GradeMax

* 0000800000001 * DFD

CAMBRIDGE
International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

* 1 8 4 6 8 4 2 0 7 8 *

COMPUTER SCIENCE **9618/13**

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.

DC (WW/CGW) 363105/2
© Cambridge University Press & Assessment 2026

[Turn over

GradeMax

1 Validation and verification can be used to protect the integrity of data.

Complete the description of methods of ensuring data integrity by writing the missing terms.

..... is a method of verification where the data is entered by a user and then manually compared to the original data to make sure that they are the same.

A verification method used during data transfer calculates a value from the data which is transferred with the data. The receiver performs the same calculation and compares the result with the value transferred.
This method of verification is ..... .

There are several methods of data validation. ..... check compares the data entered to a list of possible values that can be entered. If the data is not one of these values it is rejected.

..... check can be used to make sure data entered has the correct combination of letters, numbers and symbols. For example, a code may need to be two capital letters, one number followed by one symbol.

..... check is used to make sure the correct quantity of characters has been entered. For example, a name must be more than one character and less than or equal to 100 characters.

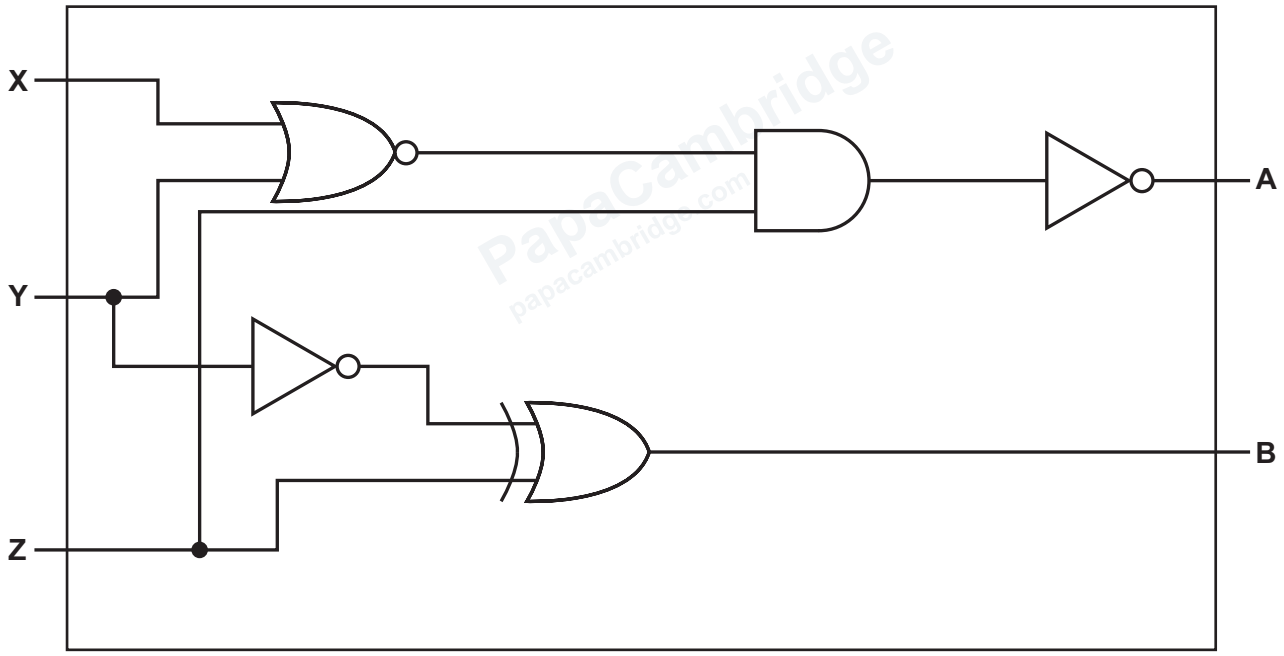
[5]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

2 **(a)** Complete the truth table for the given logic circuit.



X	Y	Z	working space	A	B
0	0	0			
0	0	1			
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

[2]

(b) State **two** logic gates that are not in the circuit in **2(a)**.

..... [1]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

3 An animation is a sequence of bitmap images with a sound recording played at the same time.

(a) The sound is recorded with a sampling resolution of 2 bytes.

State what is meant by a sampling resolution of 2 bytes.

.....

..... [1]

(b) **(i)** Explain how the data for the bitmapped images are encoded.

.....

.....

.....

.....

.....

..... [3]

(ii) The bitmap images have a bit depth of 2 bytes. Each image is 2048 pixels wide by 1536 pixels high. One second of video contains eight individual bitmap images.

There is no sound recording in this part of the video.

Calculate an estimate for the file size of one second of the video in mebibytes (MiB). Show all of your working.

working: .....

.....

.....

.....

answer ..... MiB

[2]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

(c) The sound and images are compressed independently before being transmitted over the internet to public cloud storage.

(i) Explain the different ways that lossless compression can be used to compress the images and the sound file.

image file .....

.....

.....

.....

sound file .....

.....

.....

.....

[4]

(ii) State what is meant by a public cloud.

.....

..... [1]

(iii) Give **two** benefits to the animation creator of using public cloud storage for the animation.

1 .....

.....

2 .....

.....

[2]

DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

4 A database needs designing for a school library.

The library stores data about books including the author, title, category and number of pages.

The library will also store data about the students and the books they have borrowed. The data needs to include the student's name and student's class.

