

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

Pearson Edexcel International Advanced Level

Sample assessment material

Time 1 hour 30 minutes

Paper
reference

WCP01/01

Computer Science

International Advanced Subsidiary

Unit 1: Principles of Computer Science

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.

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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 ☒.

SECTION A

Networks and encryption

1 Which **two** statements are characteristics of IPv4 addresses?

- A They are 128-bits in length and written in hexadecimal.
- B They are physical addresses that identify the location of a device.
- C They are written as four groups of numbers separated in dotted-decimal format.
- D They uniquely identify the host interface.
- E They uniquely identify the manufacturer of a device.

(Total for Question 1 = 2 marks)

2 Give the unit of measurement of latency.

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(Total for Question 2 = 1 mark)

3 Define the term 'asymmetric encryption'.

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(Total for Question 3 = 2 marks)

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4 A cipher key for a monoalphabetic substitution cipher is:

W E A K B C D F G H I J L M N O P Q R S T U V X Y Z

The plaintext to encrypt is:

BINARY

Complete the table to show the ciphertext produced using the cipher key.

Table

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(Total for Question 4 = 2 marks)

5 Explain **one** way a monoalphabetic substitution cipher is vulnerable to decryption by brute force.

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(Total for Question 5 = 2 marks)

6 Explain **one** characteristic of a Vernam cipher that makes it unbreakable.

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(Total for Question 6 = 2 marks)

TOTAL FOR SECTION A = 11 MARKS

SECTION B

Structuring data

7 Give **two** types of static data structure.

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2

(Total for Question 7 = 2 marks)

8 The program code is executed on a dictionary data structure named `cities`.

Program code

```
1 del cities["Berlin"]
2 cities["London"] = 12
3 cities["Shanghai"] = cities["Singapore"]
```

The dictionary `cities` initially contains four key-value pairs.

Cities

Berlin	9
London	11
Singapore	6
Delhi	10

Complete the table to show the updated key-value pairs in the dictionary `cities`.

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You may not need to use all the rows and cells.

Table

(Total for Question 8 = 3 marks)

9 A request is made to delete a key-value pair from a dictionary.

Describe the process of searching the dictionary for the key-value pair.

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(Total for Question 9 = 2 marks)

10 Explain **one** way referential integrity is maintained in a database.

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(Total for Question 10 = 2 marks)

TOTAL FOR SECTION B = 9 MARKS

SECTION C

Data representation

11 Convert the 8-bit binary value 0111 1011 to hexadecimal.

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(Total for Question 11 = 2 marks)

12 Give **two** characteristics of the UTF-8 character encoding system.

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(Total for Question 12 = 2 marks)

13 Describe **one** process that could cause an underflow error.

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(Total for Question 13 = 2 marks)

14 Signed numbers can be represented in a fixed-point binary format.

The 10-bit signed number is in fixed-point binary format.

Signed number

0	1	0	1	1	0	•	1	0	1	0
---	---	---	---	---	---	---	---	---	---	---

Convert the signed number to denary.

Show your workings.

Answer

(Total for Question 14 = 2 marks)

15 Computers only use binary addition to carry out subtraction.

Calculate the result of the expression:

$$-44 - 11$$

Work in two's complement 8-bit binary throughout.

Show your workings.

Answer

(Total for Question 15 = 6 marks)

TOTAL FOR SECTION C = 14 MARKS

SECTION D

Enabling technologies

16 The five Vs are characteristics that make big data different to other data.

Give **two** of the five Vs of big data.

- 1
- 2

(Total for Question 16 = 2 marks)

17 Large language models (LLM) are trained using large data sets.

Explain **one** way bias can be avoided when training a large language model.

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(Total for Question 17 = 2 marks)

18 Explain **one** benefit of using unsupervised learning to train a machine learning (ML) model.

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(Total for Question 18 = 2 marks)

TOTAL FOR SECTION D = 6 MARKS

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SECTION E**Problem solving**

19 The truth table shows the output for a Boolean operator.

Truth table

Input A	Input B	Output Q
0	0	0
0	1	1
1	0	1
1	1	0

Which is the correct Boolean operator for the truth table?

- A** AND
- B** NAND
- C** NOR
- D** XOR

(Total for Question 19 = 1 mark)

20 Define the term 'algorithm'.

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(Total for Question 20 = 1 mark)

21 A binary search algorithm requires the data in an array to be sorted into order.

Give the name of **one** algorithm that should be used to find the position of an element in an unsorted array.

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(Total for Question 21 = 1 mark)

22 Which statement is always true of the procedural programming paradigm?

- A It uses a low level of abstraction.
- B It uses imperative commands.
- C It uses logical schemas.
- D It uses no flow control.

