X206/11/01

Attempt Section I and Section II and **one** Part of Section III.

Section I – Attempt all questions.

Section II – Attempt all questions.

Section III– This section has three parts:

       Part A – Artificial Intelligence

       Part B – Computer Networking

       Part C – Multimedia Technology

Choose **one** part and answer **all** of the questions in that part.

Read each question carefully.

Write your answers in the answer book provided. **Do not** write on the question paper.

Write as neatly as possible.

Answer in sentences wherever possible.

Attempt ALL questions in this section.

1. Name the part of the processor that temporarily stores data and program instructions.

   1

2. State **one** reason why computer systems use binary numbers rather than decimal numbers.

   1

3. John's computer is infected by a virus.

   (*a*) Describe **one** way in which a computer virus could be spread.

   1

   (*b*) State the law that is broken by deliberately spreading a computer virus.

   1

4. State the type of *main memory* that stores programs and data permanently.

   1

5. Describe **one** economic factor that has led to the widespread use of computer networks.

   1

6. A digital camera has a built-in computer system.

   Name this type of computer system.

   1

7. A scanner is connected to a computer system using an *interface*.

   Explain why an interface is required.

   1

8. A *macro* is used to carry out a function in an application program.

   Describe **one** method of creating a macro.

   1

9. A program asks the user to enter an eight character password.

   Name the *standard algorithm* that a program would use to check the number of characters in a password.

   1

10. A program asks the user to enter an address.

    State the type of variable used to store the name of a city.

    1

11. Program code must be *readable*.

Describe **one** way of improving the readability of a program. **1**

12. State **one** use of a *text editor* at the implementation stage of the software development process. **1**

13. A program written in a *high level language* must be translated.

Describe **one** benefit to the programmer of using an *interpreter* rather than a *compiler* to translate the program code. **1**

14. New computer software must be documented.

State the name of the document that explains the features available in the new software. **1**

(15)

[*END OF SECTION I*]

[Turn over for Section II

15. Kirsten wants to buy a new laptop.

The specifications of two possible laptops are shown below.

Laptop Name	RACER	CAM 12
Processor	2·6 GHz	2·3 GHz
RAM	3 Gb	2 Gb
Magnetic Drive	500 Gb Hard Drive	750 Gb Hard Drive

(*a*) The RACER laptop has a 2·6 GHz processor.

Explain what is meant by 2·6 GHz.   **1**

(*b*) Kirsten buys the RACER laptop as it has more RAM.

Describe **one** advantage of having more RAM.   **1**

(*c*) Kirsten's old laptop has a *floppy disk drive*.

State **one** reason why modern computers do **not** have floppy disk drives.   **1**

(*d*) Kirsten buys an *optical drive* for the laptop.

State a suitable optical disk that she could use with this drive to save and delete
data.   **1**

(*e*) Kirsten buys a printer to attach to her new laptop. She decides to buy a
laser printer rather than an *inkjet printer*.

State **one** reason why she has chosen the laser printer.   **1**

(*f*) The laptop uses a *character set*.

Explain what is meant by a character set.   **1**

(*g*) The laptop is installed with an *operating system*.

State **one** function of an operating system.   **1**

15. (continued)

(*h*) Kirsten uses her laptop to create a letter to send to her insurance company. She saves the letter using a *standard file format*.

(i) State the standard file format that keeps the **formatting** of the letter.

1

(ii) The finished letter requires **32 Kb** of storage.

Convert this file size into **bytes**.

1

(iii) A laptop is a type of portable computer system.

Name **one** other type of portable computer.

1

(10)

[Turn over

16. An international language school uses a *mainframe computer system* to process candidates' exam results from 50 different countries. A program is being created to analyse these results.

(*a*) State **two** reasons why the language school uses a mainframe computer system to run the program. **2**

(*b*) State the *standard algorithm* the program should use to find the country that has the lowest number of candidates sitting exams. **1**

(*c*) The number of candidates for **each** of the 50 countries needs to be stored.

State the data structure required. **1**

(*d*) One of the program's tasks is to calculate the total number of candidates for **all** 50 countries. Part of the design is shown below.

```
1.   Set overall total to zero
2.
3.         get country total
4.         add country total to overall total
5.   end loop
6.   display overall total
```

Complete step 2 of the design. **1**

16. (continued)

(*e*) The candidate's date of birth is printed on their exam certificate. The program checks that the date of birth is valid.

Date of birth: **day/month/year**

Example: **10/06/1994**

Part of the design used to validate the **month** input is shown below.

