INFORMATION TECHNOLOGY

Paper 9626/11
Theory

There were too few candidates for a meaningful report to be produced.

INFORMATION TECHNOLOGY

Paper 9626/12
Theory

Key messages

Responses showed some level of understanding although responses to questions on some areas of the syllabus lacked detailed knowledge. Questions which required a recall response were generally well answered, particularly where short answers were required. However, responses to questions that required candidates to apply their knowledge and understanding sometimes lacked the accuracy and level of detail required at this level.

A Cambridge International list of command words that are used in questions is published and explains what each word requires from candidates. It is very important that, when answering questions, candidates read the rubric and answer the questions in the appropriate manner. For example, evaluation requires candidates to judge or calculate the quality or importance of something. A detailed answer is needed, which cannot be achieved by writing bullet points. To gain full credit, candidates must produce a reasoned evaluation that weighs up the advantages and disadvantages for the given scenario/context. Similarly, questions that ask candidates to 'analyse' or 'discuss' require detailed responses that include a proper analysis or discussion, rather than short or bullet-pointed responses.

To ensure candidates achieve credit for their knowledge and application, they must ensure handwriting is not rushed and can be easily read.

Mark schemes are published for use by teachers in preparing candidates for exams. Some examples were seen of candidates relying too heavily on past paper mark schemes in formulating their answers, with mark scheme points from previous sessions reproduced on scripts. These responses were not appropriate for the given scenario and did not have the accompanying discussion, evaluation etc, so did not gain credit.

General comments

At this level, it is expected that technical terms will be used accurately in responses, but this was not always seen. Some answers were too vague to gain credit.

Candidates are advised to list their thoughts in rough before writing their full response to a question. This allows them to choose and elaborate on items from the list that are appropriate to the question scenario.

Candidates are reminded that brand names for software should not be used in responses.

Topics that proved to be particularly challenging were MIS, updating of master files and validation. It is expected that candidates will demonstrate detailed knowledge of these. Whilst responses demonstrated a basic grasp of generic file formats and VPNs, they often did not evaluate or produce arguments for and against these.

Comments on specific questions

Question 1

This question was well answered, with many candidates gaining at least partial credit. **Part 1(a)** and **1(c)** were particularly well answered.

(a)   The vast majority of responses had the correct answer ticked. The most common error was to think that vishing involved the use of a text message to persuade people to reveal personal data.

(b)   Many responses correctly identified not answering the phone to unknown numbers and not divulging personal details. Some responses suggested phoning the bank, but very few mentioned this should be done from another phone or after a suitable delay.

(c)   The majority of responses identified that smishing involves SMS texts although a small minority incorrectly indicated that it was to do with emails.

(d)   A number of incomplete answers were seen to this question. A significant number of responses contained descriptions of how you might recognise a fraudulent website once you had clicked on the link and went on to say that you should not divulge personal information. Several candidates thought that not opening a text message was sufficient defence against smishing.

Question 2

This question was very well answered, though **part (b)** was not answered quite as well as **part (a)**.

(a)   The vast majority of responses had the correct option ticked. Occasionally, option one or two were selected incorrectly.

(b)   The vast majority of responses had the correct option ticked. On a very small number of responses, the first option was ticked.

Question 3

This question was reasonably well answered, with most candidates gaining at least partial credit. **Parts (a)(ii)** and **(b)** proved more challenging than the other parts.

(a) (i)   This question was very well answered. The common errors seen were referring to formulae or being inexact with language, which introduced ambiguity to the response. For example, writing 'the total of all the cars', which might have meant the number of cars rather than the total value of the cars.

(ii)   Many responses gave detail about how the IT specialist typed in the formula, rather than explaining how the software calculated the result. A lot of responses mentioned 'criteria 1' and 'criteria 2' etc., suggesting candidates had not understood the 'step by step' part of the question.

(b)   This question was challenging for candidates, with few responses fully describing how the drop-down list could be achieved. Some responses mentioned the use of a drop-down menu or list but did not go on to explain how this could be produced. Many responses mentioned copy and paste in general terms, while some described methods which still involved using the keyboard.

(c) (i)   This part was quite well answered, with most responses referring to comma separated values.

(ii)   The majority of responses described at least one change that would occur. Common valid answers related to formatting and formulae.

