Chhetri Academy

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GCSE COMPUTER SCIENCE

4.1

Edexcel 1CP2 | Specification point 4.1.5

That network speeds are measured in bits per second (kilobit, megabit, gigabit) and be able to construct...

Untiered

Past paper question booklet

8	2015-2024	Untiered
question groups	available papers	tier

Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

3 John has decided to set up a website to promote the local youth football club.

(a) Bit-mapped images of the club uniform are taken with a digital camera and put on the website.

Complete these statements.

(i) ..... are the smallest elements of a bit-mapped image and the smallest element that can be displayed on a screen.

(1)

(ii) The ..... of an image is based on the number of elements used to represent the full image. The higher the number of elements for a given size, the better the quality of the image.

(1)

(iii) ..... indicates the number of bits used to represent the colour of a picture element. The higher the number of bits used, the greater the range of colours.

(1)

(b) Files for the website are stored on secondary storage media.

Complete this table with the name of the category of secondary storage described in each row.

(3)

Category of secondary storage	Description
	Uses metal platters coated in iron oxide. The platters rotate at high speeds.
	Small pits are burned in patterns onto a flat surface. A laser can be used to interpret light reflected from the flat or pitted surface.
	No moving parts; data is stored as an electrical charge.

(c) Network protocols break the files into packets before transmission.
Three fields in a network packet are source, destination, and check sum.

Give **two** additional fields found in a network packet.

(2)

1 .....

2 .....

(d) State the purpose of a check sum.

(1)

.....

.....

(e) John needs to convert the file sizes from megabytes (MB) to gigabytes (GB).

State how John could convert 4096MB to GB.

(1)

.....

.....

(f) The end user will use a browser to view the club's website.

Describe **one** difference between the Internet and the World Wide Web.

(2)

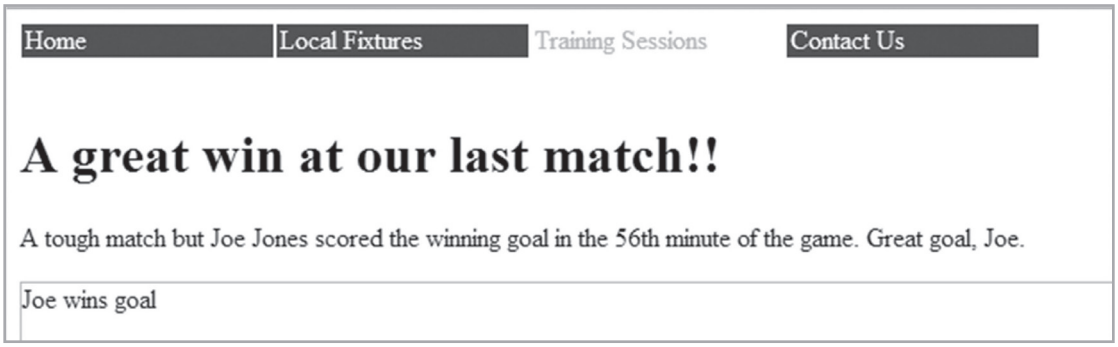
.....

.....

.....

.....

(g) John has created a sample page for the website. Here is the page displayed in a browser together with the code for the page.




```
1  <html>
2  <head>
3  <title>Local Football Club</title>
4  <style>
5      ul { list-style-type:none; margin:0; padding:0;}
6      a { display:block; width:150px; background-color:blue;
7          color:white; text-decoration: none; padding-left:2px;
8          border:2px; border-color:black; cursor:pointer; }
9      a:hover { color: orange;  background-color: white; }
10     li { display:inline; float:left; margin:1px;}
11 </style>
12 </head>
13 <body>
14     <ul>
15         <li><a href="home.html">Home</a></li>
16         <li><a href="local_fix.html">Local Fixtures</a></li>
17         <li><a href="training.html">Training Sessions</a></li>
18         <li><a href="contact.html">Contact Us</a></li>
19     </ul>
20 <br/><br/>
21 <h1>A great win at our last match!!</h1>
22 <p>A tough match but Joe Jones scored the winning goal in
23     the 56th minute of the game.  Great goal, Joe.</p>
24 <img src="thegoal.jpg" width="700" height="500" alt="Joe wins goal">
25 </body>
26 </html>
27
```

(i) State the **line numbers** that show Cascading Style Sheet information.

