Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME	

			CANDIDATE NUMBER	
CENTRE NUMBER				

INFORMATION TECHNOLOGY 9626/12

Paper 1 Theory **May/June 2019**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Calculators must not be used on this paper.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

Any businesses described in this paper are entirely fictitious.

This document consists of **18** printed pages and **2** blank pages.

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International Education

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1   Tick the **four** statements referring to asymmetric encryption which are true.

	✓
It is often referred to as public key encryption	
It uses a pair of keys, a public key and a private key	
The public key and the private key are published to everyone who wants to send a message	
Anyone with a copy of the public key can read encrypted data	
It is possible to deduce the private key from the public key	
SSL is a protocol that uses asymmetric encryption	
Keys used in symmetric encryption are longer, compared to asymmetric keys	
Asymmetric encryption is slower to convert than symmetric encryption and requires far more processing power	
Digital certificates are not used with asymmetric encryption	
The use of an asymmetric key algorithm always ensures security of a message	

[4]

2   Tick the **four** statements referring to malware which are true.

	✓
A virus corrupts files but does not delete them	
Ransomware continually deletes files until a ransom is paid	
One purpose of releasing a worm is to occupy as much bandwidth in a network as possible	
Ransomware is often initiated by means of a trojan horse	
A trojan horse is a type of malware within an email attachment that is downloaded without the user understanding the consequences	
Spyware is a type of software that removes key loggers from a hard disk	
Adware is additional software attached to a virus when it is downloaded	
Malicious bots are never used to instigate a SPAM attack	
A rootkit enables a hacker to gain administrator rights in a victim's computer	
A trojan horse just enables a virus to be transmitted. It never deletes data itself	

[4]

3 People in a village are aware that the local river is being polluted. They are concerned that this is being caused by a nearby factory.

Describe how computers and sensors could be used to monitor the level of pollution in the river in order to determine whether the factory is responsible for the pollution.

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4   Some people get confused when trying to establish what is data, information or knowledge. The sequence of numbers 192.168.1.254 could be an example of data.

Using this example, or another of your choice, explain how data, information and knowledge are linked.

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5 A large company with branches in many countries has decided to install a Virtual Private Network (VPN).

(a) Describe the purpose of such a network.

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(b) Explain how it achieves this purpose.

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6 Video-conferencing is a commonly used method of communication. It has affected different sections of society.

Describe **two** effects of video-conferencing for each of the following groups of people:

Legislators (government members who make legislation or laws)

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Business people

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Television news presenters

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7 Relational databases can have many components and properties.

(a) Describe what is meant by the following terms:

(i) Primary key ....

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(ii) Foreign key ....

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(iii) Compound key ....

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(b) Explain why referential integrity is important in a relational database.

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8 The owners of a bank are considering changing its system of reading cheques from Magnetic Ink Character Recognition (MICR) to Optical Character Recognition (OCR).

Give **two** advantages and **two** disadvantages of using OCR instead of MICR.

Advantage 1 ....

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Advantage 2 ....

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Disadvantage 1 ....

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Disadvantage 2 ....

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9 An expert system consists of many components.

Describe how the knowledge base is used to interact with the other components when an expert system is used to solve a problem.

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10 An examinations officer has created a spreadsheet containing a list of students and their dates of birth. It will be used to calculate each student's age in years. This is the age that they will be on the date of a science exam which is on 21/05/2019.

	A	B	C	D	E	F	G	H
1								
2	Family name	First name	Date of birth (dd/mm/yyyy)	Age	Number of exams entered for		21/05/2019	
3								
4	Purewal	Sandeep	17/05/2002	17	4		6	number of students aged 17 taking 3 exams
5	Jones	Ieuan	15/10/2001	17	3		4	number of students aged 16 taking 4 exams
6	Astle	Roberta	21/07/2002	16	4			
7	Herreira	David	10/08/2002	16	4			
8	Maninga	Jeff	17/09/2001	17	3			
9	Charlton	Leona	08/03/2002	17	4			
10	van Gaal	Ruud	09/02/2002	17	4			
11	Alonso	Maria	17/11/2001	17	3			
12	Lagat	Mary	10/11/2001	17	3			
13	Kibaki	Robert	13/04/2002	17	4			
14	Mbabasi	Apolo	30/06/2002	16	5			
15	Dansua	Albert	24/06/2002	16	4			
16	Kirshwan	Kiran	30/08/2002	16	3			
17	Patel	Alpa	15/03/2002	17	4			
18	Bhutto	Waseem	14/09/2001	17	3			
19	Abbasi	Akhtar	18/12/2001	17	4			
20	Kunwar	Ishwar	16/01/2002	17	3			
21	al-Hafi	Saad	14/03/2001	18	4			
22	Hala	Bassem	25/05/2002	16	5			
23	Namet	Fawzi	31/05/2002	16	4			

(a) She entered a formula in D4 to calculate the student's age.