Question 4

Responses to questions on data validation often lack detailed explanation, and this question proved challenging for candidates. Many responses incorrectly indicated that the limit check would check the length of the payroll number and ensure no more than 6 characters were entered. Rather than analysing the given validation checks, some responses contained details of better validation checks that could be used. Candidates should always be careful to read back what they write. For instance, examples of the dates were given in the question in the form dd/mm/yyyy. Some candidates attempted to describe format checks on these dates as dddd/mmmm/yyyy, dd:mm:yyyy, dd/mm/yy or others. Overall, format check seemed to be better understood than limit check.

Question 5

Very few fully correct responses to this question were seen. Many responses demonstrated a lack of detailed knowledge of the use of master and transaction files in payroll. Errors included references to relational databases and to the use of spreadsheets and lookup functions. In some responses, the 'D' and 'S' codes were confused, thereby producing incorrect answers. Other responses gave general definitions of batch

processing. There was little evidence of the field names and values given in the question being used in the answers.

Question 6

Many responses to this question were based on mark schemes from previous exam questions on this topic and did not use information given in the question. As this conference is a weekly occurrence, Josefine would not need to buy or obtain the equipment each week. A lot of responses included a list of the hardware she would need, but said nothing about checking the microphone and webcam. Some responses included brand names and others were superficial, general answers which gained little credit. Some responses detailed what would happen after the conference had started, which was not relevant to the question asked. Referring back to the question and scenario from time to time is often helpful when answering questions.

Question 7

Overall, the question was well answered, but some responses demonstrated that candidates thought a linker was an interpreter. The concepts of source code and object code were often confused. Many responses detailed what a compiler does. However, several responses compared a compiler with an interpreter, with some giving the advantages and disadvantages of these.

Question 8

Many responses to this question were incomplete, omitting to include the reason that alternative data types would not be suitable. The word integer was not understood by some candidates.

(a)   Many responses correctly identified text as the answer but did not give a reason why an alternative data type would be unsuitable. Many responses incorrectly suggested integer. This was not appropriate because the example has a leading zero and includes spaces.

(b)   Where candidates identified decimal or real as a correct answer, many did not explain why it was the most appropriate data type.

(c)   Many responses correctly identified integer as the correct answer but did not say why text or decimal data types, for example, would not be sensible.

(d)   Many responses correctly explained why Boolean was sensible.

(e)   Many responses correctly identified currency as the correct answer but did not explain, for instance, that a decimal data type could not be used as it would not display the currency symbol.

Question 9

In general, this was not a well answered question, with many responses not including the use of questionnaires, interviews or observations. Many responses referred to the importance of accuracy, rather than describing how the method of collection affected accuracy. A significant number of responses did not mention methods at all, with many including information about direct and indirect data. Some responses contained information about static and dynamic data, which are not methods of collection.

Question 10

This question produced some good responses which gained at least partial credit. Strong answers referred to txt format having a small file size or saving storage space. Other valid points made were that it could be opened in many applications, that images or videos could not be embedded and that it could not contain tables. However, there was much use of software brand names in the answers.

Question 11

This question proved very challenging, with many responses lacking detail about MIS. Most responses explained the meaning of MIS but did not adequately describe how a manager would use it. Very few responses included points other than how management information systems can be used to produce graphs and reports. Many responses discussed this in terms of general databases, which was not enough to answer the question properly. Other valid points that were made usually related to decision making and producing

predictions. Other aspects such as project management, analysing data and evaluating company performance were very rarely covered.

Question 12

(a)   Responses to this question were was often quite low-level, and not detailed or accurate enough for Advanced Level. Many responses described software as something that cannot be touched or said that it was non-physical or intangible, which gained them no credit at this level. Some responses did mention the two types of software, though some of these got one of the names incorrect.

(b)   Credit was often gained for giving examples of application and system software. However, some responses did not use the correct names for the two types of software. Some responses contained brand names in their examples, and many responses were too general to gain credit. Often candidates stated that the two types of software were operating system or utility and application software.

Question 13

This question was not very well answered because many responses focused on home working and only briefly touched on the VPN. Valid points that were made included VPNs providing security when transmitting data, but decreasing internet speed. Some responses also identified that the company has little control of the VPN. Many responses included general points with insufficient detail, for example referring to costs without expanding the answer sufficiently. Answers involving expense or lack of expense of any system should always be justified.

