Write your name here

Surname		Other names

**Pearson Edexcel
Level 1/Level 2 GCSE (9–1)**

Centre Number

Candidate Number

Computer Science
Paper 1: Principles of Computer Science

Monday 14 May 2018 – Morning
Time: 1 hour 40 minutes

Paper Reference
1CP1/01

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- You are not allowed to use a calculator.

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

Pearson

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ⊠. If you change your mind about an answer, put a line through the box ⊠ and then mark your new answer with a cross ⊠.

1 An online quiz asks students questions about computer science topics.

  (a) Images are used in some of the questions.

  (i) An image is 300 pixels high and 200 pixels wide.

  Construct an expression to calculate how many pixels are needed to represent this image.

  (1)

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  (ii) An image file uses 24-bit colour depth.

  Describe how 24-bits are used to represent the colour in the file.

  (3)

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(b) One of the colours used in an image is 'cadet blue'.

'Cadet blue' in binary is 0101 1111 1001 1110 1010 0000

Convert 0101 1111 1001 1110 1010 0000 to hexadecimal.

(3)

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(c) A player earns a badge for every 100 questions they answer correctly, providing this includes at least 10 hard questions or 30 medium questions.

This can be expressed as (NQ >= 100) and (HQ >= 10 or MQ >= 30).

Complete the truth table.

(6)

NQ >= 100	HQ >= 10	MQ >= 30	HQ or MQ	NQ and (HQ or MQ)
0	0	0	0	
0	1	0		0
0	0	1	1	
0	1	1	1	0
1	0	0		0
1	1	0	1	
1	0	1	1	
1	1	1	1	1

(Total for Question 1 = 13 marks)

2 A car has many embedded systems.

(a) An embedded system processes binary numbers.

(i) The speed limit for some roads is 60 miles per hour.

Convert the denary number 60 to 8-bit binary.

(2)

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(ii) The car displays speed limits in denary.

Convert the 8-bit binary number 0010 0011 to denary.

(2)

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(iii) The embedded system adds numbers in binary.

Complete the table to show the result of 0010 0011 + 0100 1010

(2)

0	0	1	0	0	0	1	1
0	1	0	0	1	0	1	0

(b) One example of an embedded system in a car is windscreen wipers that automatically come on when it rains.

(i) Explain how an embedded system could control the headlights of a car.

(3)

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(ii) A bit can have two different states.

State how many bits are needed to represent the 26 capital letters A to Z.

Give a reason for your answer.

(2)

Number of bits

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Reason

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....

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(c) One of the embedded systems in the car collects real-time data.

The data is encrypted.

(i) Identify **one** reason why encryption is used.

(1)

☒ **A** To prevent data corruption

☒ **B** To reduce network transmission times

☒ **C** To keep data secure

☒ **D** To prevent viruses

(ii) Complete the table using a Caesar Cipher algorithm.

(2)

Plain Text	Shift	Cipher Text
brakes	+4	
clutch		a j s r a f

(iii) Explain **one** special condition a Caesar Cipher algorithm must handle.

(2)

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(Total for Question 2 = 16 marks)

3 An organisation that supplies audiobooks over the internet is moving into a new office building.

(a) One reason for networking devices is to provide access to the internet.

(i) Give **two** other reasons for connecting devices to networks.

(2)

1 ....

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2 ....

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(ii) The organisation has chosen wireless connectivity over wired connectivity for its new office building. There is no significant difference in the cost of installing either.

Give **three** reasons why the organisation might prefer wireless connectivity.

(3)

1 ....

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2 ....

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3 ....

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(b) Each audiobook is compressed before it is released.

(i) A lossy compression algorithm reduces the size of a file by removing data.

Explain why data loss is acceptable when using lossy compression.

(2)

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(ii) A run-length encoding (RLE) algorithm reduces the size of a file based on runs of repeated items. For example, wwwbbbwwbbbbbbwwww would be reduced to 3w3b2w6b4w.

Explain why RLE may **NOT** be a good choice for encoding a text file.

(2)

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(c) The organisation calculates how long it takes to transmit the audiobook over the internet.

1 Mbps = 1000^2 bps

1 MB = 1024^2 bytes

The network transmission speed is 54 Mbps.

An audiobook file is 81 MB in size.

Construct an expression to show how many seconds it will take to transmit the audiobook file. Show your unit conversions. You do not have to do the calculations.

(5)

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(Total for Question 3 = 14 marks)

4 A company is developing a computer for use in schools.

(a) All computers have a CPU, memory and storage.

(i) Identify the type of physical storage that uses electronic circuits.

(1)

☒ **A** Solid state

☒ **B** The cloud

☒ **C** Magnetic

☒ **D** Optical

(ii) State what ROM and RAM store.

(2)

ROM

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....

RAM

....

....

(iii) John von Neumann proposed the concept of a stored program.

State the **two** items he proposed to store in main memory.

(2)

1 ....

2 ....

(iv) Identify the part of the CPU that sends signals to the other components.

(1)

☒ **A** Arithmetic logic unit

☒ **B** Control unit

☒ **C** Register

☒ **D** Bus

(b) The computer needs an operating system and utility software.

(i) The operating system controls the scheduling of processes.

Describe how the operating system uses scheduling to allocate processor time.

(2)

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(ii) Identify the function of utility software.

(1)

☒ **A** Repairing secondary storage

☒ **B** Formatting cache memory

☒ **C** Converting files

☒ **D** Translating programs

(Total for Question 4 = 9 marks)

5 A company recycles digital devices. It uses computers and networks in its business.

(a) The company stores details of its business such as recycling statistics on a server.

Users do not all have the same access to files stored on the server.

Explain the type of access to the statistics file a student on work experience at the company should be given.

(2)

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(b) Identify the term that refers to software that is out of date and vulnerable to cyberattack.

(1)

⊠ **A** Unaudited

⊠ **B** Untested

⊠ **C** Unstructured

⊠ **D** Unpatched

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(c) Explain **two** ways in which the improper disposal of digital devices could be harmful to human health.

(4)

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(d) The company is concerned about the security of its own network. It employs a network specialist to secure the network.

(i) Describe what is meant by the term 'penetration testing' when applied to networks.

(2)

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(ii) The network specialist uses a software tool to carry out a code review.

State **two** checks that are carried out during a code review.

(2)

1 ....

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2 ....

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(Total for Question 5 = 11 marks)

6 Programmers write software that controls hardware and interacts with users. Some of this software ensures that networks function properly.

(a) Compilers and interpreters translate source code written in programming languages.

State **four** other features of a compiler.

(4)

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4 ....

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(b) Routers have an important role in how the internet functions.

Describe how a router directs data on the internet.

(5)

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(c) Best case and worst case for search algorithms can be determined based on the number of comparisons necessary to find the target item.

Give the best case and worst case for a binary search algorithm.

(2)

Best case

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Worst case

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(d) Virtualisation uses layers of abstraction to hide the details of hardware devices and processes from the end user.

'Cloud storage can be viewed as a virtualisation.'

Discuss this statement.

(6)

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(Total for Question 6 = 17 marks)

TOTAL FOR PAPER = 80 MARKS

P 5 2 3 9 9 R A 0 1 5 1 6

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