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Candidate surname

Other names

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Centre Number

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Learner Registration Number

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Monday 10 June 2019

Morning (Time: 1 hour 45 minutes)

Paper Reference **31769H**

Computing

Unit 2: Fundamentals of Computer Systems

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 learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

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.*
- You may use a calculator.

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.

Turn over ►

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Pearson

Answer ALL questions. Write your answers in the spaces provided.

1 Charles is a computer technician for a small manufacturing company. He must keep the company's data and information safe.

(a) All members of staff are given a username that they use to access the company's computer systems.

Charles sets access levels for each member of staff.

Explain **one** way that setting access levels helps protect data.

(2)

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(b) **Figure 1** shows an extract from a log of activities on the company's network.

Charles has noticed some suspicious activity.

Time	Username/IP address			
	JAtkins01 141.101.104.231	DKhan02 141.101.104.231	LPerez01 141.101.104.231	JAtkins01 64.233.191.255
12:01am - 01:00am				
01:01am - 02:00am				
02:01am - 03:00am				
03:01am - 04:00am				
04:01am - 05:00am				
05:01am - 06:00am				
06:01am - 07:00am			Yes	
07:01am - 08:00am	Yes	Yes	Yes	
08:01am - 09:00am	Yes	Yes	Yes	
09:01am - 10:00am	Yes	Yes	Yes	
10:01am - 11:00am	Yes	Yes	Yes	
11:01am - 12:00pm	Yes	Yes	Yes	
12:01pm - 01:00pm		Yes	Yes	
01:01pm - 02:00pm	Yes	Yes	Yes	
02:01pm - 03:00pm	Yes	Yes	Yes	
03:01pm - 04:00pm	Yes	Yes	Yes	
04:01pm - 05:00pm	Yes	Yes		
05:01pm - 06:00pm	Yes	Yes		
06:01pm - 07:00pm	Yes	Yes		
07:01pm - 08:00pm	Yes	Yes		
08:01pm - 09:00pm	Yes	Yes		
09:01pm - 10:00pm	Yes			
10:01pm - 11:00pm	Yes			Yes
11:01pm - 12:00am	Yes			Yes

Key	
Yes	= Logged on/active session

Figure 1

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The company's server uses a multi-user operating system.

Explain **two** features of a multi-user operating system that could be used to help prevent this suspicious network activity.

(4)

Feature 1

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Feature 2

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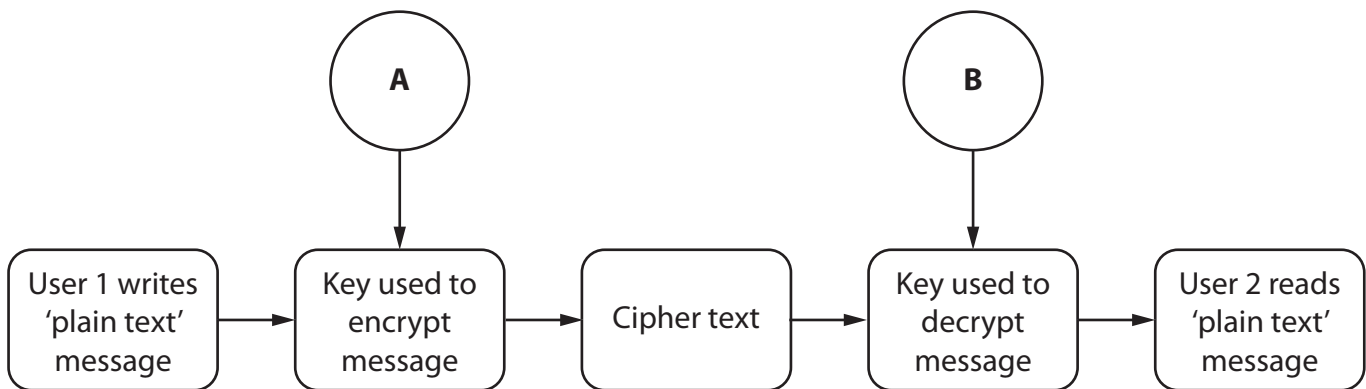
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(c) Charles provides staff with an encrypted email service.

The diagram shows a message being sent between User 1 and User 2.

The system uses public key encryption.



Identify the specific key used at Point A and Point B in the diagram.

(2)

A

B



Charles is creating a simple messaging encryption program that will use a Vigenère cipher to encrypt messages sent between users.

Figure 2 shows a Vigenère square.

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

Figure 2

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(d) Charles chooses the word PEARSON as his key.

Complete the tables to show how the Vigenère cipher would be used to decrypt the message in to plain text.

Use the Vigenère square in **Figure 2** to help you.

(4)

Encrypted message	I	L	E	E	W	K	C	G	S	C	V	K	G	V	H
Key															
Plain text															

Encrypted message	Z	E	I	Q	S	S	U	M	C	Z	W	B	G
Key													
Plain text													

(e) Give **four** reasons why a Vigenère cipher is more secure than a Caesar cipher.

(4)

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- 2
- 3
- 4



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(f) Charles uses a firewall to protect company data.

Describe how a firewall prevents unauthorised access to stored data from outside the company.

(4)

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(Total for Question 1 = 20 marks)

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2 Myra has built a new computer so she can play the latest single-player and online multiplayer games.

(a) Myra installs high quality Random Access Memory (RAM) in her new computer.

Explain **one** way the read/write speed of RAM aids computer performance when playing games.

(3)

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Myra wants to improve the performance of her computer.

She decides to 'overclock' the processor.

(b) Explain what is meant by 'overclocking'.

(3)

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(c) Explain **one** drawback of 'overclocking'.

(2)

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(d) Myra wants to play a game on her computer that is designed to be played on a games console.

Describe how emulation would allow her to play the game.

(4)

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(e) Analyse the role of interrupts when playing computer games.

You should make use of examples of software and hardware interrupts to support your answer.

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Dotted lines for writing the answer.

(Total for Question 2 = 18 marks)

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P 6 1 5 6 2 A 0 1 1 2 0

3 TechAssist is a company that provides assistive technology.

Its technologies improve the accessibility of computer systems for people with additional needs.

(a) TechAssist has provided one of its customers with a 'sip-and-puff' system.

Describe how a 'sip-and-puff' system allows users with limited movement to use computer systems.

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(b) It is important that the technologies TechAssist provides for customers are compatible with other technologies and systems.

Analyse how compatibility issues might affect TechAssist and its customers.

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(c) TechAssist has a number of customers with sight loss.

These customers have each been provided with a smartphone.

Discuss ways in which the hardware and software provided by a smartphone could assist a person with sight loss.

(10)

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(Total for Question 3 = 20 marks)



4 Jared is the lead IT technician for a medium-sized creative media business.

The company employs 100 people. They are each provided with a laptop that they use at the office, at home and when travelling.

(a) Discuss how Jared could use software to help manage and maintain the laptops.

(10)

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(b) **Figure 3** shows a summary of the company's backup policy.

Backup Policy Summary
System to be backed up: Office network server
Location of system included in backup: Office server room - server rack 1
Type of backup: Full
Time of backup: Every Friday
Storage medium: Solid State Drive
Location of backup: Office server room - server rack 2

Figure 3

Evaluate the effectiveness of the backup policy.

Your evaluation should consider:

- the extent to which the policy would protect the data
- how the policy may impact on the recovery of data
- how the policy could be improved.

(12)

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TOTAL FOR PAPER = 80 MARKS



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