INFORMATION TECHNOLOGY

> **Paper 9626/13**
> **Theory**

Key messages

Questions which required a recall response were generally well answered, particularly where short answers were required. However, responses to questions that required candidates to apply their knowledge and understanding often lacked the accuracy and level of detail required at this level. On much of the paper some expansion and detail was required. It was not sufficient to give brief answers.

A Cambridge International list of command words that are used in questions is published and explains what each word requires from candidates. It is very important that, when answering questions, candidates read the rubric and answer the questions in the appropriate manner. For example, evaluation requires candidates to judge or calculate the quality or importance of something. A detailed answer is needed, which cannot be achieved by writing bullet points. To gain full credit, candidates must produce a reasoned evaluation that weighs up the advantages and disadvantages for the given scenario/context. Similarly, questions that ask candidates to 'analyse' or 'discuss' require detailed responses that include a proper analysis or discussion, rather than short or bullet-pointed responses.

To ensure candidates achieve credit for their knowledge and application, they must ensure handwriting is not rushed and can be easily read.

General comments

At this level, it is expected that technical terms will be used accurately in responses, but this was not always seen. Some answers were too vague to gain credit.

Candidates are advised to list their thoughts in rough before writing their full response to a question. This allows them to choose and elaborate on items from the list that are appropriate to the question scenario.

Candidates are reminded that brand names for software should not be used in responses.

Topics that proved to be particularly challenging were utility software, the difference between monitoring and control, types of malware and parameter queries. It is expected that candidates will demonstrate detailed knowledge of these.

Comments on specific questions

Question 1

This question was well answered, particularly **part (a)**.

(a) The vast majority of responses had the correct answer ticked. A very small minority of responses incorrectly indicated that a motor was an input device.

(b) While most responses had the correct answer ticked, the statement relating to a dot matrix printer was selected on some responses. Some lack of understanding of exactly what a dot matrix printer is may have contributed to this. Some confusion about output devices was evident on a small number of responses which incorrectly selected either a webcam or sensor as an output device.

(c) Many responses gained partial credit, often by referring to volatility and size of storage. When contrasting primary storage (RAM and ROM) with secondary storage, however, some responses coupled them together with statements such as 'RAM and ROM are volatile'. This is only partially correct.

Question 2

(a)   The majority of responses had the correct answer ticked. Option 1 and option 4 were the commonly selected incorrect answers.

(b)   Most responses had the correct answer ticked, with the remaining responses incorrectly selecting option 1 or option 3.

(c)   This question proved very challenging for candidates. The use of a delete utility and the idea that only the reference to a file is deleted when a file is apparently deleted from a disc was not well explained. Many responses referred to proprietary software such as 'recycle bins' or 'trash' and seldom included technical explanations.

Question 3

This question was not generally well answered, but most candidates performed better on **part (a)** than they did on **part (b)**.

(a)   The concept of monitoring proved challenging for candidates. Few examples of different sensors used to monitor the level of pollution were given, with humidity sensors being mentioned quite frequently. Some understanding of the need to convert analogue to digital signals was apparent, but many responses went on to say that, having detected pollution, the computer would in some way change the atmosphere. This showed a lack of understanding of the problem and an apparent desire to fit a past mark scheme to this question.

(b)   Many responses to this question lacked detail about the technologies involved and did not give an adequate description of the similarities and differences between the two systems. Responses that did gain credit usually did so by describing similarities, such as both systems using sensors and analogue to digital conversion.

Question 4

Most responses gained at least partial credit for this question, particularly for **part (b)**.

(a)   Many responses wrote about user interfaces in general, rather than describing how this component of an expert system is used to diagnose faults with a printer, as required by the question. Some gave detailed descriptions of a GUI, which was not required. Many responses confused the user interface with the inference engine and described how the system would interpret the symptoms.

(b)   The difference between the inference engine and the knowledge base was sometimes blurred here, with answers which would have been appropriate for **part (c)**, the knowledge base, being included. However, some strong responses were seen.

(c)   Some strong responses, describing the knowledge base as a collection of facts and rules collated by experts, were seen. However, other responses gave very vague descriptions which mainly re-worded the phrase 'knowledge base'.

Question 5

This question was not well answered, with some responses not containing any valid points. Many responses described validation and verification, while others suggested giving the chapter to someone else to read. The most commonly seen correct point was the need to identify and correct grammar and spelling errors.

Question 6

This question was quite well answered. There was some understanding shown about the differences between Blu-ray discs and DVD discs. Most responses gained some credit on this question, usually for storage capacity and higher quality videos. However, some responses used phrases such as quicker or cheaper without saying in what way. Care should always be taken when referring to Blu-ray to make the distinction between Blu-ray discs and Blu-ray drives.

