

QUESTION 1.



5 (a) Telephone calls can be made by using:

- conventional telephones (using the Public Service Telephone Network (PSTN) over a wired network
- a computer, equipped with speakers and microphone, connected to the Internet

Put a tick (✓) in the correct column to match each description to the appropriate communication method.

Description	Conventional telephone using PSTN	Internet-based system
connection only in use whilst sound is being transmitted		
dedicated channel used between two points for the duration of the call		
connection maintained throughout the telephone call		
encoding schemes and compression technology used		
lines remain active even during a power outage		

[5]

(b) Distinguish between the Internet and the World Wide Web (WWW).

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.....[3]



(c) Name the hardware device that is being described:

- (i)** A device that transfers data from one network to another in an intelligent way, task of forwarding data packets to their destination by the most efficient route.

.....

- (ii)** A device used between two dissimilar LANs. The device is required to convert data packets from one protocol to another.

.....[1]

- (iii)** A device or software that provides a specific function for computers using a network. The most common examples handle printing, file storage and the delivery of web pages.

.....[1]

QUESTION 2.

8



- 7 (a) (i) Describe what is meant by a client-server model of networked computer.

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.....[2]

- (ii) Give **two** benefits of using the client-server model.

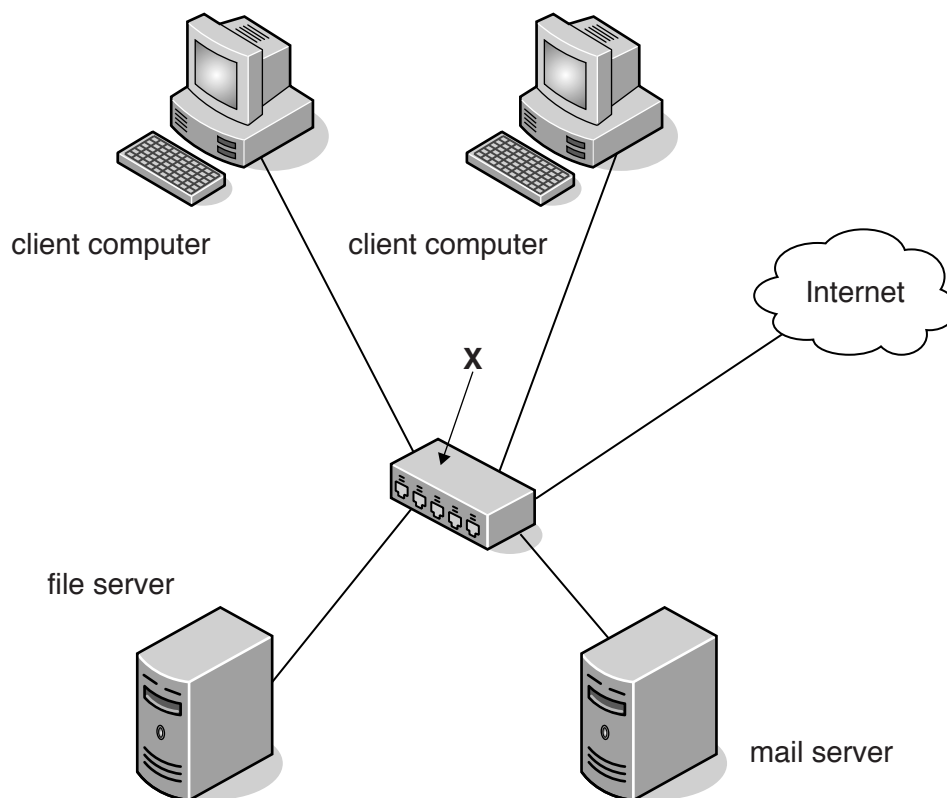
1

.....

2

.....[2]

- (b) The diagram shows a computer network with connection to the Internet.



Name the hardware device labelled **X**.

.....[1]



- (c) A web page offers a link for users to request another web page. The requested web page contains HTML code and JavaScript code.

Put each statement in the correct sequence by writing the numbers 1 to 5 in the right column.