(Total for Question 22 = 1 mark)

23 Explain **one** benefit of using the declarative programming paradigm.

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(Total for Question 23 = 2 marks)

24 The algorithm calculates the factorial of a number.

Algorithm

```
1 def factorial(n):  
2     if n == 0:  
3         return 1  
4     else:  
5         return n * factorial(n-1)
```

Give the name of the problem-solving technique used by the algorithm.

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(Total for Question 24 = 1 mark)

25 The algorithm outputs how many times a target value appears in an array.

Algorithm

```
1 times = [14, 8, 6, 14, 20, 10, 14, 20]
2 search_target = 14
3 index = 0
4 count = 0
5
6 while index < 8:
7     if times[index] == search_target:
8         count = count + 1
9         index = index + 1
12
11 print("The target appears", count, "times")
```

An error occurs if additional items are added to the array in line 1 of the algorithm.

Explain the type of error that occurs.

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(Total for Question 25 = 2 marks)

26 The program is for a binary search.

Program

```
1 distances = [1.2, 1.6, 2.11, 2.8, 3.08, 3.47, 3.61, 3.7, 3.93, 4.22, 4.85]
2 lower = 0
3 upper = len(distances) - 1
4 mid = 0
5 found = False
6
7 target = float(input("Please enter the number you want to search for "))
8
9 while index < 8:
10     mid = (lower + upper)//2
11     if distances[mid] == target:
12         found = True
13     elif distances[mid] < target:
14         lower = mid + 1
15     else:
16         upper = mid - 1
17
18 if found:
19     print("{} was found at position {}".format(target, mid))
20 else:
21     print("{} does not appear in the data".format(target))
```

Complete the table using the program for the binary search to:

- trace the execution of the program with the input data 3.7
- give the output of the program.

27 A car has a warning system. The warning system sounds an alarm if a sensor detects at least one of these conditions:

- there is an object behind the car when the car is reversing
- there is a vehicle in the lane the car is indicating a move to.

The symbols used to represent the warning system are:

Warning system symbols

Symbol	True when
Q	the alarm sounds
A	there are no objects behind the car
B	the car is reversing
C	there is no vehicle in the lane the car is moving to
D	the car is indicating

Construct a Boolean expression for the warning system using the symbols.

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(Total for Question 27 = 4 marks)

28 The partially completed flowchart is for an algorithm. The algorithm converts a denary integer into its binary value using repeated division. It outputs the result as a string.

The variables used are:

- dNum stores the positive denary integer
- bStr stores the binary string
- rem stores the remainder after each division.

Complete the flowchart by adding the **three** missing operations.

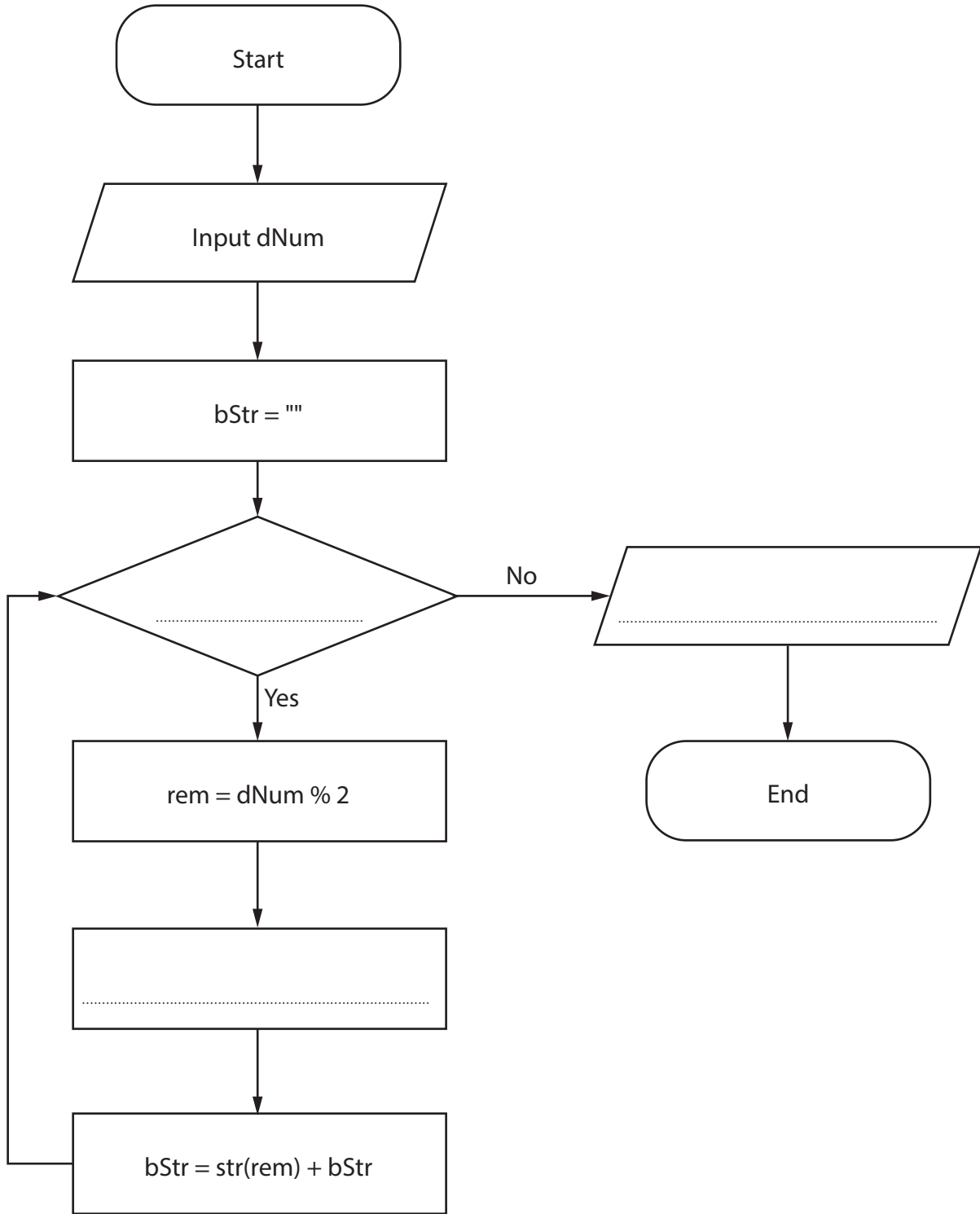
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Flowchart



