Chhetri Academy

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GCSE COMPUTER SCIENCE

2.2

OCR J277 | Specification point 2.2.1

Programming fundamentals

Untiered

Past paper question booklet

5	2018-2025	Untiered
question groups	available papers	tier

Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

2 A programmer has written an algorithm to output a series of numbers. The algorithm is shown below:

```
01 for k = 1 to 3
02     for p = 1 to 5
03         print (k + p)
04     next p
05 next k
06 m = 7
07 print m * m
```

(a) **(i)** Give the first **three** numbers that will be printed by this algorithm.

..... **[1]**

(ii) State how many times line **03** will be executed if the algorithm runs through once.

..... **[1]**

(b) Identify **two** basic programming constructs that have been used in this algorithm.

1 .....

.....

2 .....

.....

[2]

(c) **(i)** Describe what is meant by a variable.

.....

.....

.....

..... **[2]**

(ii) Identify **two** variables that have been used in the algorithm above.

1 .....

2 .....

[2]

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4 A programmer declares the following variables.

```
first = "Computer Science"
second = "is great"
```

(a) State **one** difference between a variable and a constant.

.....

..... **[1]**

(b) State the output from the following lines of program code.

(i) `print(first.length)`

..... **[1]**

(ii) `print(second.length DIV 3)`

..... **[1]**

(iii) `print(3 ^ 2)`

..... **[1]**

(c) Strings can be concatenated (joined together) using the + operator. For example, `print("Maths " + second)` will output `Maths is great`

Use string manipulation with the variables `first` and/or `second` to produce the following output.

(i) `great`

.....

..... **[1]**

(ii) `Computer`

.....

..... **[1]**

(iii) `Science is great`

.....

..... **[1]**

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4 Jack is writing a program to add up some numbers. His first attempt at the program is shown.

```
a = input("Enter a number")
b = input("Enter a number")
c = input("Enter a number")
d = input("Enter a number")
e = input("Enter a number")
f = (a + b + c + d + e)
print(f)
```

(a) Give **two** ways that the maintainability of this program could be improved.

1 .....

.....

2 .....

.....

[2]

(b) Jack's program uses the addition (+) arithmetic operator. This adds together two numbers.

(i) State the purpose of each of the arithmetic operators in the table.

Arithmetic operator	Purpose
*	
/	

[2]

(ii) Complete the description of programming languages and translators by writing the correct term from the box in each space.

continues	crashes	debugging	error	executable
high-level	interpreter	language	low-level	many
no	one	stops	with	without

Jack writes his program in a ..... language. This needs to be translated into assembly or machine code before it can be executed. This is done using a translator.

One type of translator is an interpreter. This converts one line of code and then executes it, before moving to the next line. It ..... when an error is found, and when corrected continues running from the same position. This translator is helpful when debugging code.

A second type of translator is a compiler. This converts all of the code and produces an error report. The code will not run until there are ..... errors. The ..... file produced can be run ..... the compiler.

[5]

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(c) Jack decides to improve his program. He wants to be able to input how many numbers to add together each time the algorithm runs, and also wants it to calculate and display the average of these numbers.

Write an algorithm to:

- ask the user to input the quantity of numbers they want to enter and read this value as input
- repeatedly take a number as input, until the quantity of numbers the user input has been entered
- calculate and output the total of these numbers
- calculate and output the average of these numbers.

.....

.....

.....

SECTION B

We advise you to spend at least 40 minutes on this section.

Some questions require you to respond using either the OCR Exam Reference Language or a high-level programming language you have studied. These are clearly shown.

1 **(a)** The table contains four statements about programming languages.

Tick (✓) **one** box in each row to identify whether each statement describes a low-level programming language or a high-level programming language.

Statement	Low-level	High-level
The same language can be used on computers that use different hardware		
It allows the user to directly manipulate memory		
It allows the user to write English-like words		
It always needs to be translated into object code or machine code		

[4]

(b) The variables `num1` and `num2` store integers.

Write pseudocode to add the integers stored in `num1` and `num2`. Store the result in a variable with the identifier `total`

.....

..... **[1]**

(c) Three incomplete pseudocode algorithms are given with a description of the purpose of each algorithm.

Write the missing arithmetic operator for each algorithm.

(i) Outputting 12 to the power of 2.

```
print(12 ..... 2)
```

[1]

(ii) Working out if a number is odd or even.

```
number = 53
if number ..... 2 == 0 then
   print("Even number")
else
   print("Odd number")
endif
```

[1]

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(iii) Finding the difference between two measurements.

```
measurement1 = 300

measurement2 = 100

difference = measurement1 ..... measurement2
```

[1]

(d) Read the following pseudocode algorithm:

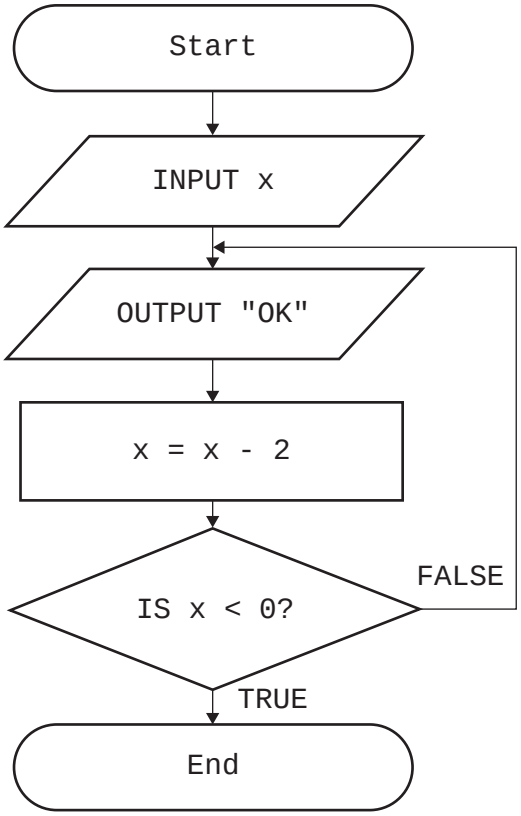
```
01  start = 3
02  do
03    print(start)
04    start = start - 1
05  until start == -1
06  print("Finished")
```

Complete the following trace table for the given algorithm.

Line number	`start`	Output

[3]

2 This flowchart uses iteration.



(a) Complete the table by identifying how many times "OK" will be output for when each value is input.

Input value	Number of times "OK" is output
3	
10	

[2]

(b) Iteration is a programming construct.

(i) Identify **and** describe **two** different examples of iteration that can be used in a high-level language.

1 .....

.....

.....

2 .....

.....

.....

[4]

(ii) Give the names of **two** other programming constructs that are used in a high-level language.

1 .....

2 .....

[2]

(c) A programmer implements the flowchart as a program in a high-level language using an Integrated Development Environment (IDE).

Identify and describe **two** tools that the programmer could use in the IDE to create a program from the flowchart.

Tool 1 .....

Description .....

.....

Tool 2 .....

Description .....

.....

[4]

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