2.1	get month
2.2	if _____ then
2.3	display error message
2.4	end if

(i) Complete step 2.2 of the design above. **2**

(ii) This part of the design needs to be repeated until correct.

State the **type** of loop required. **1**

(*f*) The following test data is used to check the **month** of the candidate's date of birth.

Normal	06
Extreme	
Exceptional	13

(i) What could be the missing input for extreme data? **1**

(ii) Explain the importance of thoroughly testing a program. **1**

(10)

[Turn over

17. Dave owns a company called Classic Cars. He decides to employ a software developer to create a program to help him process data. The following design has been created.

```
                        ┌──────────────────────────┐
                        │   Process customer data   │
                        └──────────────────────────┘
         ┌────────────────────────┼────────────────────────┐
┌──────────────────┐    ┌──────────────────────┐    ┌──────────────────────┐
│  Input and store  │    │ Calculate customer bills │  │  Output customer bills │
│   customer data   │    │                          │  │                        │
└──────────────────┘    └──────────────────────┘    └──────────────────────┘
```
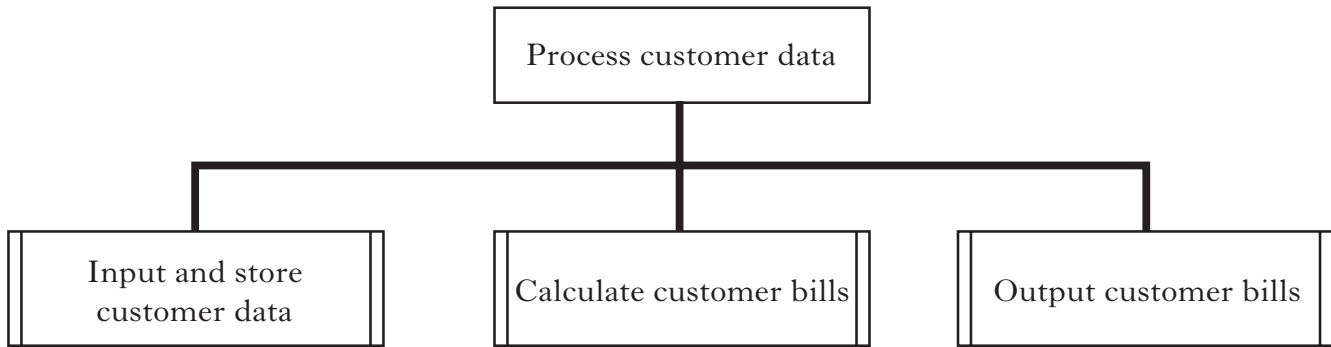
(*a*) State the *graphical design notation* used above.　　　　　　　　　　　　　**1**

(*b*) State the stage of the software development process that involves creating the program code.　　　　　　　　　　**1**

(*c*) The software developer decides to use a *high level language* to create the program.

State **two** reasons why a high level language is used rather than *machine code*.　　**2**

(*d*) The software developer uses *pre-defined functions* within the program.

Explain **one** benefit to the software developer of using pre-defined functions.　　**1**

(*e*) The software developer creates *readable* program code.

State **one** reason why readable code helps future maintenance.　　**1**

(*f*) The program is now complete and fully tested.

State **one** reason why it is important to produce a *technical guide*.　　**1**

17. (continued)

