

## **Cambridge International Examinations**

Cambridge International General Certificate of Secondary Education

COMPUTER SCIENCE	0478/12
CENTRE NUMBER CANDIDATE NUMBER	
CANDIDATE NAME	

Paper 1 Theory

May/June 2018

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

## **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.

No marks will be awarded for using brand names of software packages or hardware.

Any businesses described in this paper are entirely fictitious.

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.

The maximum number of marks is 75.

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.





			2
1	Diffe	erent units of data can be us	sed to represent the size of a file, as it changes in size.
	Fill	in the missing units of data,	using the list given:
	•	byte gigabyte (GB) megabyte (MB) nibble	
	The	units of data increase in siz	e from smallest to largest.
		Smallest	bit
			kilobyte (kB)
		<b>▼</b> Largest	terabyte (TB)
			[4]
2	(a)	Nancy has captured image as digital photo files on her	es of her holiday with her camera. The captured images are stored camera.
		Explain how the captured i	mages are converted to digital photo files.

(b)	Nancy wants	to email th	ne phot	tos to	Nac	lia.								
	Many of the possible.	photos are	very la	arge 1	iles,	so N	anc	y nee	eds to	redu	uce the	eir file siz	e as mu	ch as
	Identify which	h type of c	compre	essior	ı wo	uld be	e m	ost s	uitab	le for	Nanc	y to use.	Explair	you
	Compression	type												
	Explanation													
														[4]
A st	opwatch uses	six digits t	o displ	ay ho	urs,	minu	tes	and s	secor	ıds.				
The	stopwatch is	stopped at	:											
					• .		•	_		1				
			Hou			3 1								
			пос	urs	IVI	inute	S	Seco	onds					
An 8	3-bit register is	s used to s	tore ea	ach pa	air of	digits	S.							
(a)	Write the 8-b	it binary nu	mbers	that	are c	urren	tly s	tored	d for t	he <b>H</b> o	ours, N	Minutes a	ınd <b>Sec</b>	onds.
	Hours													
	Minutes													
	Seconds													
	20001100													[3]

3

**(b)** The stopwatch is started again and then stopped.

When the watch is stopped, the 8-bit binary registers show:

Hours	0	0	0	0	0	1	0	1
Minutes	0	0	0	1	1	0	1	0
Seconds	0	0	1	1	0	1	1	1

Write the denary values that will now be shown on the stopwatch.



[3]

4 Jafar is using the Internet when he gets the message:

"D03, page is not available"

Jafar remembers that hexadecimal is often used to represent binary values in error codes.

Convert the hexadecimal number in the error message into 12-bit binary.

[3]

5 The three binary numbers in the registers X, Y and Z have been transmitted from one computer to another.

								Parity bit
Register X	1	0	0	1	0	0	1	0
Register Y	1	1	1	0	0	1	1	1
Register Z	1	1	1	0	1	0	0	1

Only **one** binary number has been transmitted correctly. This is identified through the use of a parity bit.

Identify which register contains the binary number that has been transmitted **correctly**. Explain the reason for your choice.

The binary number that has been transmitted correctly is in <b>Register</b>
Explanation
[4]

	6
Kel	vin correctly answers an examination question about the Von Neumann model.
Eig	ht different terms have been removed from his answer.
Cor	mplete the sentences in Kelvin's answer, using the list given.
Not	all items in the list need to be used.
•	accumulator (ACC)
•	address bus
•	arithmetic logic unit (ALU)
•	control unit (CU)
•	data bus
•	executed
•	fetches
•	immediate access store (IAS)
•	memory address register (MAR)
•	memory data register (MDR)
•	program counter (PC)
•	saved
•	transmits
The	e central processing unit (CPU)
the	data and instructions needed and stores them in the
	to wait to be processed.
The	holds the address of the next
inst	ruction. This address is sent to the
The	e data from this address is sent to the
The	e instruction can then be decoded and
An۱	calculations that are carried out on the data are done by the

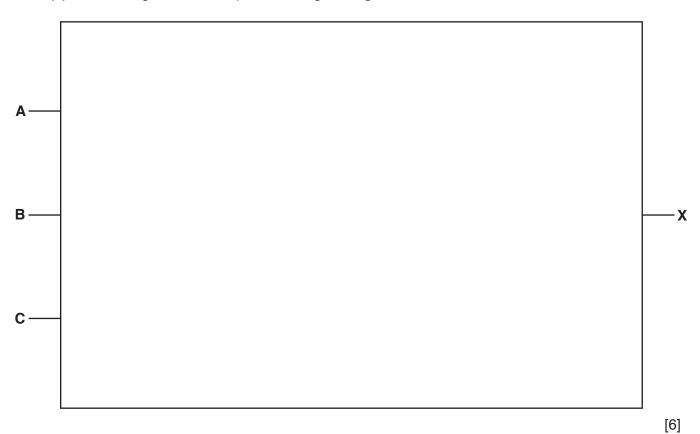
[8]

held in a register called the ......

7 Consider the logic statement:

X = 1 if ((A is 1 AND B is NOT 1) NAND C is 1) XOR ((A is 1 AND C is 1) OR B is 1)

(a) Draw a logic circuit to represent the given logic statement.



**(b)** Complete the truth table for the given logic statement.

Α	В	С	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

Dim	itri is writing a computer program in a high-level language.	
He	needs to send just the machine code for the program to his friend, electronically.	
It is	important that the program is executed as quickly as possible.	
lder	ntify which translator will be most suitable for Dimitri to use. Explain your choice.	
Тур	e of translator	
Ехр	lanation	
		[4
An a	advertisement in a magazine displays this barcode:	
	731034F3 F0736F07 F0746F0	
	Tarriet Manager	
(a)	Identify this type of barcode.	
		[1
		[1
		[1
		[1
		[1
		[1
		[1
		[1
	He I	He needs to send just the machine code for the program to his friend, electronically.  It is important that the program is executed as quickly as possible.  Identify which translator will be most suitable for Dimitri to use. Explain your choice.  Type of translator  Explanation

10 Alexandra has a new mobile device.

It h	as a t	ouch screen that uses capacitive technology.	
(a)	Des	cribe how a capacitive touch screen registers Alexandra's touch.	
			[4]
(b)	Alex	candra is wearing gloves because it is cold.	
	She	presses an icon on her touch screen but her action is not registered.	
	(i)	Explain why the touch screen will not register her touch.	
	(ii)	Alexandra does not want to remove her gloves.	[∠]
	()	Explain how Alexandra could use her mobile device whilst still wearing gloves.	
			[2]

11	A factory uses a security system to control a security light. The system uses a sensor and a microprocessor.
	Explain how the security system makes use of the sensor and the microprocessor to control the security light.
	161

12 (a) Selma has some imp		Sel	ma has some important personal information that she needs to email to her employer.
		She wants to make sure that if the personal information is intercepted, it cannot be understood.	
		(i)	State how Selma could email her personal data more securely.
			[1]
		(ii)	Describe how your chosen solution works.
			[5]
(b) Selma wants to make sure that the information received is correct.		ma wants to make sure that the information received is correct.	
		A pa	arity check can be used to detect errors.
			scribe another error detection method that can be used to check the information received orrect.
		Erro	or detection method
		Des	scription
			[3]

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