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Surname

Other names

Pearson BTEC Level 3
Certificate, Extended
Certificate, Foundation
Diploma, Diploma,
Extended Diploma

Centre Number

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Learner Registration Number

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Computing

Unit 2: Fundamentals of Computer Systems

Tuesday 23 January 2018 – Afternoon

Time: 1 hour 45 minutes

Paper Reference

31769H

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

1 Vanessa is developing a multifunctional computer system to aid cyclists.

The system will:

- be controlled by a small multifunctional device similar in size to a smartphone
- contain a touch screen and a number of different sensors
- make use of a number of different wired and wireless connection methods
- be mounted on the handlebars of the bicycle
- connect the device to front and rear lights.

Vanessa's system will use online map data to calculate routes for the user but it does not have its own internet connection.

The system is able to use Wi-Fi to connect to public hotspots.

(a) Describe **one** other way Vanessa could provide an internet connection for the system that could be used when cycling.

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(b) Give **two** reasons why using Wi-Fi to connect to public hotspots may negatively affect the performance of the system.

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(c) The system will provide the user with location data.

Describe how an internal component could be used by the system to determine location.

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(d) The multifunctional system will make use of a central processing unit (CPU) designed for mobile devices.

Explain **two** reasons why the features of a mobile CPU make it suitable for Vanessa's system.

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(e) The system will automatically turn on the front and rear lights if it is 'Dark' OR 'Foggy'.

Complete the truth table to show the Boolean logic for this part of the system.

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Dark	Foggy	Output: Lights
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(f) The system will use a touch screen interface and will use sensors to detect when the bicycle is moving.

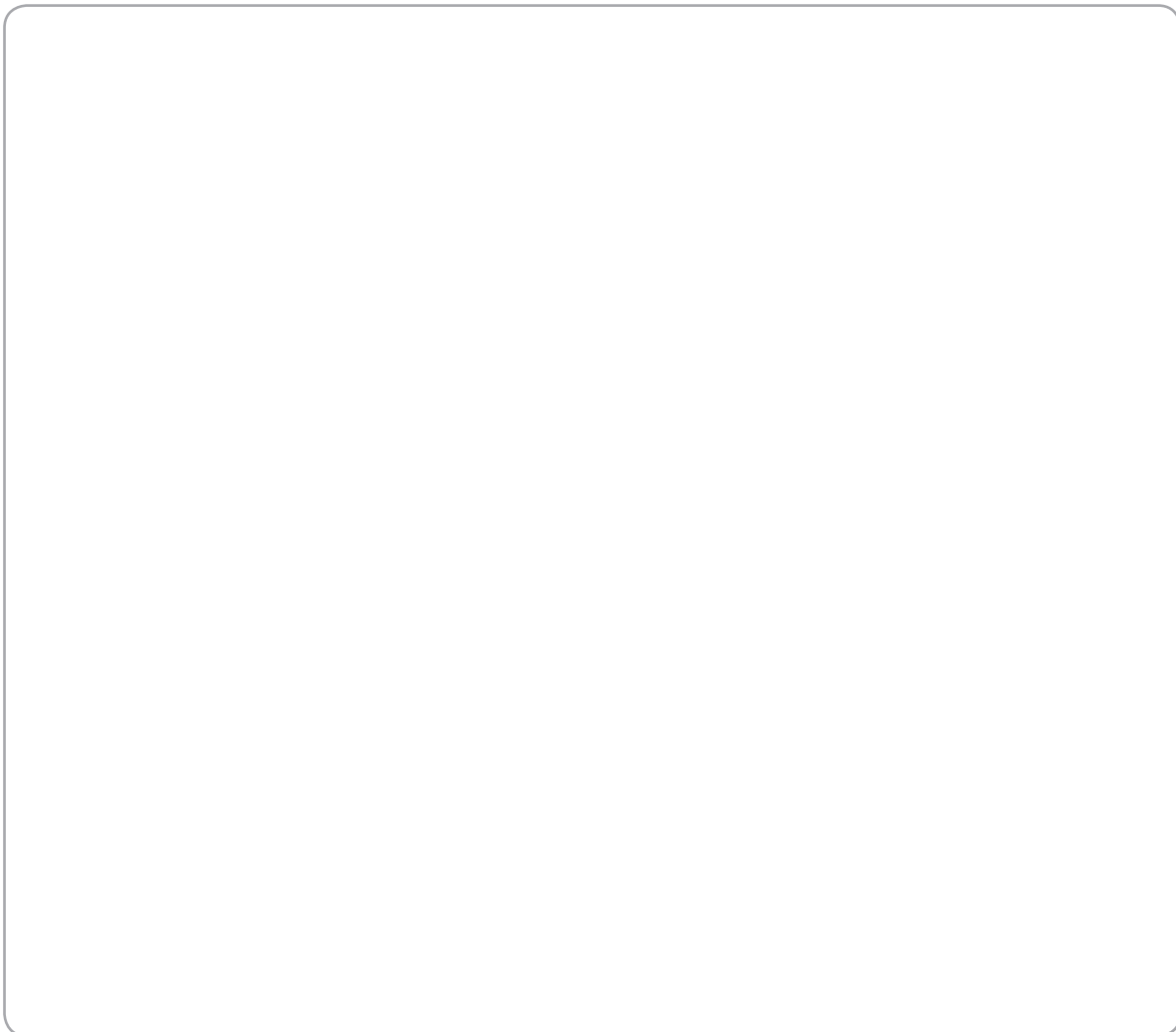
The system must:

- detect user input (touching the screen)
- not allow the screen to be unlocked when touched if the bicycle is moving
- allow the screen to be unlocked when touched if the bicycle is not moving
- lock the screen if no user input is detected
- lock the screen when the bicycle is moving
- run continuously once started.

Draw a flow chart to show the logic of the system.

Use this space to draw your flow chart.

(4)



(Total for Question 1 = 20 marks)



2 Angga has a computer network in his house which is used by Angga and his family to store and access a range of music and video files.

The media files will be stored on a central server and accessed on a range of devices.

Angga and his family would also like to use the network to play multiplayer computer games.

Figure 1 shows a simple plan of the devices and connections used in the home network.

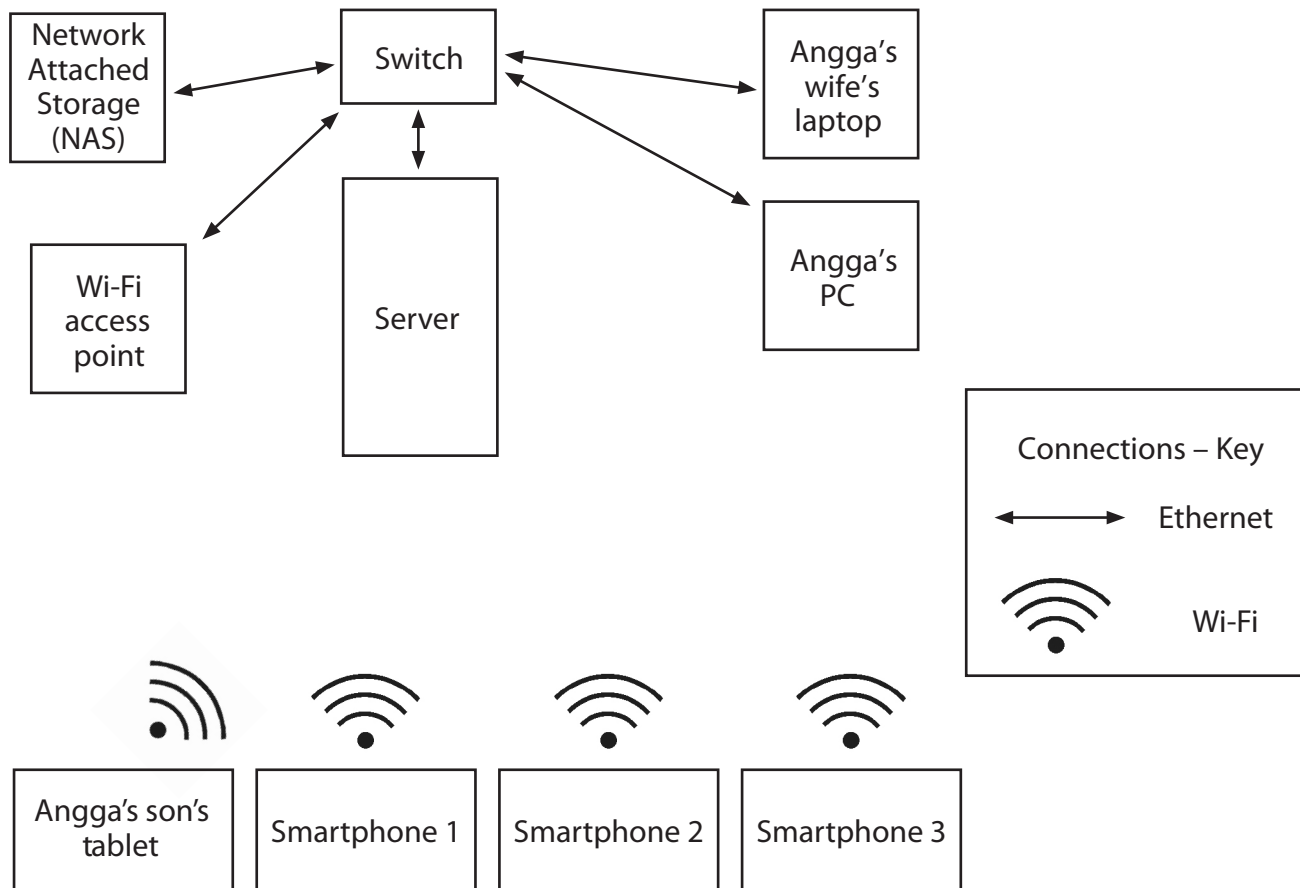


Figure 1

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- (a) Angga's computer has a central processing unit (CPU) and a graphics processing unit (GPU) that are both used when he is playing computer games.

Describe how the CPU and GPU share work to improve computer performance.

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- (b) Some of the video and audio files Angga has on the network have been compressed using 'lossy' compression.

Describe how 'lossy' compression reduces the file size of video and audio files.

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(c) Angga uses the Network to access a music album he has stored on the server.

It has been compressed using 'lossy' compression.

Describe **one** way that using 'lossy' compression will have a negative effect on the use of the audio file.

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(d) Angga wants to transfer files to his network attached storage (NAS) when he is travelling.

He intends to use File Transfer Protocol (FTP) to transfer video files from his PC to the NAS.

Explain **one** benefit of using FTP to transfer the files to the NAS.

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(e) Angga would also like to use the Network Attached Storage (NAS) to store backups.

Analyse the factors Angga would need to consider when implementing back up procedures for all his family's devices.

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(Total for Question 2 = 18 marks)

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3 Carter owns a fast food restaurant and is planning to install a new menu and ordering system.

The new system will contain computer terminals that will allow customers to view the menu, order and pay for food, before going to the counter to collect their order.

(a) When a customer places an order it is allocated an order number that is stored in an array.

The array data will be accessed as a queue.

Explain why the use of the queue data type is more appropriate than a stack for this system.

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(b) **Figure 2** shows how the terminals will be positioned in the restaurant.

