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Nationals Certificate,  
Extended Certificate,  
Foundation Diploma,  
Diploma, Extended  
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Centre Number

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Learner Registration Number

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# Computing

## Unit 2: Fundamentals of Computer Systems

Thursday 25 May 2017 – 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.*

### 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** Gareth runs a large judo club. He uses a range of computer systems to help him run the club and coach the players.

(a) Gareth collects performance data about each judo player based on performance in different strength and fitness tests.

The data collected includes different numerical data such as maximum weight lifted, 50 metre sprint times and number of throws performed in a minute.

Describe how Gareth could use application software to analyse the data he has collected.

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(b) Gareth uses a tablet computer.

The tablet computer has a graphical user interface (GUI).

Explain **two** reasons why a GUI is most suitable for a tablet computer.

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(c) Gareth uses the built-in camera in his tablet computer to record videos of the judo players when they are training.

Explain **one** reason why using the built-in camera might produce videos that are of poorer quality than those produced by a dedicated video camera.

(3)

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(d) Gareth has recorded Katie practising judo.

He needs to make the video available for Katie to watch on her own laptop after training.

Identify **one** storage device and describe how Gareth could use it to transfer the video from his tablet to Katie's laptop.

(3)

Storage device

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Description

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(e) Gareth takes some photographs of the judo players.

He has chosen to use a compressed image format.

He notices that this affects the quality of the image.

Explain **one** reason why compression sometimes affects the quality of an image.

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(f) Gareth wants to enter the judo players in to a competition.

The competition organiser sends him an entry form as an attachment to an email.

Gareth scans the attachment with anti-virus software.

Describe how anti-virus software would protect Gareth's computer system.

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**(Total for Question 1 = 20 marks)**



2 DragonPanels is a company that specialises in producing energy in environmentally friendly ways.

It is setting up a new system for producing electricity using solar panels. The system will be arranged into different zones.

Each zone will have these characteristics:

- Each zone contains 100 units.
- Each unit contains a large solar panel and a microprocessor.
- The solar panels can be remotely positioned by the control centre to get the maximum amount of sun each day.
- Each unit will send data relating to amount of energy produced, efficiency and maintenance problems back to the control centre.

The control centre needs to send instructions to each individual unit (sometimes all at once) for tasks such as repositioning the panel and software updates for the microprocessor.

Figure 1 shows a simplified diagram of one zone.