Write down the formula she used. This formula should be easy to replicate.

You can assume for the purpose of this exercise that the number of days in a year averages out to 365.25.

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You can use the space below for any working you need.

(b) (i) The spreadsheet is to be sorted in ascending order of *Age* and then descending order of *Number of exams entered for*.

Write down the values which would be displayed in D9 and E9.

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You can use the space below for any working you need.

(ii) The **original** spreadsheet is to be sorted in descending order of *Age* and then ascending order of *Number of exams entered for*.

Write down the values which would be displayed in D17 and E17.

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You can use the space below for any working you need.

(c) A teacher wanted to know the number of students aged 17 taking three exams.

Write down the formula containing a counting function she used in cell G4 to calculate this number. This formula should work even if the data changes.

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You can use the space below for any working you need.

(d) The teacher now wants to know the number of students aged 16 taking four exams.

Write down the formula containing a counting function she used in cell G5 to calculate this number. This formula should work even if the data changes.

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You can use the space below for any working you need.

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11 A library database consists of one table containing details of all the books in a library and another table containing details of all the borrowers. Parts of the tables are shown below.

Books table

ISBN	Title	Author	Publisher	ReplacementCost
0099445530	The Flamboya Tree	Clara Olink Kelly	Bow Books	€7.99
0099460874	I Capture the Castle	Dodie Smith	Archaic	€5.99
0439977797	The Tin Princess	Philip Pullman	Panda Books	€5.99
0553812645	Ten Thousand Sorrows	Elizabeth Kim	Welter Books	€6.99
0684817306	Kitchen Privileges	Mary Higgins Clark	Grimon & Custer	€12.99
1857028899	The Code Book	Simon Singh	Quatre Domaine	€8.99
9780593057063	61 Hours	Lee Child	Crossearth Publishers	€18.99
9780593065709	The Affair	Lee Child	Crossearth Publishers	€18.99
9780593072493	Inferno	Dan Brown	Crossearth Publishers	€20.00
9780752860558	Sepulchre	Kate Mosse	Nebula Books	€18.99
9781780892665	Cross Justice	James Patterson	Panda Books	€20.00
9781846558597	Midnight Sun	Jo Nesbo	Panda Books	€9.99

Borrowers table

ID	FamilyName	FirstName	Mobilephone	Residence
1	Gale	Henry	07700 900102	Midtown
2	Brown	Kurtis	01134 960675	Cheswick
3	Leadbetter	Clementine	01144 960975	Chorlton
4	Hull	Christine	07700 900643	Denby
5	Greenhalgh	Karla	08081 570372	Portlarne
6	Pooley	Fred	09098 790876	Midtown
7	Chalmers	Ben	01154 960987	Denby
8	Lewis	Christopher	07700 900152	Denby
9	Patel	Rio	08081 570976	Chorlton
10	Gopaul	Ruksana	03069 990967	Cheswick

(a) You have been asked to create a query which will output only the names and phone numbers of all the borrowers who have a family name beginning with G and also live in Midtown.

Describe the steps you would have to follow in order to create this query, without using a query wizard or a parameter query.

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(b) You have been asked to create a query which will output only the titles and authors of all the books published by Panda Books which have a replacement cost of less than €20.

(i) Describe the steps you would have to follow in order to create this query, without using a query wizard or a parameter query.

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(ii) Describe how you would set up the query in **(b)(i)** as a parameter query.

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(c) Explain why the above tables (on page 14) do not constitute a relational database and what would need to be added to make them so.

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12 Validation is often used to check that data entered into a computer is sensible. A customer orders database contains details of the Customer ID number, the value of the order placed and the date the order was placed. Any new order, when it is entered, needs to be validated.

Using these examples of database fields, analyse the use of the following different validation rules – range check, type check, length check and format check.

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13 Many driving schools are asking IT companies to develop simulators for teaching customers to drive.

Evaluate the development of simulators for this purpose.

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