Write your name here

Surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Computer Science

Paper 1: Principles of Computer Science

Sample Assessment Material
Time: 2 hours

Paper Reference
1CP0/01

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- Use of a calculator is **prohibited**.
- **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.*

Information

- The total mark for this paper is 90.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

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 ▶

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S 4 8 1 3 6 A 0 1 2 5

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 Computer scientists use numbers and mathematics in many areas, such as data representation, data transmission, and algorithms.

(a) (i) State the number of bits in a byte.

(1)

.....

(ii) Write an expression to calculate how many different numbers can be represented by an 8-bit binary number.

(1)

.....

(iii) State the number of bytes in these units.

(2)

Kilobyte

.....

Megabyte

.....

(iv) Write an expression to calculate the number of bytes in a gigabyte.

(1)

.....

Computers use sequences of binary digits to represent data.

(v) State **one** other item that computers use binary to represent.

(1)

.....

(b) Computer science uses different types of data representation.

The ASCII code for the character "K" is 75 in denary.

(i) State the ASCII code for "N" in denary.

(1)

.....

The ASCII code for the question mark character "?" in hexadecimal is 3F.

(ii) Convert the hexadecimal number 3F to 8-bit binary.

(2)

.....

(iii) State why hexadecimal representations are used.

(1)

.....

(c) Network data speeds are measured in Mbps or Gbps.

(i) State the meaning of "bps".

(1)

.....

One way of checking for errors during data transmission is by using a parity bit.

A 7-bit binary code is being transmitted with even parity. The original 7 bits are 1010100.

(ii) State the correct parity bit.

(1)

.....

(iii) Explain why you would prefer HTTPS to HTTP for transmitting data, such as banking details, over the Internet.

(2)

.....

.....

.....

.....

Algorithms can keep data secure when transmitted over a network.

(iv) State the name of this class of algorithm.

(1)

.....

(d) Sequences of binary digits make up computer programs.

Complete the table to show which of these are **not** computer programs.

(4)

	Not Computer Programs
TCP/IP	☒
Caesar cipher	☒
Spreadsheet application	☒
Word processor	☒
Programming language	☒
Web browser	☒
Flowchart	☒
Phone app	☒

(Total for Question 1 = 19 marks)

2 Hara and Nara Lee are estate agents. Nara wants to make better use of the computers they have at the office by installing a network.

(a) (i) State **two** advantages of connecting computers using a network.

(2)

1 .....

.....

2 .....

.....

Nara would like to know what different types of network media are available.

(ii) State **two** different types of physical network media.

(2)

1 .....

2 .....

Nara describes some different network topologies and their characteristics.

(iii) Complete the table to show the characteristics of these network topologies.

(4)

Characteristic	**Ring**	**Mesh**	**Star**	**Bus**
A device, such as a switch, sits at the centre	☒	☒	☒	☒
Nodes cooperate to take turns sending data	☒	☒	☒	☒
Performance degrades quickly under heavy loads	☒	☒	☒	☒
May have a dedicated connection between each node and every other node	☒	☒	☒	☒

(b) Hara and Nara decide to have a network installed in their office.

(i) State the purpose of a network protocol.

(1)

.....

.....

MAC addresses contain groups of hexadecimal digits with separators. An example of a MAC address is 70-18-8B-51-6A-FB.

(ii) Give **two** additional features of MAC addresses, not related to their format.

(2)

1 .....

.....

2 .....

.....

IP addresses also contain groups of digits with separators. An example of an IPv6 address is fe80::59a2:dc55:22b:12df%12. An example of an IPv4 address is 192.168.1.97.

(iii) Give **two** additional features of IP addresses, not related to their format.

(2)

1 .....

.....

2 .....

.....

(c) One function of an operating system is file management.

State one other function of operating systems.

(1)

.....

(d) Hara and Nara decide to have a customised software application made for them. Compilers and interpreters translate source code to machine code.

Complete the table to show characteristics of interpreters and compilers.

(4)

	Interpreter	**Compiler**
Translates one source line at a time and executes it	☒	☒
The resulting executable file can be run without the need for additional software	☒	☒
Translates the entire file of source at one time to create a module	☒	☒
Needs a special environment in which to run the source code	☒	☒

(Total for Question 2 = 18 marks)

3 A waterpark uses electronic wristbands that allow access to each ride.

(a) The wristband operates a safety bar across the entrance to a slide. The bar rises to allow each person through.

(i) Select the general term used to describe mechanisms that translate one form of energy to another.

