GradeMax

* 0000800000001 * DFD

CAMBRIDGE
International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

* 5 9 7 8 2 6 3 6 9 4 *

COMPUTER SCIENCE **9618/11**

Paper 1 Theory Fundamentals **May/June 2026**

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- You may use an HB pencil for any diagrams, graphs or rough working.
- Calculators must **not** be used in this paper.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].
- No marks will be awarded for using brand names of software packages or hardware.

This document has **16** pages. Any blank pages are indicated.

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1 A computer can store numbers and text in binary.

(a) The computer uses the UNICODE character set.

(i) Complete the table by calculating the missing values.

character	denary	binary	hexadecimal
⁘		0001 1110 1001	1E9
@	64		40
Ώ	911	0011 1000 1111	
⩔		0001 0101 1101 0110	15D6

[4]

working space .....

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(ii) Identify **one** other character set and explain how it is different from UNICODE.

character set .....

differences .....

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(b) The computer also uses two's complement.

Convert the 8-bit two's complement binary integer 01101011 into denary.

..... [1]

(c) Show how the denary number 30 is subtracted from the binary number 01101011 using binary subtraction.

Show your working.

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..... [2]

(d) Identify **two** differences between binary prefixes and decimal prefixes.

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2 .....

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[2]

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2 A computer programmer uses language translators. Two types of translator are an interpreter and a compiler.

(a) Explain why language translators are needed when programming.

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..... [2]

(b) Describe **two** benefits of using an interpreter instead of a compiler when developing a program.

1 .....

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2 .....

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[4]

(c) Identify **one** other type of translator.

..... [1]

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(d) The completed computer program is distributed under a licence.

Complete the table by writing the name of each software licence that is described.

software licence	description
	The software is released on a trial period. After the trial period ends, a fee may be required to continue using the software.
	The software is purchased for a fee. There is no access to the source code.
	The software is released with the source code. The software can be changed and distributed with the changes under the same licence restrictions.

[3]

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3 The following table shows part of the instruction set for a processor. The processor has two registers: the Accumulator (ACC) and an Index Register (IX).

instruction		explanation
opcode	**operand**	
LDM	#n	Immediate addressing. Load the number n to ACC
LDD	<address>	Direct addressing. Load the contents of the location at the given address to ACC
INC	<register>	Add 1 to the contents of the register (ACC or IX)
STO	<address>	Store the contents of ACC at the given address
ADD	#n / Bn / &n	Add the number n to the ACC
ADD	<address>	Add the contents of the given address to the ACC
DEC	<register>	Subtract 1 from the contents of the register (ACC or IX)
END		Return control to the operating system

<address> can be an absolute or symbolic address
# denotes a denary number, e.g. #123
B denotes a binary number, e.g. B01001010
& denotes a hexadecimal number, e.g. &4A

The current contents of memory are:

address	data
100	200
101	205
102	100
103	50
...	
200	101
201	100
202	20
203	13
204	220
205	30

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(a) Complete the table to identify the data that will be stored in the accumulator after each set of instructions has been executed.

accumulator current data	set of instructions	new accumulator data
B11001010	ADD B00000010 INC ACC	
#100	LDM #200 ADD 200	
#103	LDD 103 DEC ACC DEC ACC	

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(b) The instruction set also contains the following instructions:

instruction		explanation
opcode	**operand**	
AND	#n / Bn / &n	Bitwise AND operation of the contents of ACC with the operand
AND	<address>	Bitwise AND operation of the contents of ACC with the contents of <address>
XOR	#n / Bn / &n	Bitwise XOR operation of the contents of ACC with the operand
XOR	<address>	Bitwise XOR operation of the contents of ACC with the contents of <address>
OR	#n / Bn / &n	Bitwise OR operation of the contents of ACC with the operand
OR	<address>	Bitwise OR operation of the contents of ACC with the contents of <address>
LSL	#n	Bits in ACC are shifted logically n places to the left. Zeros are introduced on the right hand end
LSR	#n	Bits in ACC are shifted logically n places to the right. Zeros are introduced on the left hand end
CSL	#n	Bits in ACC are shifted n places to the left using a cyclic shift
CSR	#n	Bits in ACC are shifted n places to the right using a cyclic shift
ASL	#n	Bits in ACC are shifted n places to the left using an arithmetic shift
ASR	#n	Bits in ACC are shifted n places to the right using an arithmetic shift
<address> can be an absolute or symbolic address # denotes a denary number, e.g. #123 B denotes a binary number, e.g. B01001010 & denotes a hexadecimal number, e.g. &4A		

(i) Write the bit manipulation instruction that will set the ACC to &0

..... [2]

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(ii) The ACC currently contains the following binary value.

0	0	1	1	0	1	0	1

Write the result after the instruction `LSR #3` is run.

[1]

(c) Immediate, relative and direct are three modes of addressing used in assembly language programming.

Identify and describe **one** additional mode of addressing used in assembly language programming.

Include an example of an instruction that uses your selected mode of addressing in your answer.

mode of addressing .....

description with example .....

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4 A shop allows customers to pay to borrow toys. The shop uses a database to record information about the customers and the toys they have borrowed.

CUSTOMER(CustomerID, ContactFirstName, Phone)

TOY(ToyID, ToyName, CostPerDay)

TOY_INSTANCE(UniqueToyID, ToyID, Quality)

BORROW(BorrowID, CustomerID, UniqueToyID, StartDate, NumberDays)

(a) Complete the table by describing the relationship between each pair of tables. Include the primary key(s) and foreign key(s) and how these create each relationship.

pair of tables	description of relationship
CUSTOMER and BORROW	.....
TOY_INSTANCE and TOY	.....

[4]

(b) Write a Structured Query Language (SQL) script to return the total number of days of all toys borrowed by each customer. The customer ID and first name for each customer also need to be returned.