Books are borrowed for 14 days. A book is late if it has not been returned within the 14 days. The database needs to store whether the book is late, or not late.

(a) Create a 3-table design for the library database normalised to Third Normal Form (3NF).

Give your table design in the format:

`TableName(Field1, Field2, Field3, …)`

A primary key is underlined with a solid line.

A foreign key is underlined with a broken line.

table 1 .....

.....

.....

table 2 .....

.....

.....

table 3 .....

.....

..... [6]

(b) Explain the reasons why the library database should enforce referential integrity.

.....

.....

.....

..... [2]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

Turn over

© Cambridge University Press & Assessment 2026

(c) The school is also creating a database to store data about the departments, the staff and classes in the school. The database is called SCHOOLDATA. The database has four tables:

STAFF(StaffID, FirstName, FamilyName, DepartmentID)

DEPARTMENT(DepartmentID, DepartmentName, DepartmentLeader)

CLASS(ClassID, YearGroup, SubjectCode)

SUBJECT(SubjectCode, SubjectName, DepartmentID)

(i) The table shows some sample data for SUBJECT.

SubjectCode	SubjectName	DepartmentID
CS1	Computer Science IGCSE	ITCS
CS2	Computer Science IAS-level	ITCS
MA3	Mathematics IGCSE	MTS
ME4	Media IGCSE	ITCS

The Structured Query Language (SQL) scripts to create the database and the table SUBJECT are shown.

```
01    CREATE DATA BASE SCHOOLDATA;
02    CREATE TABLE SUBJECT(
03          SubjectCode VARCHAR NONULL,
04          SubjectName VARCHAR
05          DepartmentID VARCHAR,
06          PRIMARY KEY (SubjectCode),
07          FOREIGN KEY (DepartmentID) REFERENCES (DepartmentID)
08    );
```

The SQL scripts contain **four** errors.

Give the line number of each error and the corrected line.

error line 1 .....

corrected line .....

error line 2 .....

corrected line .....

error line 3 .....

corrected line .....

error line 4 .....

corrected line .....

[4]

© Cambridge University Press & Assessment 2026

DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN

GradeMax

(ii) Write an SQL script to return each department's name and the number of subject codes for that department.

The result needs to include a suitable field name for the number of subject codes.

Order the results in ascending order of department name.

.....

.....

.....

.....

.....

.....

.....

..... [5]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

PapaCambridge papacambridge.com

GradeMax

5 A student uses a laptop for school work. The laptop contains system software including an Operating System (OS) and utility software.

(a) Hardware management is one key management task that the OS performs.

(i) Identify **two** tasks the OS performs as part of hardware management.

1 .....

2 .....

[2]

(ii) Identify **two** other key management tasks that the OS performs.

1 .....

2 .....

[2]

(b) A disk formatter is an example of utility software.

(i) State the purpose of utility software in a computer.

.....

..... [1]

(ii) Describe the purpose of a disk formatter.

.....

.....

.....

..... [2]

(c) The student is writing a computer program in a high-level language.

The student imports routines from program libraries into their program.

(i) Define the term program library.

.....

..... [1]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

(ii) Describe **one** benefit of the student using a Dynamic Link Library (DLL) instead of a non-Dynamic Link Library.

.....

.....

.....

..... [2]

6 **(a)** Draw **one or more** lines to match each denary number with its equivalent unsigned binary, hexadecimal or Binary Coded Decimal (BCD) value(s).

Denary number	Equivalent unsigned value
	Hexadecimal: 121
3120	BCD: 0001010100001010001
289	Binary: 110000110000
22516	Hexadecimal: 57F4
15851	Binary: 11110111101011
	BCD: 0011000100100000

[4]

DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

(b) Complete the binary addition. Show all of your working.

```
  1101010011111
+ 1111111001111
```

[2]

(c) Convert the two's complement integer 011010110001 into denary.

.....

..... [1]

(d) Tick (✓) **one** box to identify the smallest integer that can be represented by a 16-bit two's complement integer.

- ☐ 0000000000000000
- ☐ 1111111111111111
- ☐ 0111111111111110
- ☐ 1000000000000000

[1]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

7 A program is written in assembly language.

(a) Complete the table by writing the name of each mode of addressing.

mode of addressing	description
	The operand is an address where the data is stored.
	The operand is an address that stores the address where the data is stored.
	The operand is an address. The address where the data is stored is calculated by adding the operand to the content of the index register.
	The operand is the data to be used.

[4]

(b) Explain how bit manipulation can be used to monitor or control a device.

.....

.....

.....

.....

.....

..... [3]

(c) Identify **one** similarity and **one** difference between a right logical shift and a right arithmetic shift.

similarity .....

.....

difference .....

.....

[2]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

GradeMax

8 A computer is used to record sound.

(a) The computer has Programmable Read Only Memory (PROM).

Complete the table by naming and describing two other types of ROM.

type of ROM	description
	....
	....

[4]

(b) The sound is recorded using a microphone.

Describe the principal operation of a microphone.

.... [3]

DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

(c) The computer outputs the sound through external speakers. The computer transfers the data to a buffer before the speakers output the sound.

Describe the purpose of the buffer.

.....

.....

.....

.....

.....

..... [3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

BLANK PAGE

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (Cambridge University Press & Assessment) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in our Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge International Education is the name of our awarding body and a part of Cambridge University Press & Assessment, which is a department of the University of Cambridge.

© Cambridge University Press & Assessment 2026