(1)

☒ **A** Switches

☒ **B** Actuators

☒ **C** Registers

☒ **D** Buses

A mechanism automatically recognises when a person reaches the end of the slide.

(ii) Select the general term used to describe mechanisms that either respond to an action or measure a quantity in the physical world.

(1)

☒ **A** Caches

☒ **B** Motors

☒ **C** Logic gates

☒ **D** Sensors

(b) To get a wristband, visitors fill in a form with their name, address, and email address.

(i) Identify a piece of legislation that will affect how the waterpark stores this data.

(1)

.....

.....

The waterpark also stores information about the time it takes each visitor to complete a ride.

(ii) Complete the table to show each pass of a **selection sort** to arrange the numbers into ascending order.

(4)

	2.9	6.7	1.1	4.2
Pass 1				
Pass 2				
Pass 3				
Pass 4				

The waterpark keeps a relational database of the different rides in the park. Here are two tables from this database.

tblRide					
Number	**RideName**	**Thrill**	**Seats**	**Queue**	**Section**
1357	White Waters	10	30	90	596
3642	Deadly Dive	25	10	30	596
6381	Teapot Tilt	5	30	90	596
6398	Alien Altitude	10	20	60	325
6734	Relaxing River	5	200	600	249
8642	Curvy Creek	15	20	60	874
9174	Quiet Cove	5	200	600	655
9612	Dark and Deep	15	20	60	655
9753	Shark's Supper	25	30	90	249

tblSection		
SectionID	**SectionName**	**FirstAider**
249	London	False
325	Paris	True
596	Hamburg	True
655	New York	False
874	Venice	False

A query executed against the two tables produces these results.

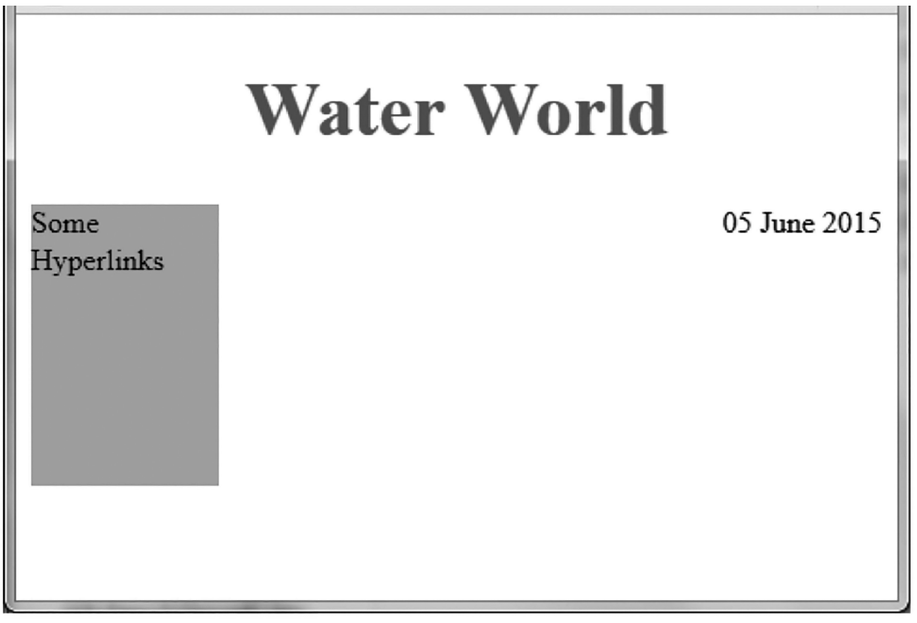
SectionName	RideName	Thrill
Hamburg	Teapot Tilt	5
Hamburg	Deadly Dive	25
Hamburg	White Waters	10
London	Relaxing River	5
London	Shark's Supper	25
New York	Dark and Deep	15
New York	Quiet Cove	5
Paris	Alien Altitude	10
Venice	Curvy Creek	15

(c) Write an SQL statement that would produce these results. The output should be sorted alphabetically by section name.

(3)

The waterpark has its own website.

Here is a page from the website, shown in a web browser.



Here is the HTML code for this web page.

```
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<title>Water World</title>
<link href="myCSS.css" rel="stylesheet" type="text/css" />
</head>

<body>
    <center>
        <h1>Water World</h1>
    </center>

    <div class="date">05 June 2015</div>

    <div class="links">Some Hyperlinks</div>
</body>
</html>
```

Here is the CSS file associated with the page.

```
1
2  @charset "utf-8";
3
4  h1 {font-size:40px;color:green;}
5  .links {height:150px;width:100px;background-color:#0FF;}
6
```

The date must stay in the same position, even when the page is resized. This can be done with a new line of CSS code.