Question 7

This question was not very well answered, although many responses gained partial credit.

(a)   The malware known as 'rootkit' was not well defined. Although most responses indicated that it was detrimental to computers, there was little description of what it actually did. The most common correct point was that a rootkit is designed to provide continued privileged or administrator access to a computer.

(b)   Malicious bots seemed to be better understood, with some responses describing several types. Detailed descriptions of spambots and zombiebots were seen. Candidates should always reread what they have written to make sure that their answers reflect what they meant to write, and should avoid the use of etc. in their descriptions.

(c)   Ransomware was generally understood, including the concept of paying a ransom. Other properties of ransomware were often omitted from responses.

Question 8

The strongest responses gave detailed descriptions of the differences between a compiler and an interpreter. However, other responses did not demonstrate understanding of these two types of software, with some responses confusing the two. This can be caused by learning descriptions by rote and then demonstrating a lack of understanding by transposing the two.

Question 9

This question was well answered. Most responses indicated understanding of the characteristics of Wide Area Networks and Local Area Networks. However, incomplete statement or lack of clarity sometimes meant credit could not be awarded. For example, 'LAN is only used in a certain area' is too vague to distinguish it from WAN.

Question 10

This question was also answered quite well, with many responses gaining credit. **Part (a)(iii)** proved the most challenging for candidates.

(a) (i)   This question was well answered, with most responses describing a primary key and giving an example from the supplied tables. Many responses, however, did not expand their definition of a primary key or provide a second example in order to gain full credit.

(ii)   The concept of a foreign key was less well understood, though most responses gave a correct example from the data supplied.

(iii)   The majority of responses did not define what a compound key is and consequently could not provide an example.

(b)   The majority of responses gained at least partial credit, usually by describing the relationships between the tables, although not necessarily how they were created. Many responses also named a type of relationship, usually concentrating on only one example.

(c)   While most responses gained some credit by identifying the two correct checks, responses were often incomplete as the checks were not described in detail. Some responses described one validation check but chose an incorrect second check.

Question 11

This question proved very challenging. The concept of dynamic and static parameter queries was not well understood, so the differences between them were not well described. Many responses confused these types of query with the concepts of static and dynamic data. Very few described the need to rewrite a static query if the parameters had to be changed.

Question 12

Although many responses gained partial credit, there was a lot of confusion between a 'network' and 'the internet'. The advantages and disadvantages were between stand-alone computers and networked computers within a school. The question asked about the advantages and disadvantages to students, but many responses described the advantages to teachers or administrators. Setup costs and the need to pay technicians/network managers were frequently mentioned without saying how these were an advantage or disadvantage to the students.

INFORMATION TECHNOLOGY

> **Paper 9626/02**
> **Practical**

Key messages

For this examination, the main issues to note are:

- Candidates would benefit from a better understanding of how to apply efficient conditional formatting within a spreadsheet.
- Candidates must ensure that they submit a single version of each completed file in the specified file format and with the specified filename.
- Candidates would benefit from being able to crop an image as specified.
- Candidates should apply more precision to the timing of objects within their video clips.
- Candidates should become more familiar with applying their theoretical knowledge to practical tasks.

General comments

A significant number of candidates did not submit all the required files in the specified file types. A significant number of candidates omitted one or more of the required files to be submitted for assessment, or submitted the containers for their working files but not the finished product (for example, files were submitted in .wlmp format, which is a container holding pointers to individual component files stored on a local (or networked) drive). When these files are uploaded the contents cannot be viewed and therefore marks cannot be awarded to the candidates. A number of candidates submitted files in .pproj or .3gp format. Most candidates performed well on the video editing questions but less so on the spreadsheet questions. In particular, the application of efficient formulae and functions to solve problems and the application of conditional formatting to ranges of cells proved challenging for candidates.

Comments on specific questions

Question 1

The majority of candidates did not format the text in the 'heading' cells to be a consistent size and larger than the body text, nor did they wrap the text as shown on the question paper. The use of 'soft returns' to move text onto another line in wrapped cells was rarely seen, with many candidates, inefficiently, inserting additional spaces to try and gain the required layout. A significant number of candidates did not centre align the text in column C as shown in the question appear.

