



88147014



International Baccalaureate®  
Baccalauréat International  
Bachillerato Internacional

**COMPUTER SCIENCE  
STANDARD LEVEL  
PAPER 1**

Monday 17 November 2014 (afternoon)

1 hour 30 minutes

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**INSTRUCTIONS TO CANDIDATES**

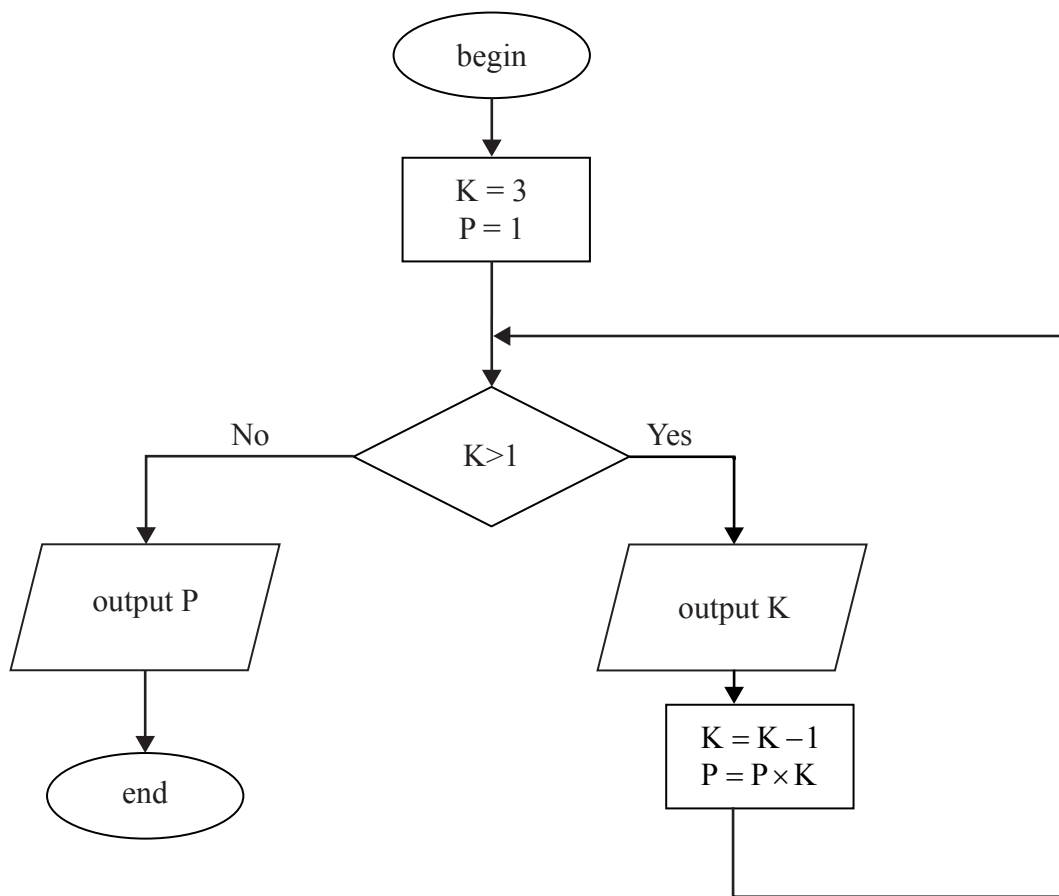
- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer all questions.
- The maximum mark for this examination paper is *[70 marks]*.

## SECTION A

Answer **all** questions.

1. Outline **two** characteristics of spreadsheets. [2]
2. Outline the function of the
  - (a) ALU; [1]
  - (b) CU. [1]
3. Outline the relationship between binary and hexadecimal. [2]
4.
  - (a) Define the term *computer network*. [1]
  - (b) Identify a type of network that would allow secure access from an employee's home to their company's LAN. [1]
  - (c) Outline **two** benefits and **two** problems of employees working from home. [4]
5. Construct the truth table for the following Boolean expression.
$$X = \text{NOT } A \text{ AND } B \text{ OR } A \text{ AND NOT } B$$
 [4]
6. State **three** advantages of using sub-programs in solving programming problems. [3]

7. Consider the following algorithm.



Trace the algorithm and show the outputs that will be produced.

[3]

8. (a) Define the term *protocol*.

[1]

(b) Outline why protocols are necessary.

[2]

## SECTION B

Answer **all** questions.

9. A customer buys an item in a small local shop and pays with a credit card. The sales transaction data is input to a computer at the point of sale. Prices are downloaded every morning from a central computer at the company headquarters. The credit card is verified with the card authorization centre and then the receipt is printed.

- (a) Draw and label a system flow chart to represent this process in the shop. [5]

At the end of the day the sales transaction data is sent to the central computer at the company headquarters.

- (b) Describe the processing that should be carried out at the company headquarters. [2]

All programs and data should be protected from theft, destruction, manipulation and alteration in this process.

- (c) Identify **three** causes of data loss. [3]

- (d) Describe why data loss is a more serious problem than the loss of software or hardware for a sales company. [3]

- (e) Identify **two** methods of preventing data loss. [2]

10. Three IB students are working on a programming project. They have 10 days to complete the work. To plan the project activities and timeline they produce the following Gantt chart.

Project activity	Timeline in days									
	1	2	3	4	5	6	7	8	9	10
Define the problem										
Design algorithms										
Code the program										
Design test data										
Test and correct modules										
Overall program test										
Produce documentation										

- (a) State **two** tasks students should perform to define a problem. [2]
- (b) Identify **two** tools or techniques that students could use to represent algorithms. [1]
- (c) Discuss whether beta testing would be appropriate in this scenario. [3]
- (d) Outline **three** criteria that could be used when deciding which programming language is to be used for coding. [3]
- (e) From the Gantt chart above
- (i) identify **two** tasks that could be done concurrently; [1]
- (ii) identify **two** tasks that should be done sequentially. [1]
- (f) Explain why a Gantt chart may not be suitable for planning a large business project. [4]

11. Consider the array `NUMBERS`.

**NUMBERS**

[0]	[1]	[2]	[3]	[4]	[5]
3.12	43.20	12.45	78.43	13.50	43.67

- (a) (i) Identify the consequence of attempting to output `NUMBERS[6]`. [1]
- (ii) Describe a method of preventing the problem in part (a)(i). [2]
- (b) Construct the algorithm that will output the average of all values in the array `NUMBERS`. [4]

The method `minPos()` determines the index of the smallest value in an array. The method `maxPos()` determines the index of the largest value in an array. For example, `NUMBERS.maxPos()` is 3.

Consider the following algorithm fragment.

```
S=NUMBERS.minPos()
L=NUMBERS.maxPos()
T=NUMBERS[S]
NUMBERS[S]=NUMBERS[L]
NUMBERS[L]=T
```

- (c) (i) Show the contents of the array `NUMBERS` after the algorithm is applied. [2]
- (ii) Deduce the purpose of the algorithm. [2]
- (d) Construct the algorithm for the method `maxPos()`. [4]