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

Centre Number

Learner Registration Number

Computing
Unit 2: Fundamentals of Computer Systems

Tuesday 12 June 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 ▶

Pearson

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

1   Benjin is a digital artist who creates digital graphics for a range of purposes.

(a) Benjin uses a graphics tablet when he is creating graphics.

Describe how **one** feature of a graphics tablet helps digital artists in their work.

(2)

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(b) Benjin has upgraded the Graphics Processing Unit (GPU) in his computer.

Describe **one** function of the GPU when the computer generates graphics.

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(c) Describe how pipelining improves the speed at which graphics are generated.

(4)

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(d) Benjin creates a bitmap image.

Describe how a bitmap image is represented in a computer system.

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(e) Benjin has created two versions of the same image.

Figure 1 shows some properties of the two versions.

Version 1	Version 2
File Type: JPEG	File Type: JPEG
Resolution: 300 ppi	Resolution: 72 ppi
Size: 2.4MB	Size: 1.1MB

Figure 1

Benjin reduced the resolution of Version 2. This reduced the file size.

Explain why reducing the resolution impacts on file size.

(2)

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(f) **Figure 2** shows a string of data from an image file.

The string of data represents the colours used in a section of the image.

Y	Y	Y	B	B	B	B	B	B	Y	R	R	Y	Y	Y	Y	B	B	B	B

Figure 2

The string will be encoded using lossless compression.

Give **one** example to show how the string could be represented after compression.

(2)

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(g) Benjin is staying in a hotel. He uses the hotel's open Wi-Fi to access the internet.

Benjin uses the internet connection to edit image files that are stored on the office server.

Explain **two** reasons why this choice of connection may **not** be appropriate for this task.

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(Total for Question 1 = 20 marks)

2 Preet runs a 'laser tag' venue. She uses computers to manage the games and to control all the equipment.

Players wear 'packs' that power the gun and hit sensors when they play the games.

The packs also keep track of game information such as:

- pack ID
- number of shots fired
- number of times hit and by which pack.

Her computer systems must:

- send game information to the packs at the start of each game when the players enter the game arena:
  – reset data that varies with each game (e.g. shots fired/number of times hit)
  – game specific rules
- receive data from the packs at the end of the game to record game information
- process the data from each pack to calculate player rankings.

Figure 3 shows a diagram of part of Preet's game arena.