(1)

.....

(ii) Here is line 18 of the code.

Contact Us

Explain how it is connected to the Cascading Style Sheet information.

(1)

.....

.....

(h) Audio interviews with the club's coach are converted to a digital format.

(i) State the aspect of the analogue signal that must be sampled and stored as binary data during the analogue to digital conversion.

(1)

(ii) State how increasing the **sampling frequency** affects the digital representation of the original audio.

(1)

(i) The club has a simple black and white logo. The image is compressed using a lossless, run-length encoding (RLE) algorithm.

Explain how a run-length encoding algorithm works.

(2)

(Total for Question 3 = 18 marks)

2 Charles is a computer programmer for a company that sells digital products through the Internet.

He must be aware of the ethical and legal issues arising from the use of computers.

(a) Identify the legislation that applies in each situation.

(3)

Situation	EU Cookie Law (e-Privacy Directive)	Computer Misuse Act	Copyright, Designs and Patents Act
A teenager was given a computer game for her birthday. She gives a copy of the game to her friend.	☒	☒	☒
A university student tries to gain access to government computers, even though he is not a registered user.	☒	☒	☒
A company has been storing small files on users' computers to track the use of its website, but is not telling them.	☒	☒	☒

(b) Charles is writing program code for the IT department to use.

(i) Identify the type of programming language **most** suitable for each situation.

(4)

Situation	High-level programming language	Low-level programming language
Keeping a list of computers that need fixing.	☒	☒
Increasing the speed of part of a computer program so that it runs in 1 hour instead of 20 hours.	☒	☒
Keeping track of how many users log into the company's file servers each day.	☒	☒
Writing a program for a new computer processor.	☒	☒

Here is some pseudocode.

```
10  SET aNum TO 0
11  SET userNum TO 0
12
13  WHILE userNum = 0 DO
14      SEND "Enter a number:" TO DISPLAY
15      RECEIVE userNum FROM (INTEGER) KEYBOARD
16  END WHILE
17
18  IF userNum < 10 THEN
19      SET aNum TO cubeNum (userNum)
20  ELSE
21      SET aNum TO userNum
22  END IF
23  SEND aNum TO DISPLAY
24
25  FUNCTION cubeNum (aNum)
26  BEGIN FUNCTION
27      SET total TO aNum * aNum * aNum
28      RETURN total
29  END FUNCTION
```

(ii) State the coding technique that Charles could use to make the pseudocode easier to understand.

(1)

.....

(iii) State the name of the subprogram shown in the pseudocode.

(1)

.....

(iv) State the range of line numbers that show a selection statement.

(1)

.....

(v) State a line number on which the variable `aNum` is a local variable.

(1)

.....

(vi) State a line number on which the variable `aNum` is a global variable.

(1)

.....

(c) Charles is preparing to write program code.

(i) Complete the table to show the place value of the 1s to the right of the decimal in this binary real number.

(3)

Place value	4	2	1	•					
	0	1	0	•	1	1	0	0	0

Convert this binary real number to denary.

(ii) State the number of bits in a nibble.

(1)

(iii) Write an arithmetic expression to show the time needed to transmit a 10 KB file at 10 Mbps.

(2)

(Total for Question 2 = 18 marks)

3 An organisation that supplies audiobooks over the internet is moving into a new office building.

(a) One reason for networking devices is to provide access to the internet.

(i) Give **two** other reasons for connecting devices to networks.

(2)

1 .....

.....

2 .....

.....

(ii) The organisation has chosen wireless connectivity over wired connectivity for its new office building. There is no significant difference in the cost of installing either.

Give **three** reasons why the organisation might prefer wireless connectivity.

(3)

1 .....

.....

2 .....

.....

3 .....

.....

(b) Each audiobook is compressed before it is released.

(i) A lossy compression algorithm reduces the size of a file by removing data.

Explain why data loss is acceptable when using lossy compression.

(2)

.....

.....

.....

.....