(Total for Question 28 = 3 marks)

TOTAL FOR SECTION E = 20 MARKS

SECTION F

Computer systems

29 Give **two** benefits of the stored-program concept.

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(Total for Question 29 = 2 marks)

30 Two purposes of an operating system (OS) are memory management and multitasking.

Give **two other** purposes of an operating system.

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(Total for Question 30 = 2 marks)

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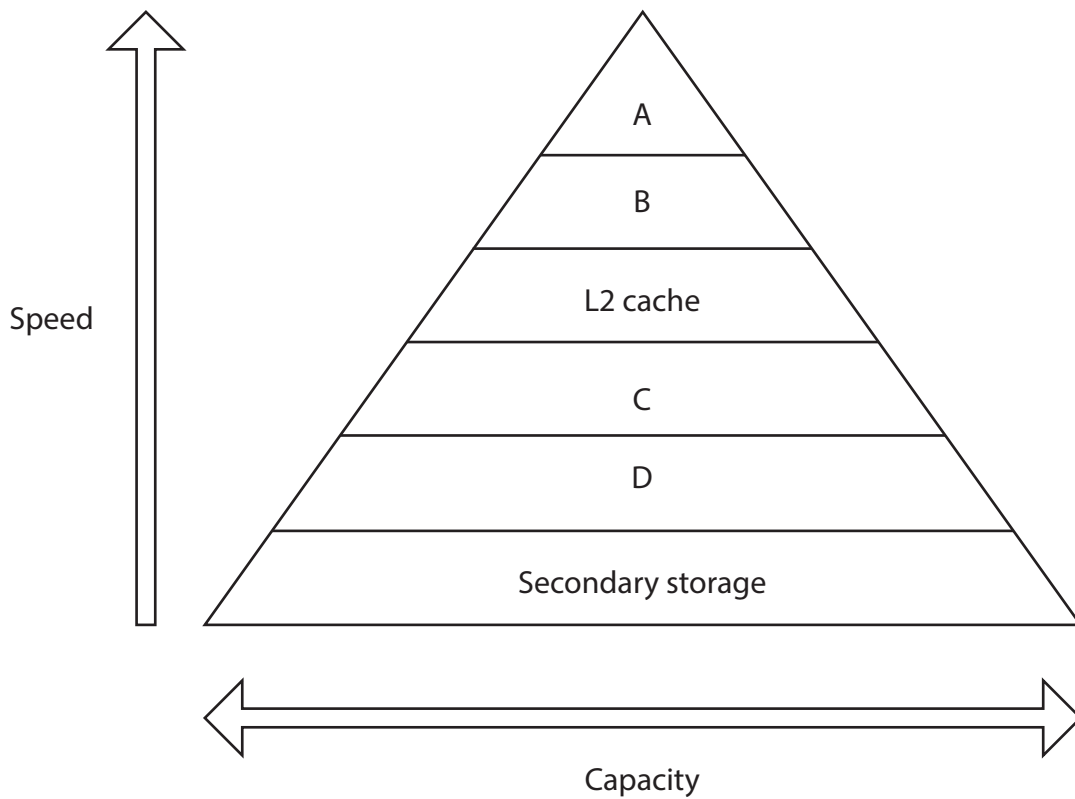
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31 In a laptop, the memory holds executing processes and their data.