(*g*) Dave decides to advertise his company using a website.
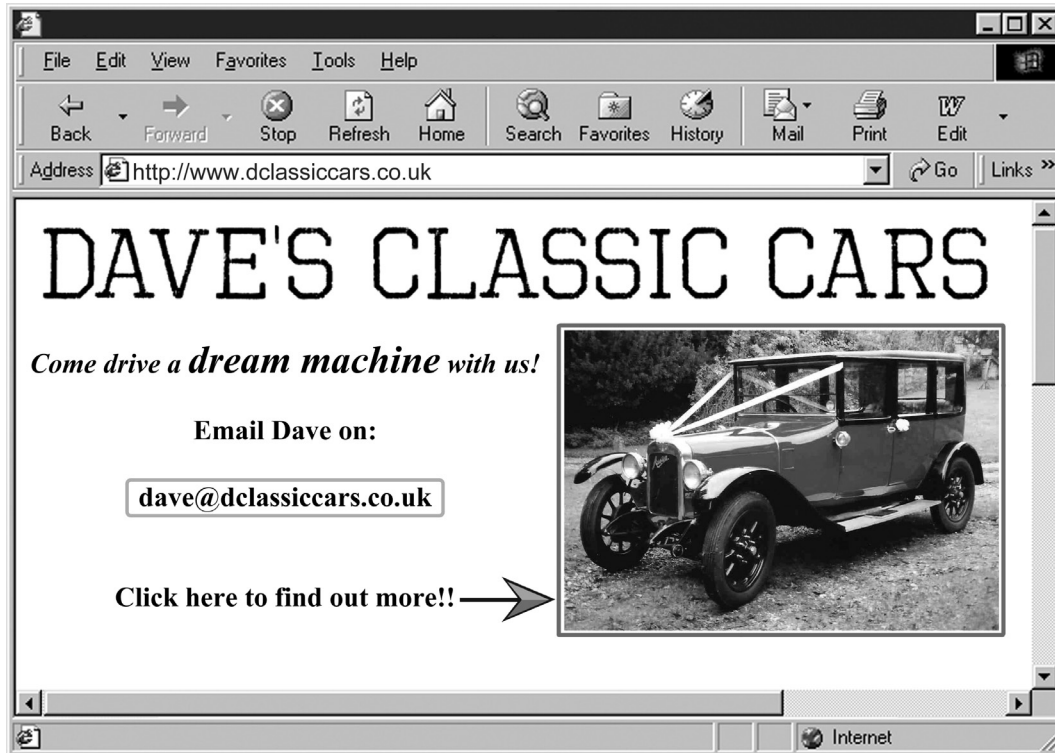
  (i) When a user clicks on the graphic of the car, another page on Dave's website is shown.

      Name this navigation feature. **1**

 (ii) Dave adds a video clip to the website.

      State why high *bandwidth* is recommended for viewing this video clip. **1**

(iii) Apart from cost, state **one** advantage to Dave of using *e-mail* to communicate with customers. **1**

(10)

[*END OF SECTION II*]

[Turn over

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SECTION III

Attempt ONE part of Section III

Choose **one** part and answer **all** of the questions in that part.

[Turn over

Part A—Artificial Intelligence

Attempt ALL questions in this section.

18. DomesticDiva is an intelligent robot that has been programmed to clean floors.

(*a*) DomesticDiva has been fitted with sensors so that it can move about the house without bumping into the furniture.

Name **two** sensors that would help the robot detect the furniture. **2**

(*b*) DomesticDiva responds to spoken commands such as START, STOP and CLEAN.

(i) State the area of artificial intelligence that is being used by the robot to understand spoken commands. **1**

(ii) State **two** factors that may make communication with the robot difficult. **2**

(*c*) DomesticDiva uses artificial intelligence to understand the layout of the house from photographs.

State the area of artificial intelligence that is being used for this task. **1**

(*d*) State **one** development in hardware, other than faster processors, that has made progress in the field of artificial intelligence research possible. **1**

(7)

19. The TV favourite Lions' Den has launched a website to help people get cash investment for their business ideas.
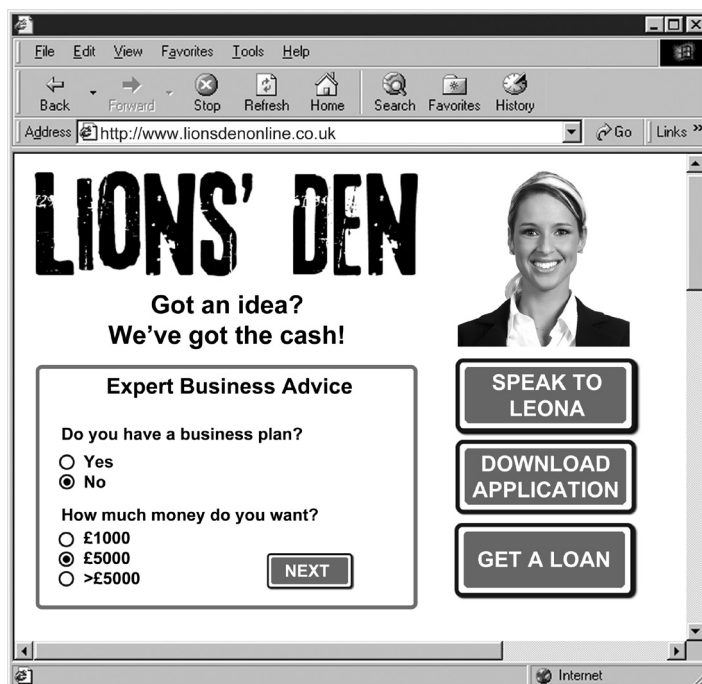
(*a*) An *expert system* can be accessed from the website.