(ii) A run-length encoding (RLE) algorithm reduces the size of a file based on runs of repeated items. For example, wwwbbbwwbbbbbbwwww would be reduced to 3w3b2w6b4w.

Explain why RLE may **NOT** be a good choice for encoding a text file.

(2)

(c) The organisation calculates how long it takes to transmit the audiobook over the internet.

1 Mbps = 1000^2 bps

1 MB = 1024^2 bytes

The network transmission speed is 54 Mbps.

An audiobook file is 81 MB in size.

Construct an expression to show how many seconds it will take to transmit the audiobook file. Show your unit conversions. You do not have to do the calculations.

(5)

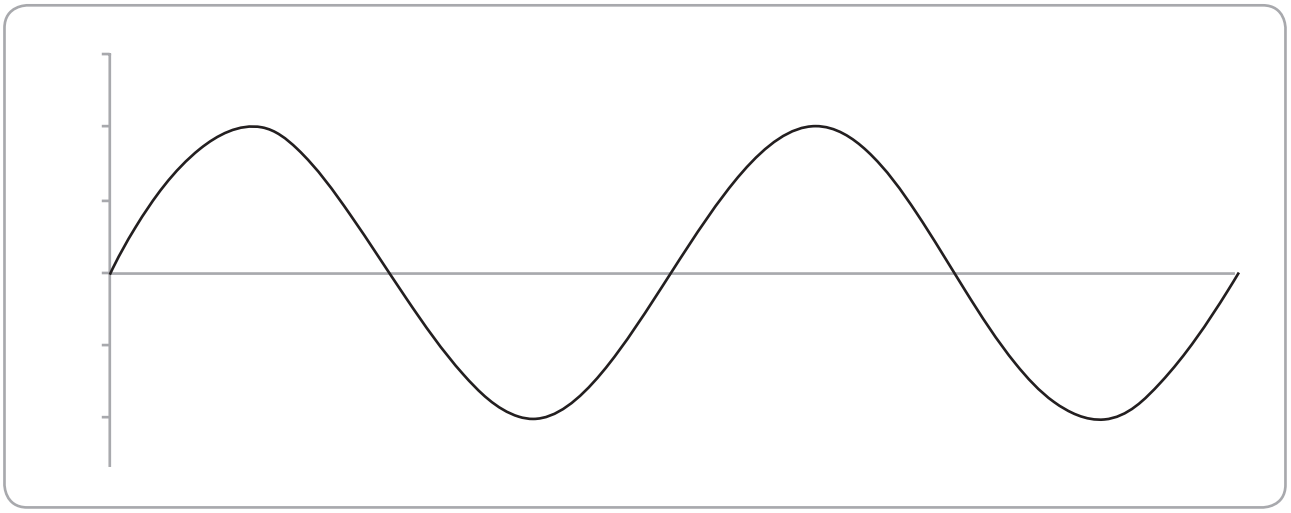
(Total for Question 3 = 14 marks)

4 A baby monitor uses a microphone to record sound.

(a) An analogue to digital converter is used to change the sounds received by the microphone into a form that can be processed by a computer.

(i) Complete the diagram to show sampling frequency and label both axes.

(3)



(ii) State the advantage of using a bit depth of 16 rather than a bit depth of 8.

(1)

.....

.....

(b) Identify the hardware component that holds a program that is currently being executed.

(1)

- ☒ **A** ALU
- ☒ **B** RAM
- ☒ **C** Hard drive
- ☒ **D** Control unit

(c) Construct an expression to show how many seconds it will take to transmit 20 MB of data using a network transmission speed of 2 Mbps

1 KB = 1024 bytes.

You do not have to do the calculation.