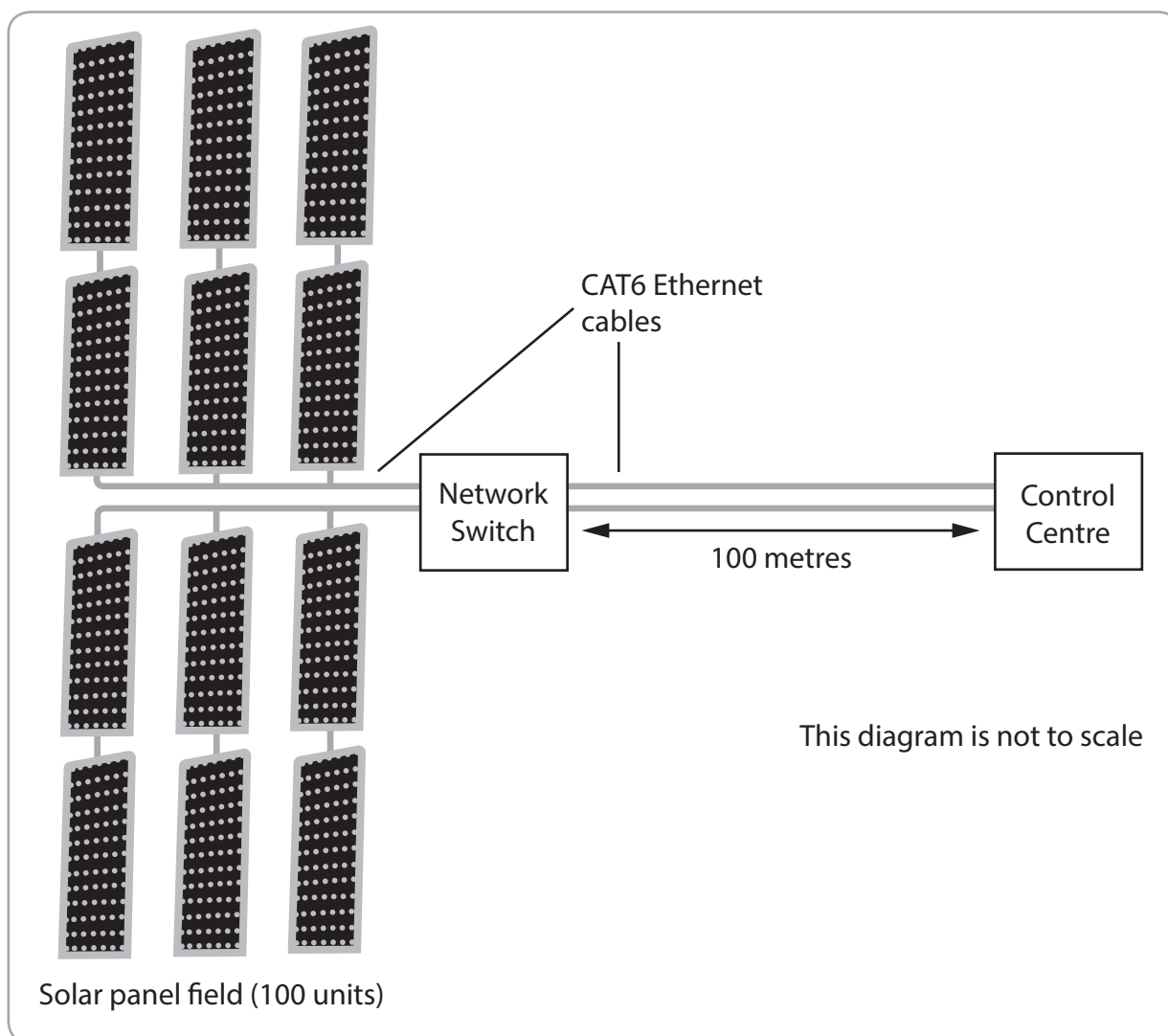


Figure 1



- (a) Ethernet cables have been used to connect the parts of the system shown in **Figure 1** because they use a full-duplex communication channel.

Explain **one** other reason why Ethernet cables would be used in this system.

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- (b) Explain why a full-duplex communication channel is the best choice for transmitting data between the units and the control centre.

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The units will contain a number of digital displays that are used to show different information.

**Figure 2** shows one of the displays that will be used.



**Figure 2**

- (c) The data sent to the display in **Figure 2** will be coded with Binary Coded Decimal (BCD).

State the denary (base 10) equivalent of this BCD string.

**0010100001001001**

(1)

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P 5 1 7 4 2 A 0 7 2 0

(d) Each solar panel is made up of a number of smaller modules that are arranged in groups of four.

Data is produced about each group of modules. One important piece of information is the average amount of power each group produces in a given period.

The average is calculated by adding all the energy values together and dividing by the number of modules.

The table shows the data from a single solar panel stored using 8-bit binary notation.

Module	Energy Produced (watts)
Module 1	00111100
Module 2	00100110
Module 3	01100110
Module 4	00110000

Calculate, in denary, the average power output from the solar panel.

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(e) The average power output data will be sent back to the control centre.  
A parity scheme will be used to detect errors in the data that is transmitted.  
Describe how a parity scheme is used to detect errors in transmitted data.

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3 Gurvinder is a scientist who analyses and interprets weather data.

He uses a number of different computer systems to help him with his work.

(a) Gurvinder is building a new computer and would like to know more about computer microarchitecture.

Explain the purpose of registers in a central processing unit (CPU).

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(c) Gurvinder wants to run a very complex weather simulation.

He has decided the best way to do this will be by using a computer cluster.

Discuss the factors Gurvinder will need to consider when setting up a computer cluster.

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**(Total for Question 3 = 18 marks)**

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(b) Stephanie has chosen to use emulation when creating and testing her software.  
Evaluate the extent to which emulation would meet Stephanie's needs.

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**(Total for Question 4 = 22 marks)**

**TOTAL FOR PAPER = 80 MARKS**





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