   (i) Explain what is meant by an expert system.   **1**

   (ii) State **two** advantages of using the expert system rather than consulting a human expert.   **2**

(*b*) A natural language program called "Leona" is used to answer simple questions. Leona simulates conversation with a human.

Name this type of natural language processing application.   **1**

(*c*) A user downloads an application form to a palmtop computer system.

State **one** input device that could be used to complete the application form.   **1**

(*d*) Business users can apply online for loans. An *artificial neural system* is used to assess the risk of giving loans.

   (i) Explain what is meant by an artificial neural system.   **1**

   (ii) Describe **one disadvantage** of using an artificial neural system for this task.   **1**

     (7)

[Turn over

20. The Royal Theatre in Newtown is organising a weekend of special events. It uses a knowledge base to store facts and rules about events and tickets. Part of the knowledge base is shown below.

1	showing_on(opera,saturday).	(*Opera is showing on Saturday*)
2	showing_on(dance,saturday).	
3	showing_on(storytelling,sunday).	
4	costs(dance,3).	(*Dance costs £3*)
5	costs(opera,7).	
6	costs(storytelling,4).	
7	suitable_for(dance,adults).	(*Dance is suitable for adults*)
8	suitable_for(opera,adults).	
9	suitable_for(storytelling,children).	
10	family_show(X) if suitable_for(X,children).	(*X is a family show if* *X is suitable for children*)
11	get_free_ticket(X) if costs(X,Y) and Y>5.	(*Get a free ticket for X if X* *costs Y and Y is greater than £5*)

(*a*)   (i)   State the result of the following query:

   ? showing_on(dance,sunday).   **1**

   (ii) State the result of the following query:

   ? family_show(X).   **1**

(*b*) Using the numbering system to help you, *trace* how the system will evaluate the query:

   ? get_free_ticket(X).   **4**

(*c*) One way of representing information before creating a knowledge base is by using a *semantic net*.

   (i)   Draw a semantic net to represent the facts:

      likes(jess, comedy).
      likes(jess, dance).
      features(dance, ballet).   **3**

   (ii) Name the stage of the software development process at which a semantic net will be drawn.   **1**

20. (continued)

(*d*) The following search tree illustrates a search through a knowledge base.
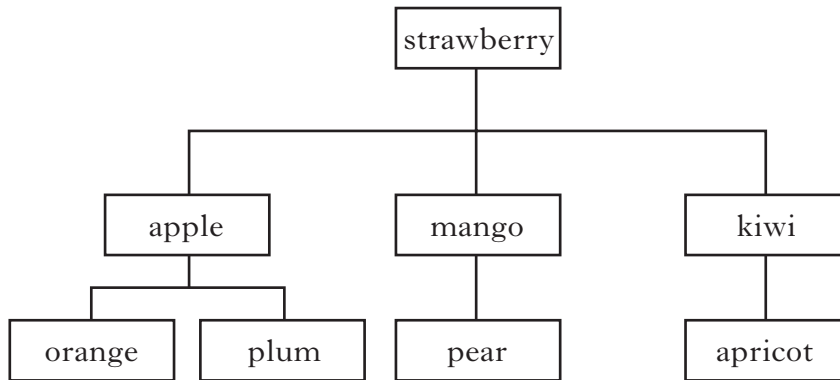
The solution to the problem is pear.
The nodes are visited in the following order:

　　strawberry　　apple　　mango　　kiwi　　orange　　plum　　pear

State the type of search that has been used here.

1

(11)

[END OF SECTION III—PART A—ARTIFICIAL INTELLIGENCE]

[Turn over

Marks

21. The BST bank uses the Internet to advertise, sell financial services and communicate with customers. By using the Internet the bank has saved money on staffing and other costs.

(*a*) Apart from costs, state **two** other advantages to the **bank** of using the Internet for these purposes.　　**2**

(*b*) Bank customers can download an application program from the bank's website to view balances on their mobile phone.

State the Internet service that is used to download the application program.　　**1**

(*c*) Mobile phones use *WAP* technology and *microbrowsers*.

　(i) What is a microbrowser?　　**1**

　(ii) State **one** reason why mobile phones use microbrowsers.　　**1**

(*d*) The bank upgrades the website to allow customers to transfer money between accounts.

