("You scored "+str(score)+" out of "+str(len(capitals))
```

```
#Q3

capitals = ["COPENHAGEN","CANBERRA","ATHENS","BERLIN","OSLO","LIMA"

countries = ["DENMARK","AUSTRALIA","GREECE","GERMANY","NORWAY","PER
count = 0
score = 0

while count < len(capitals):
    answer = input("What is the capital of "+countries[count]+"? ")
    if answer == capitals[count]:
        print("\nCorrect!")
        count+=1
        score+=1
    else:
        print("\nSorry, that's
        count+=1

print("You scored "+str(score)+" out of "+str(len(capitals)))
if score
    print
elif score
    print("You know your stuff")
elif score <=6 and score >4:
    print("More practice needed :(")
else:
    print("hmmmmm...")
```

Review Questions 9

1. For loop
2. break
3. The program will enter an infinite loop as the count starts at 1 and then increments by 2 so will never equal 100.
4.
```
count = 0
while count != 100:
    print(count)
    count += 
```
5. a. Fi
   b. It a e value of **number** to the value of **total**.