

EDULiTO

Programming Techniques

Topic Tests



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Topic Test - Programming Techniques

1 (a) Define the following terms. [4]

Term	Definition
Variable	
Identifier	
Assignment	
Constant	

1 (b) This program has been written in Python to calculate the area of a circle in cm. [6]

```
rad=int(input("What is the radius of the circle?: "))
pi=3.14
area=pi*rad**2
print("The area of the circle is",area)
```

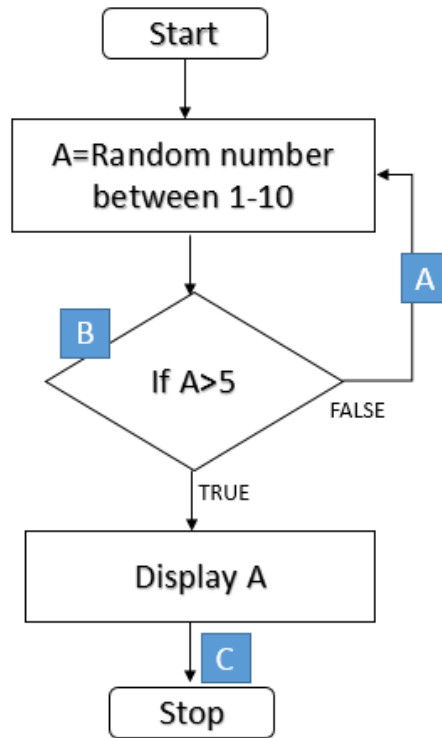
- i) Name two variables:
- ii) Which identifier is a constant?
- iii) If you assign the value of 1 to rad, what will be the area?
- iv) Which variable provides input data for this program?
- v) Which variable provides output data for this program?

2. (a) In the flow chart below identify sequence, selection and iteration. [3]

A is

B is

C is



2 (b) In the Python Code below identify the **first line** where iteration and selection have been used. [2]

Iteration

Selection

```

1 def bubble_sort(list):
2     for n in range(len(list)-1,0,-1):
3         for i in range(n):
4             if list[i]>list[i+1]:
5                 temp = list[i]
6                 list[i] = list[i+1]
7                 list[i+1] = temp
8 list = [54,26,93,17,77,31,44,55,20]
9 bubble_sort(list)
10 print(list)
    
```

3. Look at the pseudocode below. Write down what the program displays after it has been run. [2]

```
namePlace="Canada Water"  
print(namePlace.length)  
print(namePlace.substring(3,3))
```

.....

4. (a) What does this program do? [1]

```
file1 = openRead("text.txt")  
x = file1.readLine()  
file1.close()
```

.....

.....

(b) What does this program do? [1]

```
file1 = openRead("text.txt")  
while NOT file1.endOfFile()  
print(file1.readLine())  
endwhile file1.close()
```

.....

.....

(c) What does this program do? [1]

```
file1 = openWrite("text.txt")  
file1.writeLine("Canada Water")  
file1.close()
```

.....

.....

5. Using the database table shown below. [4]

- (a) How many **records** are there? How many **fields** are there?
- (b) Give an example of a field name
- (c) What would be a suitable datatype for the information in the **First Name** column?
.....

First Name	Surname	Title	Gender	Date of Birth	Address	Town
Layla	Fong	Mrs	F	20/07/1982	27 Park Lane	Birmingham
Paige	Turner	Prof	F	14/12/1984	78 Manor Road	Chertsey
Americk	Patel	Dr	M	29/11/1981	14 York Avenue	York
Terry	McDougal	Dr	M	05/03/1975	19 South Avenue	London
Sam	Smith	Prof	M	07/11/1982	66 Park Road	Crediton
Mark	Smith	Prof	M	08/01/1954	38 The Lane	Worthing
Sarah	Scott	Miss	F	11/09/1990	76 Alexander Road	Burdon
Mark	Smith	Mr	M	20/02/1990	44 School Road	Tonbridge
Richard	Dean	Prof	M	08/08/1978	2 Main Road	Deeside
Bethany	Jones	Miss	F	07/04/1987	68 Cross Hand Road	Peterborough

6. (a) Complete the SQL database using the information shown in the Personal_info table below. The first two lines of code have been included to start you off. [4]

ID	First Name	Surname	Age	Post Code
1010	Aisha	Ahmed	15	E17 9PY
1011	Joanne	Strensky	14	E17 7TR
1012	Stephanie	Manley	15	E8 6RE
1013	Lucy	Grant	16	E10 9TS

```
CREATE TABLE Personal_Info
(ID int(4),
```

6 (b) Using the same table as 6 (a). What would be the result of the query shown below? [3]

Query:

```
SELECT Personal_info.First Name, Personal_info.Age FROM Personal_info ORDER  
BY Personal_Info.Age;
```

6 (c) Using the same table as 6 (a). What would be the result of the query shown below? [3]

Query:

```
SELECT Personal_Info.First Name, Personal_info.Surname, Personal_info.age,  
FROM Personal_info WHERE ((Personal_info.age)>15);
```

6 (d) In the SQL language what is a wild card? Give an example of how a wild card could be used in SQL. [3]

.....