Name the stage of the software development process being carried out.　　**1**

(*e*) The bank's website has a help page. Customers use the following URL to access this help page:

　　http://www.bstbank.co.uk/help

　(i) Name the *protocol* used by this URL.　　**1**

　(ii) Describe how the *Domain Name Service* (*DNS*) would find this URL on the Internet.　　**2**

　(iii) State **one** limitation of using *domain names* across the Internet.　　**1**

(10)

22. The McTavish family connects their three computer systems and a printer wirelessly within their home.

(*a*) Name this type of network. **1**

(*b*) State **one** additional hardware requirement for setting up this network. **1**

(*c*) State **one** advantage of using a wireless connection compared to a cabled connection. **1**

(*d*) They now decide to connect their three computers to the Internet.

State **one** reason why they need an ISP. **1**

(*e*) The family access the Internet to stream video.

State the type of Internet connection required for this task. **1**

(*f*) Describe **one** *software security* feature the parents could use to prevent the children accessing inappropriate content on the Internet. **1**

(*g*) Explain what the family should do to avoid accidentally downloading computer *viruses* from the Internet. **1**

(7)

[Turn over

23. A data transmission company installs and sells Internet connections.

(*a*) State **two** reasons why there is no longer a demand for the company to supply and install *dial up modems*. **2**

(*b*) The police are interested in purchasing a fast, secure and dedicated connection to the Internet.

  (i) State the type of connection the company should recommend to the police. **1**

  (ii) State **two types** of network threats that could lead to failure of the police computer network. **2**

(*c*) The company also sells *encryption* software.

Explain what happens when data is encrypted. **1**

(*d*) The company is investing in televisions that allow multi-user gaming across the Internet.

  (i) State **one** other task this type of television could perform to suggest it is an appliance that uses *converging technologies*. **1**

  (ii) State **one** other example of an appliance that uses converging technologies in the home. **1**

(8)

[*END OF SECTION III—PART B—COMPUTER NETWORKING*]

Part C—Multimedia Technology

Attempt ALL questions in this section.

24. Nihal is creating a website for a local cycling shop to advertise mountain bikes for sale and cycling skills courses.

(*a*) Nihal discusses the requirements of the website with the manager of the cycling shop.

Name the stage of the software development process that Nihal is carrying out. **1**

(*b*) Nihal takes photographs for the website using his digital camera.

(i) The digital camera makes use of a CCD.

Describe the function of a CCD in a digital camera. **1**

(ii) Each photograph has a file size of 2·4 Mb. The digital camera memory card has a capacity of 2 Gb.

Calculate how many images can be stored on the memory card.

Show all working. **2**

(iii) Nihal edits Photograph A to produce Photograph B as shown below.

State which feature of the image editing software Nihal has used. **1**

Photograph A   Photograph B

(iv) Nihal's photographs are saved as JPEG files. JPEG files use *lossy compression*.

Explain what is meant by lossy compression. **1**

(*c*) Nihal is advised to use a *WYSIWYG editor* to create the website.

(i) Describe how a WYSIWYG editor would be used to create his website. **1**

(ii) Name **one** other method that could be used to create the website. **1**

(*d*) Nihal records a video on bike maintenance for the website. He saves the video file and then uploads it to the website for viewing.

   (i) State the **most appropriate** item of hardware that is used to capture video. **1**

   (ii) State **one** file type that could be used to store the video. **1**

   (iii) The video is very jerky when played.

   Explain how Nihal could alter the settings in the video recording software to ensure that the video is not jerky. **1**

   (11)

25. Homes4U has a multimedia DVD to advertise its luxurious flats.

(*a*) The background music for the DVD was recorded using a microphone.

The recording software allows the settings to be altered.

Select Settings:

A →

O 44 kHz

O 96 kHz

← B

O 8 bits

O 16 bits

Cancel   OK
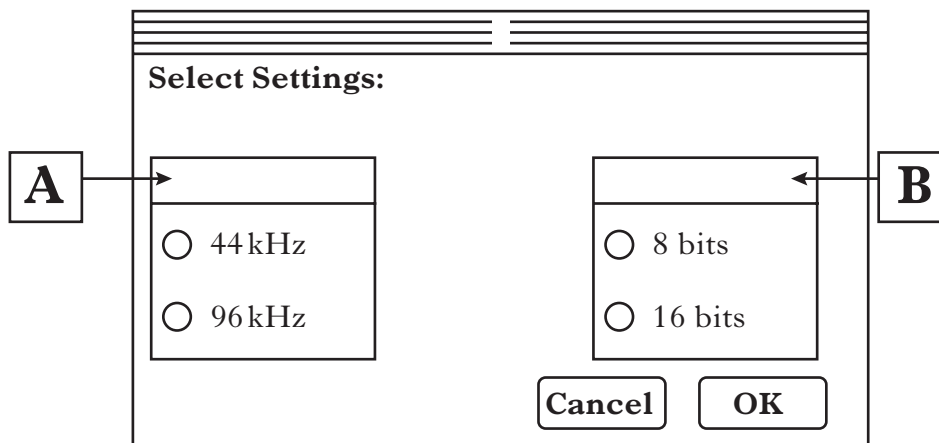
   (i) State the name of the setting for A. **1**