(d) Write the required CSS code.

(2)

.....

.....

Quantum computing is an emerging trend in computing technology.

*(e) Discuss this statement:

Quantum computing has the potential to solve problems beyond the scope of conventional computing.

(6)

(Total for Question 3 = 18 marks)

4 Byron is researching birds, their behaviours, and their songs.

(a) Byron uses a multi-agent-based computational model to simulate the behaviour of birds.

(i) Explain why multi-agent-based modelling is suitable for this scenario.

(2)

.....

.....

.....

.....

Computer programs can also simulate other machines.

(ii) State the general term for a type of computational machine that is a software simulation of a real machine.

(1)

.....

(b) Byron is collecting data to help in his research.

He decides to store the life span of a bird as a real number with a decimal point.

(i) Explain how positive real numbers can be stored in floating point binary.

(4)

Byron wants to save examples of bird songs.

(ii) Complete this sentence.

(1)

Bird songs are ..... signals, which means they are continuous, with values that constantly change.

(iii) Describe the process needed to convert the bird song to a format that can be stored on a computer.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

Byron wants to save images of the birds for publishing on the web.

(iv) Complete this sentence.

(1)

JPEG is a ..... image compression algorithm, which results in a much-reduced file size but also the deletion of data.

Non-physical goods, such as an idea, design, song, or a programming algorithm, are susceptible to being illegally redistributed once they are stored on a computer. They may be covered by copyright, patent, or trademark laws.

(v) State the term for these non-physical goods, which are a result of original creative thought.

(1)

.....

Byron's mobile phone tracks his location.

(c) Describe potential advantages to society of this technology and possible concerns for its use.

(4)

(Total for Question 4 = 17 marks)

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5 Kitty Kamp is an animal shelter for cats. It makes sure the cats are healthy before they are adopted.

When a cat is brought into the shelter, the receptionist enters information into a computerised form. This information is saved in a database and can be sorted.

(a) State **two** additional reasons for saving information in a structured database.

(2)

1 .....

.....

2 .....

.....

(b) When the information is entered, the computer program shows the receptionist which building the cat should be sent to for an initial assessment.

- If the receptionist enters an invalid gender, an error message is displayed and they must enter the gender again.
- Female cats are sent to Building 32 and male cats are sent to Building 16.

(i) State one input and one output for this process.

(2)

Input

.....

.....

Output

.....

.....

(ii) Draw a flowchart showing the logic described in part 5(b).

(5)

The form validates telephone numbers to make sure they are fit for processing. An example of correctly entered data is 01745920043.

All telephone numbers begin with a 0.

(c) State **two** different validation checks that could be used to validate the telephone numbers.

Provide **one** example of test data for each type of check to show the error is caught.

(4)

Type of Check	**Test Data**

BLANK PAGE

Cat health is checked during the assessment. Each individual aspect of health is rated on a scale of 1 to 5, with 1 being the healthiest and 5 being the least healthy.

An algorithm calculates an overall health score for each cat. The score is between 1.0 and 5.0, inclusive.

Weight contributes 50% to the score and teeth contribute 30% to the score. Eyes and ears contribute equally to the total score.

Here is a pseudocode version of the algorithm. Line numbers are not part of the pseudocode.

```
 3  FUNCTION calcHealth (weight, teeth, eyes, ears)
 4  BEGIN FUNCTION
 5      .
 6      .
 7      .
 8
 9      SET health TO 0
10      SET Multiplier TO [50, 30, 30, 10]
11      SET total TO 0
12      SET ht TO 0
13      SET he TO 0
14      SET hr TO 0
15      SET hw TO 0
16
17      SET ht TO teeth * Multiplier[1]
18      SET he TO eyes * Multiplier[2]
19      SET hr TO ears * Multiplier[3]
20      SET hw TO weight * Multiplier[0]
21
22      SET total TO hw + ht + he + hr
23      SET health TO total / 100.0
24
25      RETURN health
26  END FUNCTION
```

Here is a call to the calcHealth function with its input parameters.

```
30  Score = calcHealth (5, 5, 5, 5)
```

(d) Complete the trace table, using this call, to show an error in the algorithm.

(5)

weight	teeth	eyes	ears	ht	he	hr	hw	total	health

(Total for Question 5 = 18 marks)

TOTAL FOR PAPER = 90 MARKS