The labelled diagram shows the memory hierarchy. It is arranged in order of increasing speed and decreasing capacity.

Memory hierarchy



Complete the table by adding the type of memory for the **four** labels in the memory hierarchy.

Table

Label	Type of memory
A	
B	
C	
D	

(Total for Question 31 = 2 marks)

32 The table shows some of the steps in handling an interrupt received as part of multitasking.

Complete the table by adding the **two** missing steps.

Table

1	Suspends the currently executing process
2
3	Services the interrupt
4
5	Resumes executing the suspended process

(Total for Question 32 = 2 marks)

33 Errors can occur when data is transmitted.

Explain **one** reason skew only affects parallel data transmission.

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(Total for Question 33 = 2 marks)

34 An operating system (OS) allocates and deallocates memory as part of memory management.

Outline how segmentation is used in memory management.

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(Total for Question 34 = 2 marks)

35 One component of the central processing unit (CPU) is the memory buffer register (MBR).

Explain **one** reason the MBR is needed.

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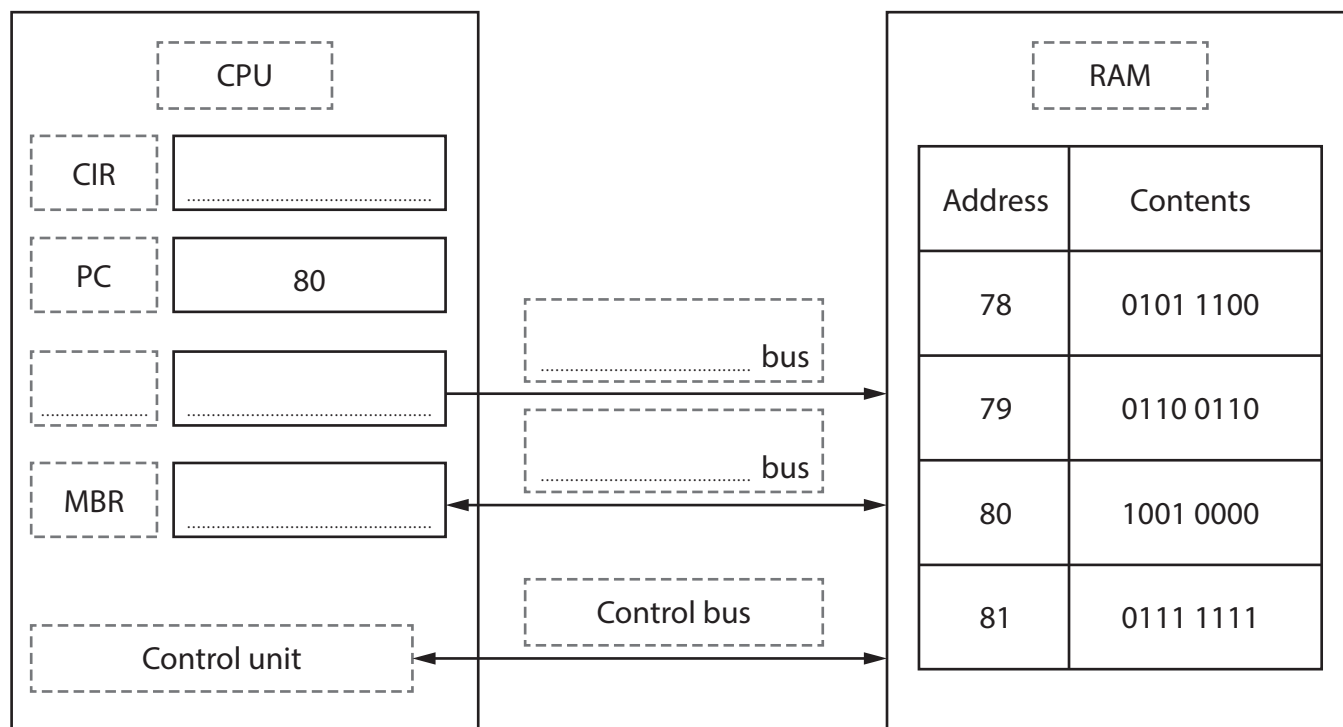
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(Total for Question 35 = 2 marks)

36 The partially completed diagram shows the components of a computer system. The components are used in the fetch-decode-execute (FDE) cycle.

Complete the diagram by adding the **six** missing items to show the next instruction being fetched.

Diagram



(Total for Question 36 = 6 marks)

TOTAL FOR SECTION F = 20 MARKS
TOTAL FOR PAPER = 80 MARKS