Statement	Sequence number
The requested web page is displayed on the client computer	
The user clicks on the hyperlink and the web page is requested from the web server	
The requested web page content is transmitted to the client computer	
The client computer processes the JavaScript code using the web browser software	
The web server locates the requested web page	

[5]

QUESTION 3.



- 6 (a) Explain the difference between the World Wide Web (WWW) and the Internet.
-
-
-
-[2]

- (b) Three methods of connecting devices include fibre-optic cables, copper cables and radio waves. The table below gives descriptions relating to these connection methods.
- Tick (✓) one box on each row to show the method that best fits each description.

Description	Fibre-optic cable	Copper cable	Radio waves
Wireless medium			
Twisted-pair is an example			
Uses light waves			
WiFi			
Fastest transmission medium			

[5]

- (c) Bit streaming is used for both real-time and on-demand services.
- Describe **one** difference between real-time and on-demand bit streaming.

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.....

.....

.....[2]

- (d) A device needs an IP address to connect to the Internet. IPv4 is the more common type of IP address.

Describe, using an example, the format of an IPv4 address.

.....

.....

.....

.....

.....

.....[3]



- (e) A computer user keys in the Uniform Resource Locator (URL) of a web page in a browser.

Describe how the browser uses the Domain Name Service (DNS) to display the web page.

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.....[4]

QUESTION 4.



6 A user watches a video available on a website. The website uses on-demand bit streaming. Describe how it is possible to watch the video without it continually pausing.

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.....[4]

QUESTION 5.



6 Downloading a file from a website is an example of a client-server application.

(a) Describe what is meant by the term **client-server** for this application.

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.....[2]

(b) The following sequence of steps (1 to 5) describes what happens when someone uses their personal computer (PC) to request a web page. The web page consists of HTML tags and text content only. Four of the statements from **A**, **B**, **C**, **D**, **E** and **F** are used to complete the sequence.

A	Browser software interprets the script, renders the page and displays.
B	Browser software renders the page and displays.
C	Browser software compiles the script, renders the page and displays.
D	The web server retrieves the page.
E	The Domain Name Service (DNS) uses the domain name from the browser to look up the IP address of the web server.
F	The web server sends the web page content to the browser.

Write one of the letters A to F in the appropriate row to complete the sequence.

1. The user keys in the Uniform Resource Locator (URL) into the browser software.
2.
3.
4.
5.

[4]

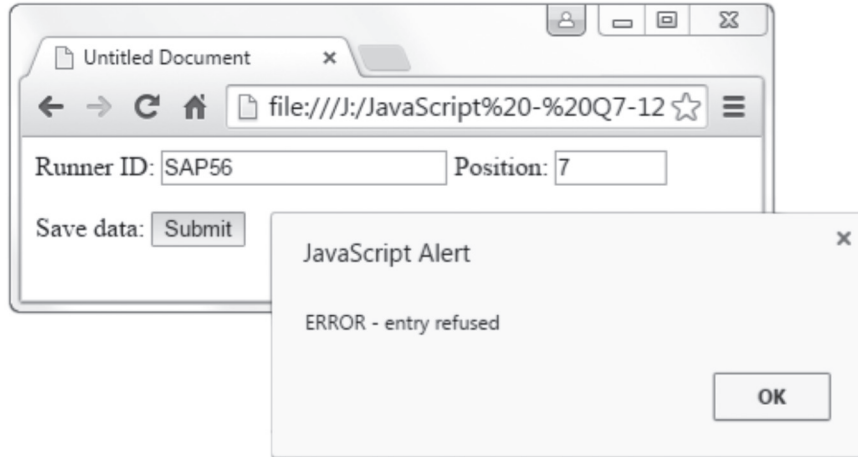


Question 6(c) begins on the next page.