Question 2

The use of simple functions such as SUM and simple arithmetic operators in cells were frequently completed well, although a small number of candidates used inefficient methods, such as inefficient use of the sum function or repetitive addition. A range of different solutions were seen, with few candidates using additional ranges of cells to assist them in solutions to the more complex formulae, for example in column AX. The conditional formatting part of this step proved very challenging for candidates, with few candidates selecting the whole range of cells and applying a single condition for each of the three required colour schemes. The candidates who successfully completed this step used both absolute and relative cell referencing within their conditional formatting formulae. Many candidates did not calculate the percentage of buses that were later than expected, and others did not apply a suitable % format to the cell.

Question 3

Few candidates successfully created a second identical spreadsheet in the same workbook. Most submitted the Arrive workbook with a single spreadsheet, although many had successfully changed the background colour and removed the required rows. Not all candidates removed the conditional formatting from all cells.

Question 4

The accuracy of data entry was not always evident when editing the text in the merged cell A4:A16. A significant number of candidates did not enter any formulae into column B or the range D4 to AW16. Some candidates attempted to use the Stage spreadsheet within these formulae and there were a number of different methods attempted by candidates. Where candidates attempted to apply conditional formatting to this data, many applied the correct colour scheme but few used formulae that gave the correct results.

Question 5

Almost all candidates set the aspect ratio of the frames to 16:9, although some of these left the frame dimensions set to 1920 × 1080 instead of the required 854 × 480. Many candidates completed this step with 100% accuracy. There were submissions where the sound remained. Some candidates did not remove the first 12.5 second from the clip. Most candidates slowed down their clip to half speed, even where they had selected the wrong part of the clip or omitted the 2 second duration. Most candidate saved the clip in mp4 format, but not all saved it with the resolution specified in the question paper, resulting in some relatively large file sizes for a short video clip.

Question 6

Almost all candidates took a still image but not all were from the end of their video clip. The majority were saved in an appropriate format.

Question 7

Most candidates successfully split the clip, edited the speed in the second section and spliced the clip to successfully create a new clip of 8 seconds duration. A small number of candidates did not save the video clip as instructed at this step.

Question 8

Most candidates completed many elements of this with 100% accuracy and a number of different approaches were seen. A few candidates did not place the background image 20-Bus.jpg at the start of the clip. Most introduced the name of the company as specified, although fewer candidates added an appropriately sized subtitle with 100% accuracy in the bottom right corner. Most candidates started the audio clip after 4 seconds. A significant number of candidates did not leave the title text in place on the background when adding the subtitle. Most candidates added their clip 'TPT'. Most candidates added the image 20-NewBus.jpg but did not crop this image. Of those candidates who did, not all considered the aspect ratio of the frames and so produced a still image that did not fit seamlessly with the rest of the video. Most candidates placed the next two still images at the specified timings. The video clip saved in step 5 was placed correctly by the majority of candidates, as was the still image from step 6, although this was not always used as a background for the credits. Not all candidate placed their credits to scroll up the right half of the screen, instead using the default settings of their package. Not all credits were appropriate and contained sufficient information. The text supplied in the question for one element of the credits frequently contained typographical errors.

Question 9

Almost all candidates completed this step as specified, although some exported it in the wrong file format or did not export their video from their video editing package.

INFORMATION TECHNOLOGY

| Paper 9626/32 |
| Advanced Theory |

Key messages

Some good responses that displayed strong subject knowledge were seen. However, answers are expected to be in some detail at A Level and many responses lacked sufficient detail to gain credit. Some responses were also vague or generic, with knowledge not being applied to the contexts set in the questions. It is vital that candidates read the information given in the short scenarios so that they can apply their knowledge when answering the subsequent questions. Answering questions without referring to the scenario, or writing about a topic with little reference to the question as set, will not give access to the full range of available marks.

Credit will not be given for repeating statements made in the questions.

General comments

The syllabus shows a list of command words that are used in questions and the list explains what each word requires from candidates. It is very important that, when answering questions, candidates read the rubric and answer the questions in the appropriate manner.

Some candidates created numbered bullet points for questions that required free responses. These answers rarely produce more than simple points or short statements with no descriptions, explanations or comparisons. When answering questions that ask candidates to 'explain', 'describe', 'evaluate', 'analyse' or 'discuss' a topic, candidates should write in continuous prose so that they can expand and elaborate on their discussions.