The result needs to include a suitable field name for the total number of days.

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..... [4]

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(c) The table BORROW needs amending to include an additional field.

(i) The field will store whether the toy has been returned and will store either Yes or No.

Write an SQL script to include the additional field in the table BORROW.

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..... [2]

(ii) The toy that was borrowed with the borrow ID A2226 has been returned.

Write an SQL script to amend the record and store that the toy has been returned.

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..... [3]

(d) When data is entered into the database it is validated and verified.

(i) Explain how validation and verification support data integrity within a database.

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..... [4]

(ii) Give **one** reason why data may still be incorrect even after it passes validation and verification.

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..... [1]

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5 A school needs to create a new logo. The logo can be created as a bitmap image or a vector graphic.

(a) Explain how a bitmap image is encoded in a computer.

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..... [3]

(b) Complete the description of a vector graphic by writing the missing terms.

A ..... is an individual element of an image, for example: a line, a square.

A ..... is an attribute of one part of the image, for example: a line colour, the width of a line.

A ..... is all of the elements that are included in the vector graphic.

[3]

(c) Tick (✓) **one** box to identify whether a bitmap image or a vector graphic will be most appropriate for the school logo.

Justify your choice.

	tick (✓)
bitmap image	
vector graphic	

justification .....

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..... [3]

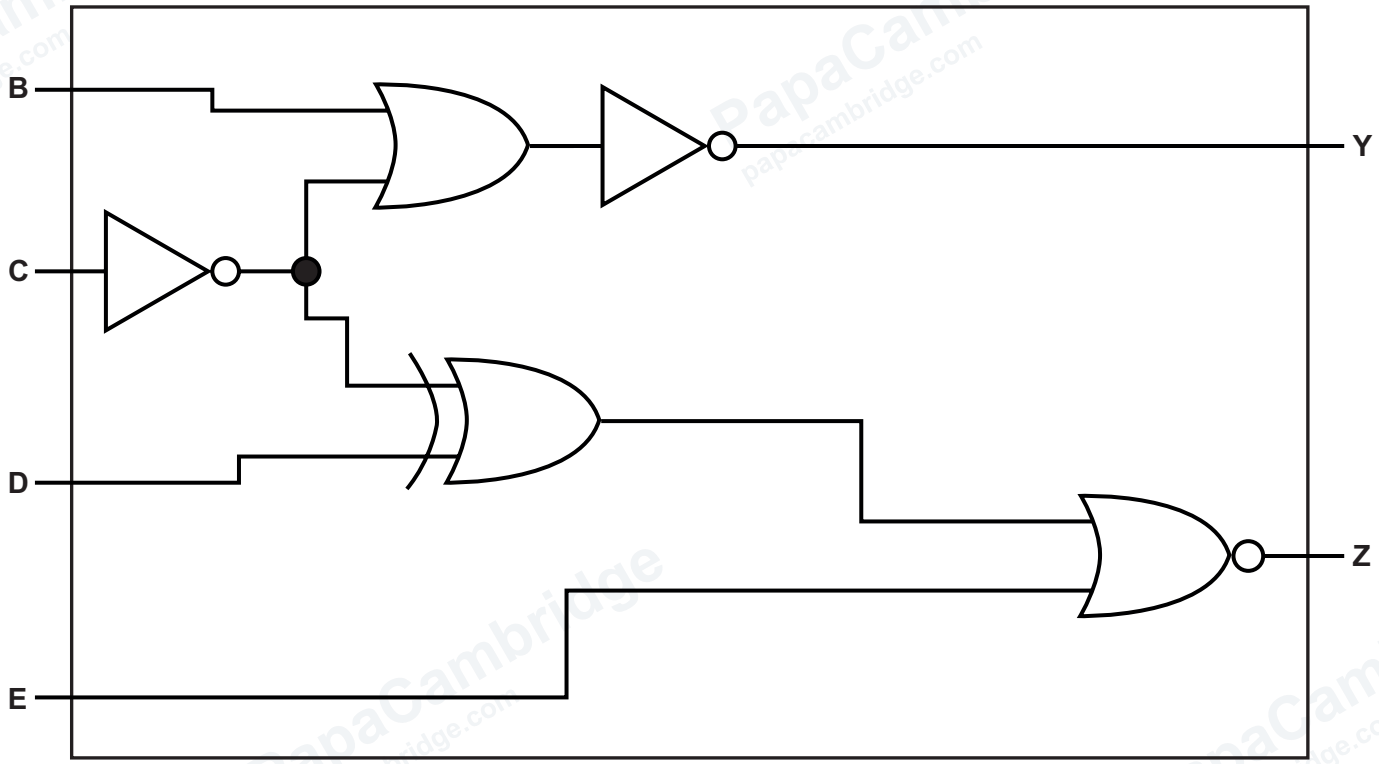
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6 **(a)** Write the logic expressions for the following logic circuit.



Y = ...

Z = ...

[2]

(b) Create and complete the truth table for a two-input NAND gate.

[2]

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7 A networked computer game competition takes place in a school.

The game is hosted on a server on the school LAN (local area network). Each competitor logs on using their own computer.

(a) The game runs as a thin-client.

Give **two** characteristics of a thin-client system.

1 .....

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2 .....

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[2]

(b) One part of the school's LAN is a wired bus topology.

(i) Explain how data is transmitted between two nodes in a bus topology using Ethernet.

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..... [5]

(ii) Give **two** drawbacks of using a bus topology.

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[2]

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(c) Each of the school's computers has a static private IP address.

(i) State what is meant by a static private IP address.

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..... [1]

(ii) The school's network uses subnetting.

Give **three** benefits of using subnetting in a network.

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[3]

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