(4)

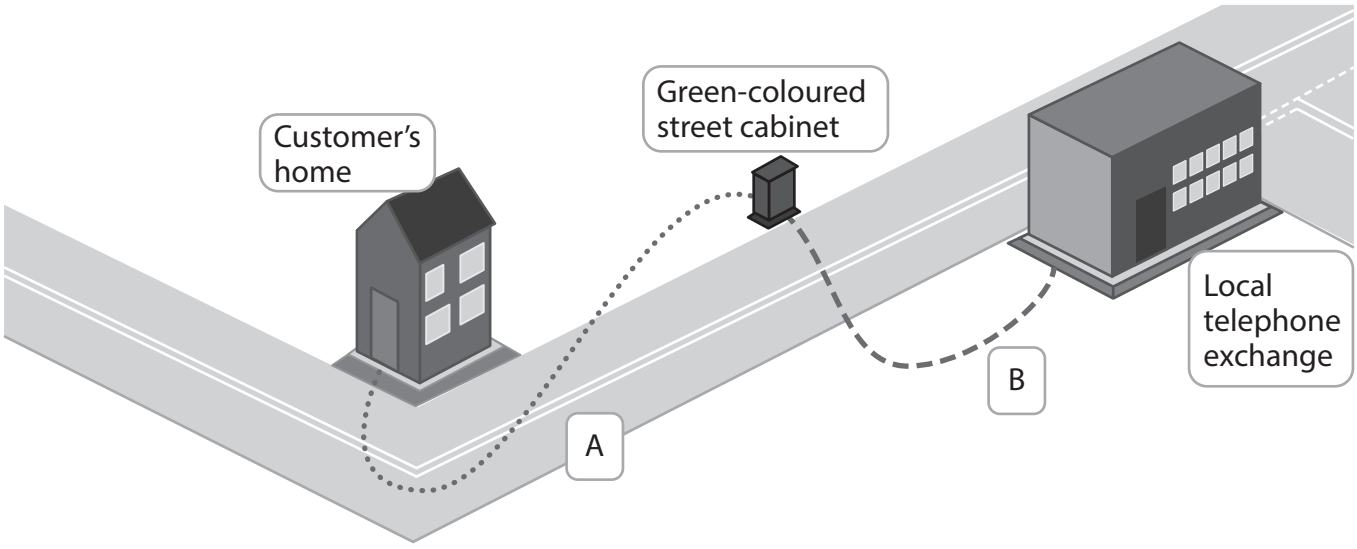
(d) Describe how an embedded system within a baby monitor can be used to alert parents about changes in room temperature.

(3)

(e) The diagram shows two **different** types of connectivity media.

State the different types of connectivity media used at A and B.

(2)



A .....

B .....

(Total for Question 4 = 14 marks)

3 Gemma manages a network for an organisation.

(a) Two computers are assigned the same IP address.

Explain why Gemma must change the IP address of one of the computers.

(2)

(b) Identify the network topology that requires a server.

(1)

- ☒ **A** Bus
- ☒ **B** Mesh
- ☒ **C** Ring
- ☒ **D** Star

(c) The network transfers data at 3 Gbps.

Construct an expression to show how many bytes can be transmitted in 10 seconds.

You do not need to carry out the calculation.

(3)

(d) Identify the number of bits in a nibble.

(1)

- ☒ **A** 2
- ☒ **B** 4
- ☒ **C** 8
- ☒ **D** 16

(e) Identify the type of software used to compress files.

(1)

- ☒ **A** Backup
- ☒ **B** Utility
- ☒ **C** Security
- ☒ **D** Network

(f) Identify the email protocol.

(1)

- ☒ **A** FTP
- ☒ **B** HTTP
- ☒ **C** SMTP
- ☒ **D** TCP/IP

(g) State the role of an ISP.

(1)

.....

.....

(h) A search engine selects information taken from the results of a search for 'Pearson'. The information is displayed here as a 'knowledge graph'.

Pearson
Publishing company

Pearson

pearson.com

Pearson plc is a British multinational publishing and education company.

Stock price: PSON (LON) 927.60 GBX −1.80 (−0.19%)
24 Aug, 16:35 BST – Disclaimer

Headquarters: London

CEO: John Fallon (1 Jan 2013–)

Founder: Samuel Pearson

Founded: 1844

Profiles

Twitter

Identify the property of the data that allows this information to be selected.

(1)

- ☒ **A** Formatted
- ☒ **B** Hyperlinked
- ☒ **C** Structured
- ☒ **D** Virtualised

(Total for Question 3 = 11 marks)

1 Networks

(a) Devices are connected to networks.

(i) Give **two** reasons for connecting computers in a network.

(2)

1 .....

.....

2 .....

.....