Few candidates omitted questions. Candidates are advised to attempt all questions. Most candidates who used additional pages properly cross-referenced these to their answers. This ensures that the full responses can be seen and marked by the examiners. Candidates who need additional space should always use clearly labelled additional pages and should not write on the margins or other blank spaces.

Answers that candidates do not want to be marked should be clearly crossed though and a note added to indicate where the intended answer is written.

Comments on specific questions

Question 1

(a) This question required candidates to explain terms that are used when programming with JavaScript. The terms have specific meanings when used in the context of JavaScript and it is expected that candidates know these. Some good answers were seen, but many responses were vague and lacked detail. This question was often omitted.

   (i) A string in JavaScript is characterised by being inside quote marks. A good answer would have noted that a string is a collection of characters placed inside single or double quotes.

   (ii) The term global refers to a variable that is outside a function and can be referred to from anywhere in a script or is a value assigned to an undeclared variable. Good answers would have made these points. Many candidates erroneously referred to the term 'global' as being 'worldwide' and did not refer to the term in a JavaScript context.

   (iii) Responses to this question were often vague and out of context. A common incorrect answer was that a 'regular expression' is one that is used often or repeatedly. This is not how it is used in a

JavaScript context. Good answers would have referred to a regular expression as a sequence of characters that form a search pattern used with functions to search strings or as a description of what is being searched for.

(iv)   Most responses correctly indicated that an operator is a sign used to compare, assign or calculate values.

(v)   Good answers would have explained that statements are instructions that are executed by a web browser when the code/script is run.

(b)   This question required candidates to describe how `console.log()` is used in JavaScript. Strong answers included references to it being used for testing or debugging purposes, writing messages into the browser console and the information being in brackets. A common incorrect response was to repeat the question by stating that it is used to 'output data for display' in a browser.

Question 2

(a)   This question asked candidates to describe the use of static routing tables. Strong answers referred to their construction by network administrators, the fixed nature of the entries in the table and the fixed nature of the routes that packets should take. Few responses provided additional descriptions of the use of the tables as fail-safes if any dynamic routing does not provide a route, or of the transfer of the tables from router to router.

(b)   Strong answers included references to the automatic updating of the tables by algorithms that take into account real-time network conditions, the sharing of the table data between routers and their use to avoid network issues such as the loss of a router from the network. As for **part (a)**, few responses contained detailed information, such as information about hop counts and limits.

Question 3

(a)   Many strong answers describing the features of alpha and beta testing were seen. The most common error was to transpose the details of the testing.

(b)   Strong answers referred to the use of technical documentation by technicians not involved in the development, use in amending the software by other programmers, understanding the data flow and the use when writing user documentation. A common error was to refer to testing and maintenance. The question asked for reasons *other* than for testing and maintenance.

(c)   Strong answers were seen that referred to the importance of maintenance for detecting and correcting errors in the program code, improving the functionality of the DBMS and modifying the DBMS.

Question 4

(a)   Strong answers referred to ensuring that management and staff are prepared and trained for the changeover to determine what needs to be done at and after changeover, ensuring that data is properly backed up, confirming the compatibility of hardware etc. and transferring and testing the data afterwards. As the question was about preparing for the implementation and the steps that need to be taken after the changeover, a description of the actual changeover was not required.

(b)   This question was well answered, with references to the benefits of the new system being immediately available to all users and the changeover happening at a convenient time.

(c)   This question was well answers, with references to the old system not being available for use if the new system fails and the potential loss of data if old backups cannot be restored to a new system.

Question 5

(a)   Strong answers described scanning the fingerprints, storing the biometric data, the comparison of scanned fingerprints with the stored data and the actions taken following the comparison. A common error was to describe the benefits and drawbacks of biometrics, rather than describing the use of biometrics in the context given in the questions.

(b)   Strong answers referred to biometric data being unique to the individual, making it suitable for access control as it is more secure. They also identified that biometric data is always with the individual so cannot be forgotten or lost, but that biometric characteristics may change over time, so a rescan may be required. Additionally, staff may object to their data being taken and stored. Evaluations must refer to both the advantages and disadvantages. To gain full credit, responses needed to make points about the use of biometrics and make judgments on how suitable, or not, biometrics are for access control.

Question 6

This question required candidates to discuss the advantages and disadvantages of the use of data mining for analysing social trends. The question did not require description of how data mining is carried out but of how it is used. Strong responses referred to the use of data mining for the prediction of future trends, its use in decision making, the possible invasion of privacy, uncertainty about the accuracy of the data and the possible misuses of the data. Discussions must have a combination of the advantages and disadvantages to gain full credit.