Diagram is not to scale

Auto gun

A

Auto gun trigger
pressure sensor
in floor

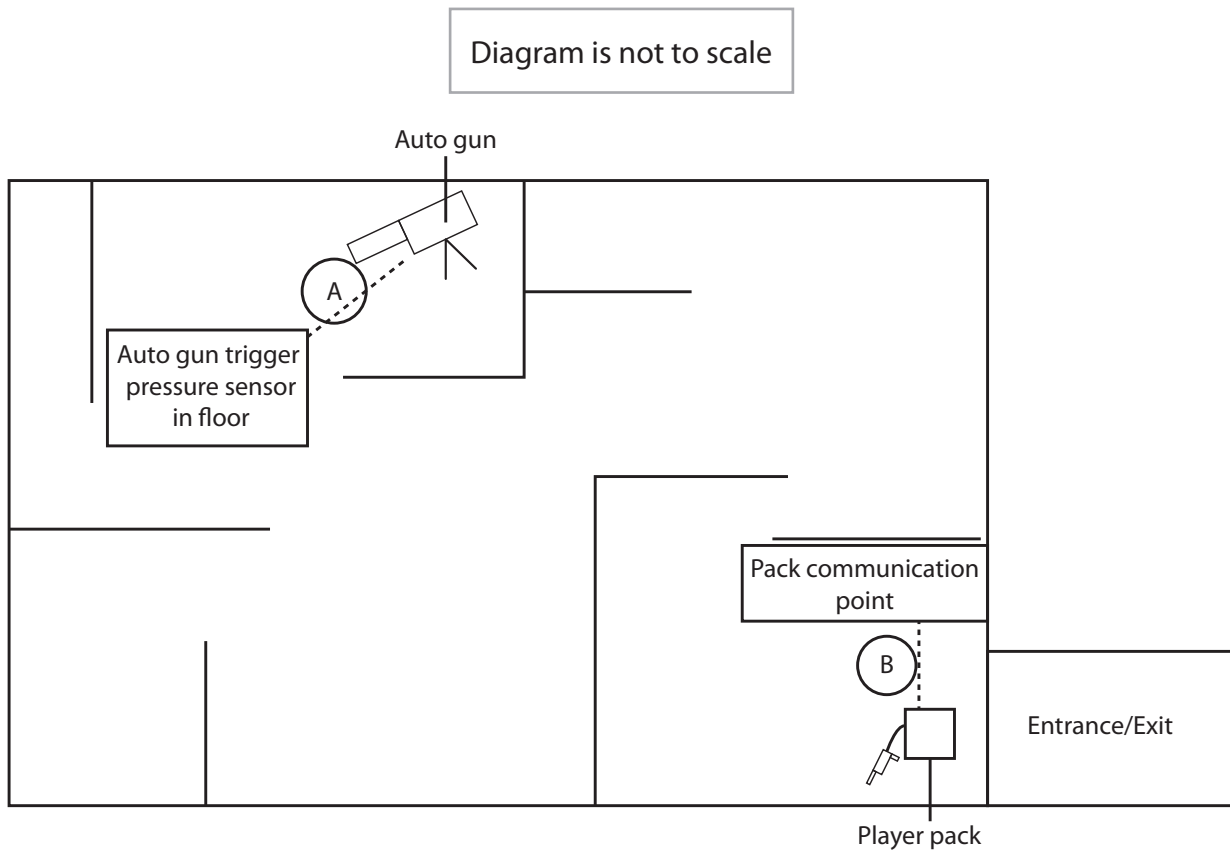Pack communication
point

B

Entrance/Exit

Player pack

Figure 3

(a) Explain the most appropriate communication channel for each of the connections labelled A and B on the diagram.

(4)

A – Auto gun trigger

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B – Pack communication point

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At the end of a game this data is transmitted from each pack to the computer systems:
- the number of shots fired
- the number of times the pack has been hit
- the number of targets hit by each player.

The data for each game is stored in a two-dimensional array.

Figure 4 shows example data from a game with six players.

	0	1	2	3	4	5
Shots fired	453	287	765	342	255	187
Number of times hit	78	54	21	87	65	24
Number of targets hit	78	102	42	28	50	29

Figure 4

(b) Explain why this type of array is used to store game data.

(3)

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(c) Preet is going to create league tables. Players will be awarded points every time they play.

Points will be awarded based on:
- hit percentage (number of targets hit/shots fired)
- being placed in the top five players in a game.

Describe **two** ways validation could be used when Preet is adding the data to the league tables.

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(d) First the data array shown in **Figure 4** has to be converted. Then the data can be processed to provide information for the league tables.

Explain **one** reason why the data array has to be converted.

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(e) The auto gun in **Figure 3** can be programmed with different rules.

Preet wants to program the auto gun so that:

- it is disarmed for 1 minute when the game starts
- if triggered by the sensor, it will fire 5 shots
- after firing it takes 45 seconds to recharge
- if hit by a shot from a player, it will become disarmed for 1 minute.

The auto gun will not register being hit when it is recharging or disarmed.
The program for the auto gun should run for the whole game.

Draw a flowchart that shows the logic for Preet's requirements for the auto gun.

(7)

(Total for Question 2 = 20 marks)

3 Carl is a music teacher. He builds custom computer systems for his students to use when they are learning and creating music.

(a) The computer systems Carl builds are connected to specialist music equipment from different manufacturers.

Describe how device drivers support the use of different equipment.

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(b) Carl is preparing a hard drive to install a new operating system.

He must choose the file system to use.

Analyse how the choice of file system would affect the use of a computer system.

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(c) The computer systems Carl builds will be used by children.

The systems will use a graphical user interface (GUI) for the programs the children will use.

Carl will use a command line interface (CLI) to perform administrative and maintenance tasks.

Discuss the **benefits** of using GUI and CLI for these activities.

(8)

(Total for Question 3 = 18 marks)

4 Gwyn is an IT manager for a company that specialises in medical research and the development of new medicines.

The company employs a range of research, sales and management staff.

The sales and management staff often travel around the country meeting with customers and suppliers. In these meetings staff need access to confidential data and information. Some of which is stored on the company's server, and some on the staff's individual devices.

Sales and management staff are each supplied with a laptop and a smartphone.

(a) Discuss the implications for Gwyn and the company of enabling staff to communicate with the company server when they travel.

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(b) Gwyn wants to make sure all company data is backed up and recoverable. He decides to use local storage rather than a third party cloud-based service.

Evaluate how his decision will impact on the company's backup and data recovery procedures.

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(Total for Question 4 = 22 marks)

TOTAL FOR PAPER = 80 MARKS

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