   (ii) State the name of the setting for B. **1**

   (iii) State which *standard file format* for digitised sound would give the best quality sound with the smallest file size. **1**

   (iv) Instead of recording sound with a microphone, the sound could have been synthesised.

   (A) Describe **one** way of creating sound in this way. **1**

   (B) State the file format that would be used to store the information from the synthesised music. **1**

25. **(continued)**   *Marks*

(*b*) The DVD includes a *virtual reality* guide to the luxurious flats.


   (i) Explain the benefit of using virtual reality rather than a slideshow of images to advertise the flats. **1**

   (ii) State **one** specialised input device that could be used with this virtual reality application. **1**

(*c*) Multimedia files can be run as executable files.

State **one** other way that you could run multimedia files on a computer system. **1**

(8)

[Turn over

26. A *vector graphics package* was used to create a company logo for a local optician.
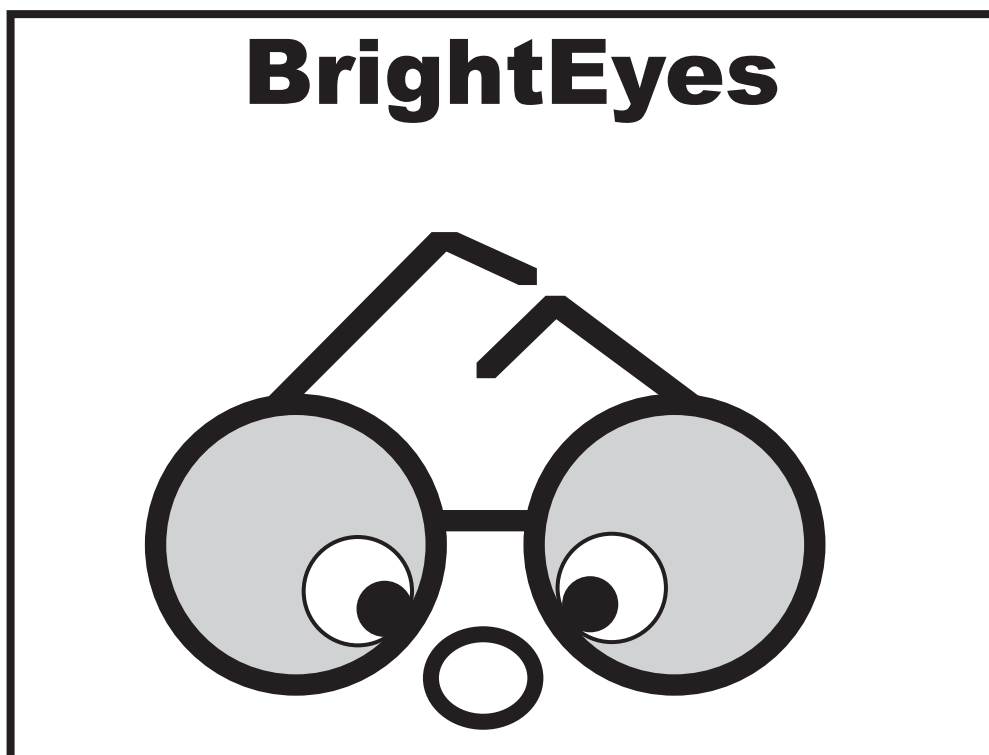
(*a*) Name **two** attributes of the circle objects used in the logo. **2**

(*b*) Name **one** file type used to store graphics in vector format. **1**

(*c*) Describe **two** advantages of a vector graphic over a bit-mapped graphic. **2**

(*d*) The logo is displayed on a large monitor in the optician's window.

State the item of hardware that is required to display graphics on the monitor. **1**

(6)

[*END OF SECTION III—PART C—MULTIMEDIA TECHNOLOGY*]

[*END OF QUESTION PAPER*]

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