Question 7

(a)   Strong answers referred to the work breakdown structure (WBS) technique used to divide project/activities into smaller activities, network diagrams showing connected activities and their interdependencies, the determination of activity timings and the use of PERT and Gantt charts. Responses needed to explain how these are used, rather than what they are.

(b)   This was a "discuss" question so both advantages and disadvantages of using online project management software were required. Strong answers referred to the centralisation of resources and data, the accessibility from anywhere that has a suitable internet connection, the accessibility from different devices that allows users to collaborate and the reduced functionality compared to specialised software e.g., the creation of Gantt charts, the requirement for a compatible web browser and the concerns about data security.

Question 8

This question elicited good responses with accurate references to the current use of robotics in space exploration. These responses gained credit because they were restricted to robotics in use today. Weaker answers were generic in describing the fact that robots can go where humans would not be safe, can work continuously and can affect employment. Also, responses that described the science fiction depiction of humanoid robots exploring planets and solar systems or piloting spaceships did not gain credit. Strong answers described the use of robotics, some with artificial intelligence, as autonomous spacecraft for delivery of materials to the International Space Station and the autonomous vehicles, or 'rovers', that are sent by different countries to explore other planets, the Moon or asteroids.

Question 9

This question was about the use of fourth (4th) generation systems for data storage. Some candidates instead described 4G and 5G mobile (cellular) communication systems and therefore did not gain credit. Some weaker answers referred only to the use of lasers without adding the necessary details to gain credit. Strong answers referred to the use of different colour lasers (green and red) to record data as holograms where green colour lasers read the data and the red colour laser acts as a reference beam, the capacity to store multiple terabytes of data on small diameter disks and its use in Ultra HD Blu-ray for storing very high-definition video.

INFORMATION TECHNOLOGY

> **Paper 9626/33**
> **Advanced Theory**

Key messages

Some good responses that displayed strong subject knowledge were seen. However, answers are expected to be in some detail at A Level and many responses lacked sufficient detail to gain credit. Some responses were also vague or generic, with knowledge not being applied to the contexts set in the questions. It is vital that candidates read the information given in the short scenarios so that they can apply their knowledge when answering the subsequent questions. Answering questions without referring to the scenario, or writing about a topic with little reference to the question as set, will not give access to the full range of available marks.

Credit will not be given for repeating statements made in the questions.

General comments

The syllabus shows a list of command words that are used in questions and the list explains what each word requires from candidates. It is very important that, when answering questions, candidates read the rubric and answer the questions in the appropriate manner.

Some candidates created numbered bullet points for questions that required free responses. These answers rarely produce more than simple points or short statements with no descriptions, explanations or comparisons. When answering questions that ask candidates to 'explain', 'describe', 'evaluate', 'analyse' or 'discuss' a topic, candidates should write in continuous prose so that they can expand and elaborate on their discussions.

Some candidates omitted questions completely. Candidates are advised to attempt all questions. Most candidates who used additional pages properly cross-referenced these to their answers. This ensures that the full responses can be seen and marked by the examiners. Candidates who need additional space should always use clearly labelled additional pages and should not write on the margins or other blank spaces.

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Comments on specific questions

Question 1

This question asked for detailed descriptions of four protocols used in the networking of computing devices. This question was omitted completely by some candidates. Answers that stated that each protocol is 'a network protocol' were just restating the question and did not gain credit.

(a)   This question required candidates to state that DHCP is a *management* protocol used to automatically assign network parameters, such as an IP address and a gateway address, to a device.

(b)   Strong answers stated that the BitTorrent protocol provides peer-to-peer file sharing and is used to transfer large files using minimum network bandwidth.

(c)   There are several points that could be included in a good, detailed description of UDP. For example, UDP is a connectionless communication protocol used when delivery of datagrams is not important to the service and it provides no reporting of lost packages to the sender.

(d)   Strong answers about TCP included that is connection-oriented and is used when delivery of datagrams is important, so it provides a mechanism for reporting to the sender if packets are lost.