(ii) Describe **one** way a local area network (LAN) is different from a wide area network (WAN).

(2)

.....

.....

.....

.....

(iii) A network has a speed of 17.08 megabits per second.

Identify the equivalent speed in bits per second.

(1)

☒ **A** 17 080

☒ **B** 17 080 000

☒ **C** 17 080 000 000

☒ **D** 17 080 000 000 000

(iv) Define the term 'latency'.

(1)

(b) Data is split up into packets for transmission over a network.

(i) Each device on a network has a unique identifier that is used when sending or receiving packets of data.

State the name of the unique identifier.

(1)

(ii) Identify the item included between the header and the footer in a data packet.

(1)

- ☒ **A** Data being sent
- ☒ **B** Destination address
- ☒ **C** Packet number
- ☒ **D** Public key

(c) Describe how a firewall protects a local area network (LAN).

(2)

(d) State the name of an email protocol.

(1)

.....

(e) Explain **one** disadvantage of using a star network topology.

(2)

.....

.....

.....

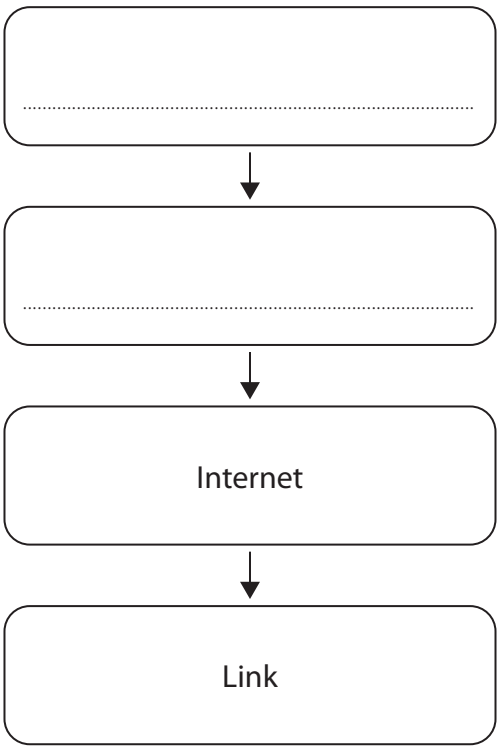
.....

(Total for Question 1 = 13 marks)

2 Networks

(a) Complete the diagram of the 4-layer TCP/IP model.

(2)



(b) Name the network topology that uses terminators to absorb signals.

(1)

.....

(c) Identify the reason computers are connected in a network.

(1)

- ☒ **A** To improve encryption
- ☒ **B** To prevent hacking
- ☒ **C** To reduce latency
- ☒ **D** To share peripherals

(d) State the network protocol used to request a webpage.

(1)

(e) Explain **one** benefit to a user of using IMAP to access emails.

(2)

(f) A factory has two file servers installed in an office.

A closed-circuit television system monitors the factory.

Explain **one other** method of physical security that could be used to protect the servers.

(2)

(g) Network speed is the current rate of data transmission, measured in bits per second.

Define the term 'bandwidth'.

(1)

(h) High-speed fibre-optic cables form the internet backbone. Routers connect other networks to this backbone.

Describe how a router enables data to arrive at its destination.

(2)

.....

.....

.....

.....

(Total for Question 2 = 12 marks)

3 Networks

(a) Networks are described in many different ways.

(i) Give the type of network that covers a small geographical area.

(1)

.....

(ii) Name the characteristic of a wireless network that is measured in metres.

(1)

.....

(iii) Give **two disadvantages** of a bus network topology.

(2)

1 .....

.....

2 .....

.....

(b) Describe penetration testing.

(2)

.....

.....

.....

.....

(c) Network protocols control the rules of communication.

(i) Name a network protocol that transmissions from other electrical devices can interfere with and that can be blocked by walls.

(1)

(ii) Name the network protocol used to download a music file from a server.

(1)

(d) Describe how the link layer of the TCP/IP protocol stack works.

(2)

(e) Construct an expression to calculate the transmission rate, in megabits per second, required to transmit a 1.4 gibibyte file in 13 minutes.

You do not need to do the calculation.

(4)

(Total for Question 3 = 14 marks)