.....

.....

.....

6 (e) How will you add this data **1021, Jean, Johnson, 14,E9 1QY** to the personal_info database? [2]

ID	First Name	Surname	Age	Postcode
1010	Aisha	Ahmed	15	E17 9PY
1011	Joanne	Strensky	14	E17 7TR
1012	Stephanie	Manley	15	E8 6RE

6 (f) Lucy Grant has moved house and has the new post code **E17 6WS**. How would you update the database to show this new information? [3]

7 (a) What is the difference between a one dimensional array and a two dimensional array? [2]

.....

.....

.....

.....

7 (b) Below is a Python program that uses lists (arrays within Python are called lists). What would be the output from this program? [2]

```
names = ["Paul", "Phillip", "Paula", "Phillipa"]
ages = [12, 15, 11, 14]

print(names[0], "is", ages[0])
print(names[1], "is", ages[1])
print(names[2], "is", ages[2])
print(names[3], "is", ages[3])
```

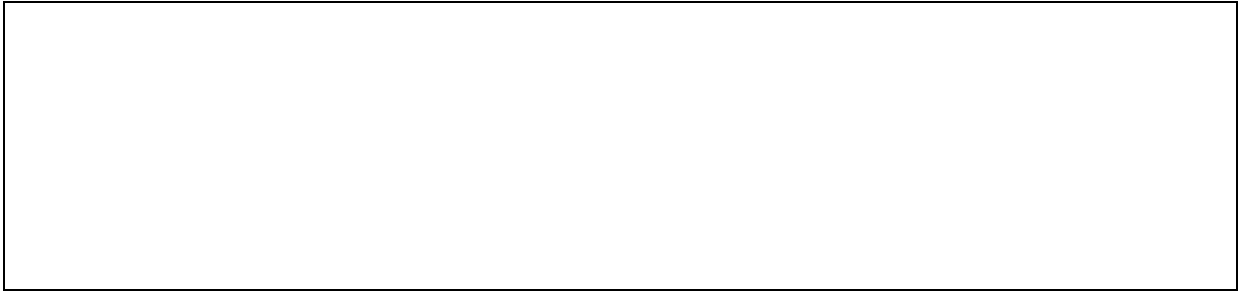
7(c) The Python program below can be used to display data. If the number of radii is 3 what will the program output? [4]

```
#Lists
list_radius=[]
list_circumference=[]
list_area=[]

#variables
pi=float(3.14)
circumference=float()
area=float()
no_rad=int()
radius=int()

#How many radii?
no_rad=int(input("How many radii do you want to enter into your table?"))
for n in range(no_rad):
    radius=n+1
    list_radius.append(radius)
    radius,circumference,area=n+1,2*pi*radius,pi*radius**2
    list_circumference.append(round(circumference,1))
    list_area.append(round(area,1))

print("Radius")
print(list_radius)
print("Circumference")
print(list_circumference)
print("Area")
print(list_area)
```



8(a) Programs often contain sub programs that perform particular tasks. Procedures and functions are both examples of sub programs. What is the difference between a function and a procedure? [1]

.....
.....
.....

8 (b) What is meant by the term “call” a function? [1]

.....
.....
.....

8 (c) What does this function do? [1]

```
function square(number)  
return number^2  
endfunction
```

.....
.....
.....

9. (a) In relation to data types, what is meant by casting? [1]

.....

.....

.....

9 (b) Complete the table below, for each item choose an appropriate data type. [8]

Item	Data Type
Surname	
Telephone number	
Is the sensor detecting light?	
Number of people in a car	
Value of Pi to two decimal places	
Postcode	
Is the circuit open or closed?	
Population of greenfly	

10 (a) Provide an example of how each of these arithmetic operators are used, using $x=20$ $y=6$. The first one has been done for you. [6]

Arithmetic Operators	Example of use using $x=20$ $y=6$
+	$x+y=26$
-	
*	
/	
MOD	
DIV	
^	

10 (b) What will be the output from each of the calculations shown below? [6]

- (i) 14 MOD 5
- (ii) 20 MOD 10
- (iii) 100 MOD 11
- (iv) 14 DIV 5
- (v) 20 DIV 10
- (vi) 100 DIV 11

11. (a) What will be the output from the algorithms below? [3]

num1=4 num2=8

Pseudocode	Output
If num1>num2 then print ("yes") else print("no") endif	
If num1!=num2*4 then print ("yes") else print("no") endif	
If num1*9>=num2^5 then print ("yes") else print("no") endif	

11 (b) What will be the output from the algorithms below? [4]

num1=10 num2=8 num3=15

Pseudocode	Output
If num1>num2 AND (num2-num1)>1 then print ("yes") else print("no") endif	

<pre>If num3*2=num1*3 OR num3>(num2+num1) then print ("yes") else print("no") endif</pre>	
<pre>If num2*12>=num1^2 OR num3!=num2*2 then print ("yes") else print("no") endif</pre>	
<pre>If NOT num3*5<=num1^3 AND num1<=num2*2 then print ("yes") else print("no") endif</pre>	