(c) The following web page used for data capture consists of:

- two text boxes for the entry of:
 - a race runner's ID code
 - their finishing position in a race.
- a button that the user clicks to submit this runner's result.



```

1  <html>
2  <head>
3  <title>Untitled Document</title>
4  <script language="JavaScript">
5
6  function myButton_onmousedown()
7  {
8  var Output1 = "Runner ID OK";
9  var Output2 = "ERROR - entry refused";
10
11 var Runner ID = document.forms["form1"]["txtRunnerID"].value;
12 //                               || in Javascript is the 'OR' operator
13 if (RunnerID.substr(0,3) == "VAR" || RunnerID.substr(0,3) == "CAM")
14 {
15     alert(Output1)
16 }
17 else
18 {
19     alert(Output2)
20 }
21 }
22 </script>
23
24 </head>
25 <body>
26 <form name = form1>
27   <label>Runner ID: </label>
28   <input type="text" name="txtRunnerID" >
29   <label>Position: </label>
30   <input type="text" name="txtPosition" size = "5" >
31   <p>
32     <label>Save data: </label>
33     <input type="button" name="btnSubmit" Value = "Submit"
34
35     onMouseDown = "myButton_onmousedown()" >
36   </p>
37 </form>
38
39 </body>
40 </html>

```



- (i) The developer has used three variables in the JavaScript code. State the variables used.

1.

2.

3.

[2]

- (ii) The button has an event whose identifier is `onMouseDown`. When the mouse button is clicked, some code is run.

State the line numbers which contain this code.

From line to line

[1]

- (iii) The JavaScript code uses a selection statement.

State the line number which contains its condition.

Line number:

[1]

- (iv) Describe the purpose of the validation check that the code performs.

.....

.....[1]

- (v) Name and describe **two** other types of validation check which could be appropriate for this data capture form.

Validation check:

Description

.....

Validation check:

Description

.....

[4]





QUESTION 6.



2 Computer **A** needs to access a web page.

- (a) State how Computer **A** could access the web page without using a Domain Name System (DNS).

.....
.....[1]

- (b) (i) The following table shows four IPv6 addresses.

State if each address is valid or invalid.

IP address	Valid or invalid
21E5:69AA:FFFF:1:E100:B691:1285:F56E	
::255.255.255.255	
59FB::1005:CC57:6571	
56FE::2159:5BBC::6594	

[4]

- (ii) The following table shows four statements about either public or private IP addresses.

Tick (✓) **one** box in each row to indicate whether each statement refers to a public or a private IP address.

Statement	Public	Private
192.168.2.1 is an example of this type of address		
Assigned by the Internet Service Provider (ISP)		
IP address cannot be duplicated in different networks		
Network Address Translation (NAT) is necessary to access the Internet directly		

[4]

- (c) One type of transmission media is copper cable.

Give **two** additional types of transmission media.

1

2

[2]

QUESTION 7.



2 Gopal types the Uniform Resource Locator (URL) of a website into a web browser.

(a) The following sequence (1 to 5) describes the steps that take place. There are three statements.

1 Gopal types into the web browser.

2

3 DNS looks up the URL in table

4

5

Three statements **A**, **B** and **C** are used to complete the sequence.

A	DNS finds corresponding IP address
B	Web browser sends URL to Domain Name Service (DNS)
C	DNS returns IP address to web browser

Write one of the letters **A** to **C** in the appropriate rows (2, 4 and 5) to complete the sequence. [2]

(b) Describe the purpose of an IP address.

.....

.....

.....

..... [2]

(c) A telecommunications operator has installed fibre-optic cables in Gopal's neighbourhood.

(i) Give **three** benefits of fibre-optic cable over copper cable.

1

.....

2

.....

3

.....

[3]



(ii) Give **two** drawbacks of fibre-optic cable over copper cable.

- 1
- 2

[2]

QUESTION 8.



1 Devices connected to the Internet have IP (Internet Protocol) addresses.

(a) Three IPv4 addresses are given.

Circle either Valid or Invalid to indicate whether each address is valid or invalid. Explain your decision.

Address 1: 3A.21.2H.1 Valid / Invalid

Explanation

.....

Address 2: 299.53.2.2 Valid / Invalid

Explanation

.....

Address 3: 192.2.1.0 Valid / Invalid

Explanation

.....

[3]

(b) A website can be accessed using either the Uniform Resource Locator (URL) or the IP address.

Describe how a URL is converted into its matching IP address.

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.....

.....

..... [3]

(c) People use the Internet to stream media.

Complete the following statements by filling in the names of the missing methods of bit streaming.

..... bit streaming is used when watching a live stream of events that are currently taking place. The event is captured live with a video camera connected to a computer, and it cannot be paused or rewind.