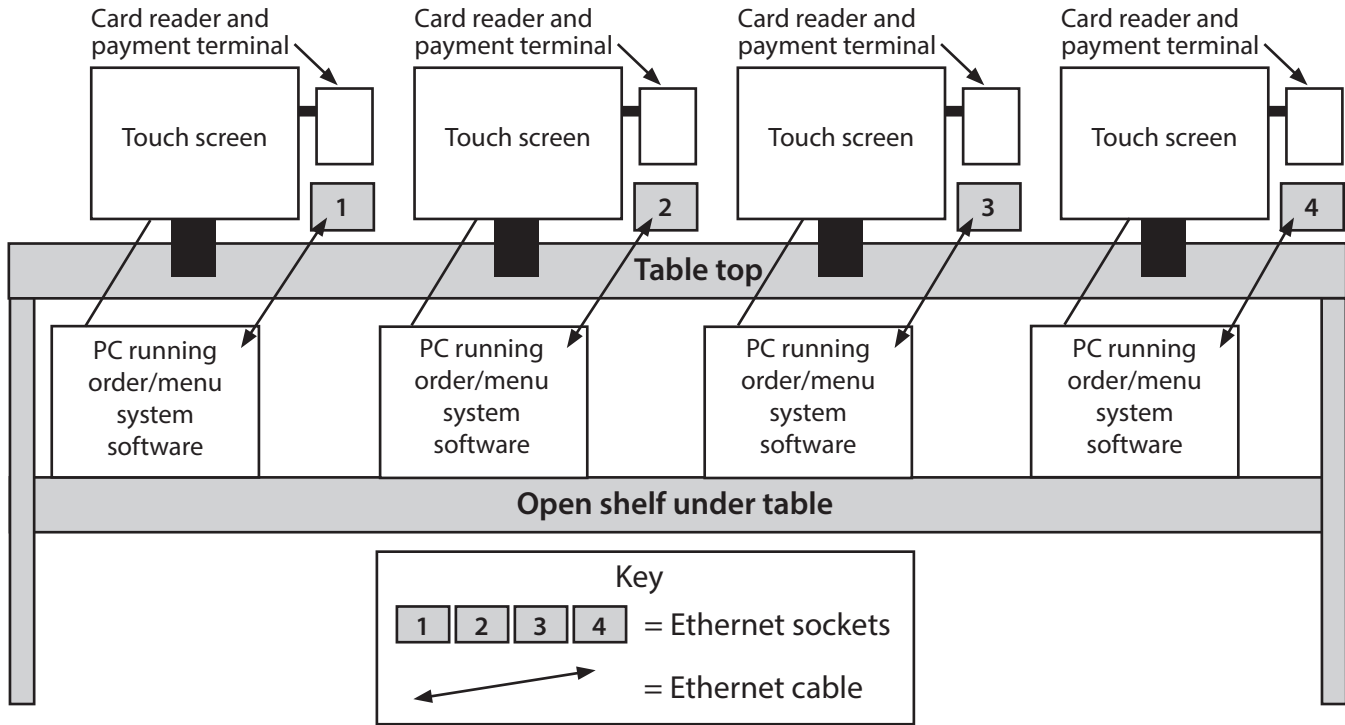


Figure 2

One of Carter's staff members is concerned about the security of the menu and ordering system.

Discuss how the hardware and layout in **Figure 2** may affect the security of the system and the impact this may have on Carter's business.

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(c) **Figure 3** shows two interfaces Carter is considering for the menu and ordering system.