Topic Test Programming Techniques - Mark Scheme													
Question Number	Answer	Additional Guidance	Mark										
1 a	<p>Variable - Variables are used to store a value. The value can change as the program is executed. [1]</p> <p>Identifier- An identifier is the label/name/text given to a variable, function, array etc. [1]</p> <p>Assignment- A value can be assigned to a variable. [1]</p> <p>Constant- The value stored cannot be altered by the program during normal execution – the value is constant. [1]</p>		4										
1 b	<p>i-rad, area [2]</p> <p>ii-pi [1]</p> <p>iii-3.14 [1]</p> <p>iv-rad [1]</p> <p>v-area [1]</p>		6										
2 a	<p>A Iteration. [1]</p> <p>B Sequence. [1]</p> <p>C Selection. [1]</p>		3										
2 b	<p>Iteration – Line 2. [1]</p> <p>Selection – Line 4. [1]</p>		2										
3	<p>12 [1]</p> <p>Ada [1]</p>		2										
4 a	The program makes x the first line of text.txt. [1]		1										
4 b	The program will print out the contents of text.txt. [1]		1										
4 c	In the program Canada Water is made the contents of text.txt (any previous contents are overwritten). [1]		1										
5 a	10 records [1] 7 Fields [1]		1										
5 b	Any appropriate [1]		1										
5 c	One from - String, text, alpha-numeric		1										
6 a	<pre>CREATE TABLE Personal_Info (ID int(4), First_name varchar(20), [1] Surname varchar(20), [1] Age int(3), [1] Postcode varchar (8));[1]</pre>	Accept any appropriate field length.	4										
6 b	<table border="1"> <thead> <tr> <th>First Name</th> <th>Age</th> </tr> </thead> <tbody> <tr> <td>Joanne</td> <td>14</td> </tr> <tr> <td>Aisha</td> <td>15</td> </tr> <tr> <td>Stephanie</td> <td>15</td> </tr> <tr> <td>Lucy</td> <td>16</td> </tr> </tbody> </table> <p>First name and age field only [1]</p> <p>Data correct [1]</p> <p>Ordered by age [1]</p>	First Name	Age	Joanne	14	Aisha	15	Stephanie	15	Lucy	16	Remove a mark for each additional field.	3
First Name	Age												
Joanne	14												
Aisha	15												
Stephanie	15												
Lucy	16												

GCSE Computer Science (9-1) Programming Techniques - Topic Tests

6 c	<table border="1"> <tr> <td>First Name</td> <td>Surname</td> <td>Age</td> </tr> <tr> <td>Lucy</td> <td>Grant</td> <td>16</td> </tr> </table>	First Name	Surname	Age	Lucy	Grant	16	Remove a mark for each additional field.	2
	First Name	Surname	Age						
Lucy	Grant	16							
<p>First name, surname and age field only [1] Data correct [1]</p>									
6 d	<p>The wildcard uses the * symbol [1] It is used in place of any number of unknown characters. [1] e.g. the following code searches for all first names with the letter "a": WHERE ((Personal_info.First Name) LIKE "*a*"); [1]</p>	Accept any appropriate example.	3						
6 e	<p>INSERT INTO personal_info [1] VALUES (1021, "Jean", "Johnson", 14, "E9 1QY"); [1]</p>		2						
6 f	<p>UPDATE Personal_Info [1] SET Personal_info.Postcode = " E17 6WS " [1] WHERE Programmes.ID = 1013; [1]</p>		3						
7 a	<p>A one-dimensional array is a series of data elements organised in a row. [1] A two-dimensional array can be visualised as a grid (or table) of data elements organised with rows and columns. [1]</p>		2						
7 b	<p>Paul is 12 Phillip is 15 Paula is 11 Phillipa is 14 All correct [2] Three correct [1]</p>		2						
7c	<p>Radius [1, 2, 3] Circumference [6.3, 12.6, 18.8] Area [3.1, 12.6, 28.3] 1 mark for radius, circumference and area 3 marks for correct data</p>		4						
8 a	<p>Functions return values, unlike procedures which do not. [1]</p>		1						
8 b	<p>When you "call" a function you are telling the program to execute that function. [1]</p>		1						
8 c	<p>This function squares the variable number. [1]</p>		1						
9 a	<p>Casting means the changing an entity of one data type into another. [1] E.g. conversion of an integer value into a floating point value or a string.</p>		1						

GCSE Computer Science (9-1) Programming Techniques - Topic Tests

9 b	Item	Data Type	Accept	other naming for types eg real.	8
	Surname	str			
Telephone number	str				
Is the sensor detecting light?	bool				
Number of people in a car	int				
Value of Pi to two decimal places	float				
Postcode	str				
Is the circuit open or closed?	bool				
Population of greenfly	Int				
1 mark for each correct answer.					
10 a	Anything appropriate 1 mark for each.				6
10 b	4 0 1 2 2 9 1 mark for each				6
11 a	No [1] No [1] Yes [1]				3
11 b	No [1] Yes [1] Yes [1] Yes [1]				4 /79