..... bit streaming is used when watching an event that has taken place in the past. Existing media are encoded to bit streaming format and uploaded to a server. It can be paused and rewind.

[2]



(d) A recording of a concert is stored as a file. The file is compressed using lossy compression before it is streamed to users.

(i) State why this file needs to be compressed.

.....
..... [1]

(ii) Define the term **lossy compression**.

.....
..... [1]

(iii) The file could be compressed using lossless compression.

Explain why lossy compression is a more appropriate compression technique than lossless for this file.

.....
.....
.....
.....
.....
..... [3]

QUESTION 9.



1 Computers on the Internet have IP addresses.

(a) IP addresses can be in either IPv4 or IPv6 format.

(i) Give an example of a valid IPv4 address.

.....
..... [1]

(ii) State why there is a need for IPv6 addressing.

.....
..... [1]

(iii) A computer's IPv6 address is:

C100:2235::1000:25AA:AA50

Explain why this IPv6 address would be an invalid IPv4 address.

.....
.....
.....
..... [2]

(b) A company has computers in two separate buildings that communicate using the Internet over a Public Switched Telephone Network (PSTN).

(i) Describe the transmission of data using a PSTN.

.....
.....
.....
..... [2]

(ii) The company wants to install a dedicated line between the two buildings.

Identify **one** benefit and **one** drawback of installing a dedicated line between the two buildings.

Benefit

Drawback

[2]



- (c) A network can use routers and gateways.

Explain the role of routers **and** gateways in a network.

.....

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.....

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..... [4]

- (d) The company has an email server.

Identify **three** other types of server.

1

2

3 [3]

QUESTION 10.



4 Customers of a bank can access their account information by logging in on the bank's website.

(a) The bank has a client-server model of networked computers.

(i) Describe, using the bank as an example, the key features of a client-server model.

.....

.....

.....

.....

.....

..... [3]

(ii) Give **two** other examples of applications that can use the client-server model.

1

.....

2

..... [2]

(b) The bank's customers log in to the website using a web application.

Explain why the web application uses server-side scripting.

.....

.....

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.....

.....

..... [3]



(c) The bank is upgrading its local area network (LAN) copper cables to fibre-optic cables.

(i) State **two** benefits to the bank of upgrading to fibre-optic cable from copper cable.

- 1
-
- 2
-
- [2]

(ii) State **two** drawbacks of upgrading to fibre-optic cables.

- 1
-
- 2
-
- [2]



- (d) The bank uses a relational database, ACCOUNTS, to store the information about customers and their accounts.

The database stores the customer's first name, last name and date of birth.

The bank has several different types of account. Each account type has a unique ID number, name (for example, regular or saving) and bonus (for example, \$5.00, \$10.00 or \$15.00).

A customer can have more than one account.

Each customer's account has its own ID number and stores the amount of money the customer has in that account.

The bank creates a normalised, relational database to store the required information. There are three tables:

- CUSTOMER
- ACCOUNT_TYPE
- CUSTOMER_ACCOUNT

- (i) Write the attributes for each table to complete the database design for the bank.

CUSTOMER (.....

)
 ACCOUNT_TYPE (.....

)
 CUSTOMER_ACCOUNT (.....

)

[3]

- (ii) Identify the primary key for each table that you designed in **part (d)(i)**.

CUSTOMER
 ACCOUNT_TYPE
 CUSTOMER_ACCOUNT

[2]

- (iii) Identify **one** foreign key in one of the tables that you designed in **part (d)(i)**.

Table name
 Foreign key

[1]



(iv) The following table has definitions of database terms.

Write the correct database term in the table for each definition.

Definition	Term
All the data about one entity	
The data in one row of a table	
A column or field in a table	

[3]

QUESTION 11.



- 6 Dominic uses a tablet computer to complete work. He records videos of his work for his colleagues to watch at a later date.

(a) The tablet computer has input and output devices.

(i) The table lists four devices built into the tablet.

Tick (✓) one or more boxes for each device to identify whether it is an input device, an output device or both.

Device	Input	Output
Touchscreen		
Webcam		
Microphone		
Fingerprint scanner		

[2]



- (ii) An external speaker is plugged into the tablet computer.