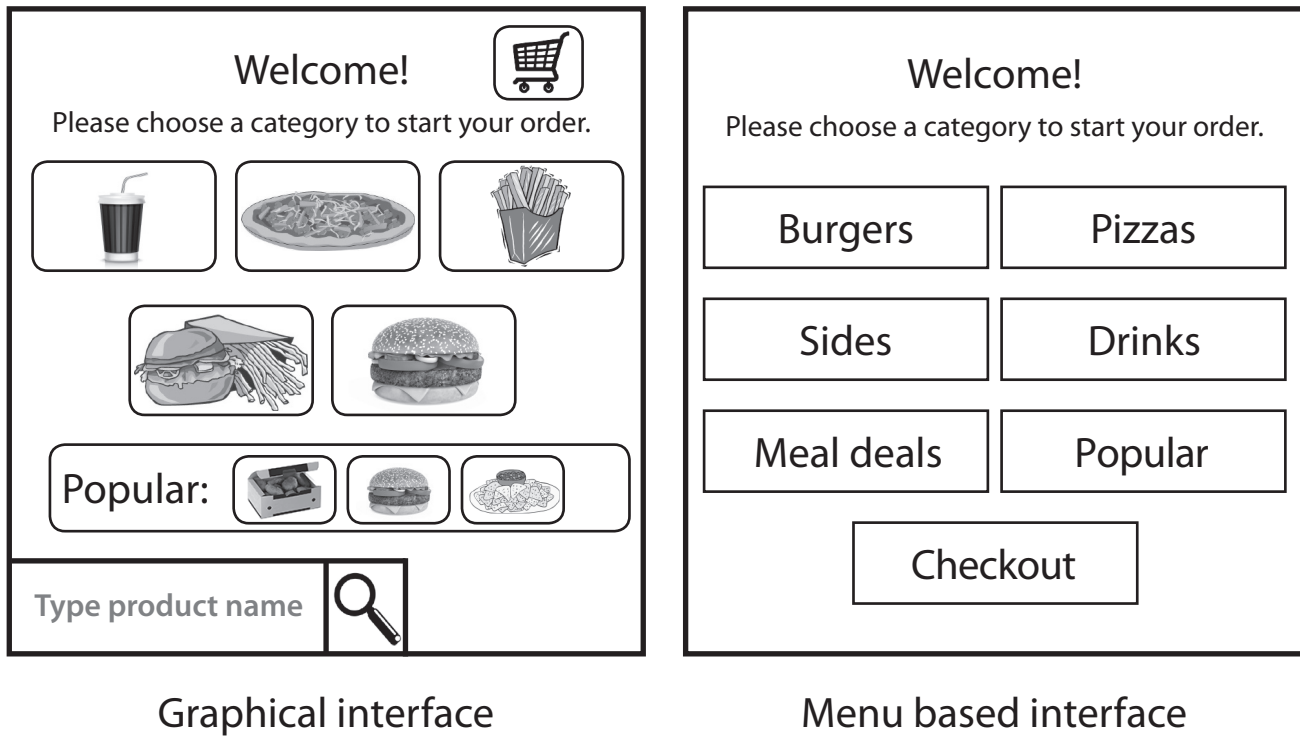


Figure 3

Analyse how the features of the two interfaces will affect the use and performance of the system.

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(Total for Question 3 = 20 marks)



4 Shania is a scientist who studies and monitors animal and plant life.

To aid her studies she uses a number of computer systems.

For her current study she is using:

- a laptop
- digital still and digital video cameras
- microphones and sound meters
- sensors to monitor temperature, moisture in soil, motion, air and water pollution.

Shania's laptop is used to control the connected devices, temporarily store collected data and to manipulate and interrogate data.

(a) When the study is being conducted a large amount of data is transmitted.

Data transmitted to Shania's laptop include:

- data collected by the sensors
- image and video data collected by the cameras
- sound data from the microphones.

Data transmitted by Shania's laptop include:

- control signals from the laptop to the connected devices
- copies of the data collected by the sensors, which are sent to a server in her office to be backed up
- daily observations and chosen data, which are uploaded to a website for colleagues and other scientists to see.

Shania wants to make sure that all data is as accurate as possible. Errors caused by data being corrupted during transmission need to be corrected.

Discuss error correction systems that could be used and the implications for Shania.

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(b) Shania's laptop uses an operating system that is specially designed for data collection and manipulation tasks.

Discuss the role of the kernel in controlling and managing system components and tasks in Shania's computer system.

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(Total for Question 4 = 22 marks)

TOTAL FOR PAPER = 80 MARKS



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