International Baccalaureate®
Baccalauréat International
Bachillerato Internacional

COMPUTER SCIENCE
STANDARD LEVEL
PAPER 1

Monday 17 November 2014 (afternoon)

1 hour 30 minutes

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]*.

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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 = NOT A AND B OR A AND NOT B *[4]*

6. State **three** advantages of using sub-programs in solving programming problems. *[3]*

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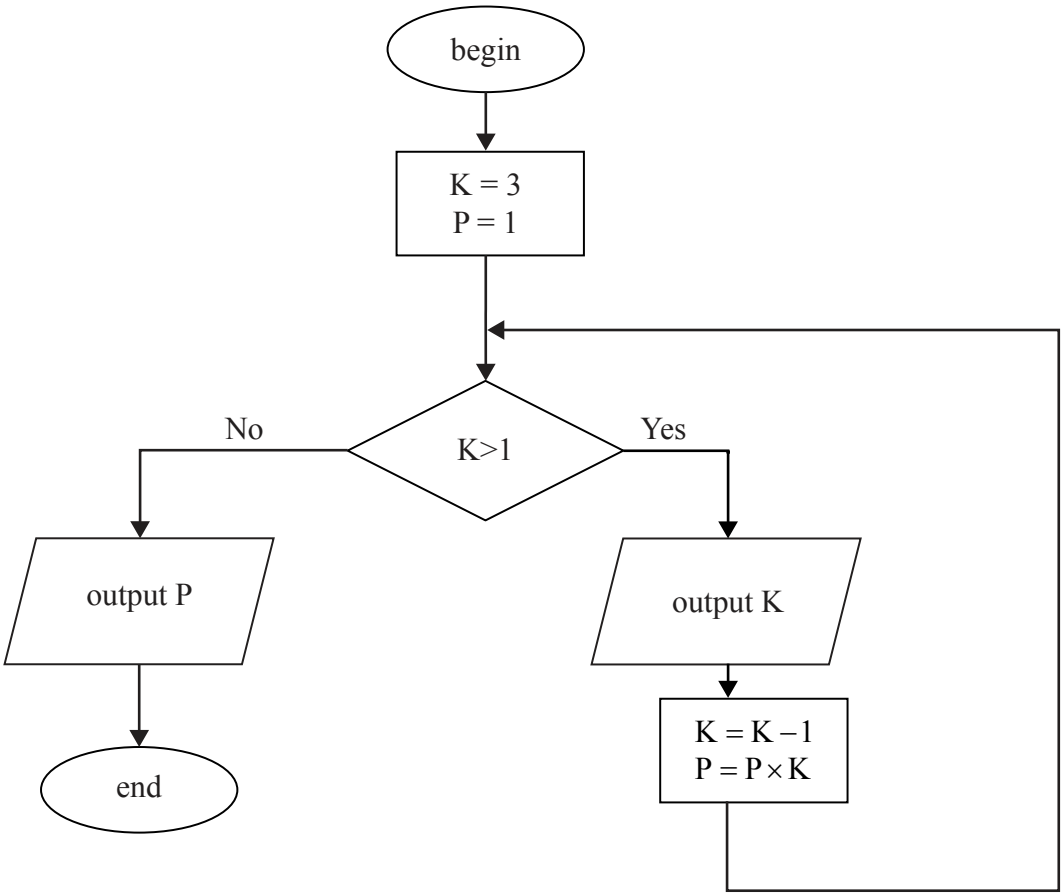
7. Consider the following algorithm.



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]*

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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]*

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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]*

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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]*

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