The sequence of steps 1 to 7 describes the internal operation of the speaker.

The statements **A**, **B**, **C**, **D** and **E** are used to complete the sequence.

Letter	Statement
A	Changes in the audio signal cause the direction of the electrical current to change. This determines the polarity of the electromagnet.
B	The vibration creates sound waves.
C	An electric current is sent to the speaker.
D	The electromagnet is repelled by, or attracted to the permanent magnet.
E	The electric current passes through the coil.

Write **one** of the letters **A** to **E** in each appropriate row to complete the sequence.

- 1
- 2
- 3 The current in the coil creates an electromagnetic field.
- 4
- 5
- 6 The movement of the coil causes the diaphragm to vibrate.
- 7



(b) The tablet computer's secondary storage is solid state (flash) memory.

(i) Give **one** reason why the tablet computer needs secondary storage.

.....

..... [1]

(ii) Describe solid state memory.

.....

.....

.....

.....

.....

..... [3]

(c) The tablet computer has RAM and ROM memory.

State the purpose of RAM and ROM memory in the computer.

RAM

.....

ROM

..... [2]

(d) Dominic's tablet captures a video of Dominic to send to other people. The video is made of a sequence of images and a sound file.

(i) Describe how the images and sound are encoded into a digital form.

Images

.....

.....

.....

.....

Sound

.....

.....

.....



- (ii) The sequence of images and the sound file create a video. This is sent as a video stream. The video stream can use interlaced encoding or progressive encoding.

Describe the terms **interlaced encoding** and **progressive encoding**.

Interlaced encoding

.....

.....

.....

Progressive encoding

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.....

.....

[4]

- (e) Dominic sends his videos to his colleagues over the Internet using bit streaming.

- (i) Describe how the video is sent using bit streaming.

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.....

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.....

.....

.....

..... [4]

- (ii) Circle either Real-time or on-demand to identify whether the video will be sent using real-time or on-demand bit streaming. Justify your choice.

Real-time / on-demand

Justification

.....

.....

.....

[2]



(iii) Describe the following video terms.

Temporal redundancy

.....

.....

.....

Spatial redundancy

.....

.....

.....

[2]



QUESTION 12.

- 1 In a supermarket, a self-checkout machine allows customers to scan the barcodes and then pay for their shopping. These are an alternative to the traditional cashier-staffed



(a) The self-checkout machine has a touchscreen.

(i) Identify **two** other input devices that self-checkout machines have.

1

2 [2]

(ii) Identify **two** other output devices that self-checkout machines have.

1

2 [2]



- (iii) The touchscreen uses capacitive technology.

The sequence of steps 1 to 6 describes the internal operation of the touchscreen.

The statements **A**, **B**, **C** and **D** are used to complete the sequence.

A	Charge is drawn to the point of contact.
B	The screen has a layer that stores an electrical charge.
C	There is a change in the electrostatic field.
D	The coordinates are sent to the touchscreen driver.

Write **one** of the letters **A** to **D** in each appropriate row to complete the sequence.

- 1
- 2 When the user touches the screen
- 3
- 4
- 5 The coordinates of the point of contact can be calculated.
- 6

[2]

- (b) The self-checkout machines have primary storage.

- (i) Give **two** reasons why the self-checkout machine needs primary storage.

- 1
-
- 2
-

[2]

- (ii) The self-checkout machines use Static RAM (SRAM) for their cache.

The following table has statements about SRAM or Dynamic RAM (DRAM).

Tick (✓) **one** box in each row to identify whether the statement is about SRAM or DRAM.

Statement	SRAM	DRAM
More expensive to make		
Requires refreshing (recharging)		
Made from flip-flops		

[2]



- (c) The self-checkout machines connect to a server that stores all the data for the supermarket. This is a client-server network.

- (i) Describe, using an example for the supermarket, the client-server network mode.

.....

.....

.....

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..... [4]

- (ii) The supermarket is concerned about the security and integrity of the data on the server.

Identify **two** methods that can be used to minimise the security risk to the data, and **one** method to protect the integrity of the data.

Security 1

.....

Security 2

.....

Integrity

.....

[3]