Question 2

This question required candidates to explain how access rights are used to control who can and who cannot access company files that are stored on a network. Access rights are permissions that are applied to files and folders (directories). Some good answers were seen, and these explained that permissions fall into several categories such as: READ that only allows viewing of files or folder; WRITE that also allows files to be modified, deleted or created within a folder; EXECUTE that allows a file to be run. Different individuals or groups of individuals can be given different access rights, stored in access control lists, to folders and files to control whether or not they can access them. Weaker responses referred to passwords placed on files, or folders, but this is not the same as using access rights so did not gain credit.

Question 3

Some strong answers about encryption, including how it works, were seen. However, few responses related encryption to the combatting of IT crime. Responses could have been enhanced by, for example, explaining that encryption protects files on cloud storage from outside attacks by preventing confidential data being understood by unauthorised persons. Answers that described the mechanics of encryption but not how it is used were unable to gain full credit.

Question 4

Many responses gained some credit on this question, but to gain full credit responses needed to discuss teleworking in terms of positive and negative effects on workers. These include that workers may be more motivated and productive in their work due to having autonomy to control when to work. However, workers may work longer hours, be distracted by factors in their home environment and may incur extra expenses for internet access or specialised software. Descriptions of teleworking did not answer the question.

Question 5

(a)   This question was well answered. Good descriptions included references to the script being embedded in HTML code/in the body of HTML code between the <script> and </script> tags, variables being declared and descriptions of the calculation and display of the result.

(b)   This question proved challenging for candidates. The correct answer is that JavaScript has no means of displaying data on screen so has to pass this task to the web browser.

Question 6

This question was not about how automatic stock control systems work but about how they are used by companies. Strong answers included references to: automatic reordering when the stock re-order level is reached; recognising when an item is purchased by a customer and ensuring that shelves are always stocked with an appropriate number of items; the use of bar codes/RFID tags on items to track them by automatic data capture systems.

Question 7

This question did not require candidates to describe parallel running, but to analyse its suitability as a method of replacement of a bank's computer system. References to resolving errors in the new system by checking against the old system, the possibility of training staff in small groups rather than all at once set against the costs of running two systems and the duplication of data would have been valid responses. The command word "analyse" requires candidates to "examine in detail to show meaning, and identify elements and the relationship between them" so responses had to include both benefits and drawbacks of the parallel running implementation method for the given scenario.

Question 8

As with the previous question, the command word in this question was "analyse". Candidates are reminded of the importance of responding appropriately for the given command word and of the need to read each question carefully before writing their response. Strong responses to this question explained how bitmap images are compressed and how they are stored in files and then analysed the different formats available.

Good answers included references to formats such as JPEG, BMP, GIF, PNG and their support, or lack of support, for compression, transparency or animation. Comparison between bitmap and vector images did not answer the question so did not gain credit.

Question 9

This question required candidates to describe how mail merge rules work when selecting records to be included, or not included, in a document. Most responses described comparisons being made with pre-set criteria and decisions being made on whether to include a record in the document. However, many responses did not fully describe the outcomes.

(a)   This question was well answered, with descriptions of what happens if the defined condition is met and what happens if it is not.

(b)   This question required a description of the comparison of the contents of a data field and a pre-set value, with the result being used to determine whether the next record should be merged into the letter.

(c)   This question required a description of the comparison of the contents of a data field and a pre-set value, with the result being used to determine whether the current record should be skipped (if the comparison is true) or included (if the comparison is not true).

Question 10

(a)   This question required candidates to describe what is included in diagrams of the stages in projects so that critical paths can be discovered. Good answers referred to elements such as lists of activities, the durations of the activities, floats, endpoints and dependencies.

(b)   This question required candidates to describe the outcomes of critical path analysis. Strong responses included the visual representation of the whole project, the shortest possible time that a project would take and any possible alternative paths through a project.

Question 11

This question separated the preparation required for document analysis from the analysis process itself. A few candidates muddled up their answers to **parts (a)** and **(b)**.

(a)   Many responses to this question lacked detail. Strong answers described the need to create a list of documents to be examined, to consider how the documents will be accessed, to have a consideration of linguistic or cultural barriers, bias and ethical issues and to determine how the results of the analysis will be recorded.

(b)   Again, many responses to this question lacked sufficient detail. Strong answers included gathering the documents to be examined, researching and determining the source and destination of the documents using, perhaps, a data flow diagram of the system, examining the contents of the documents and making records of the results of the examination.

Question 12

(a)   A common answer to this question was to simply state that a WAP allows wireless connections to a network. While this is a correct observation, it repeats information given in the question and does not add to the information given. Additional information was required, such as that WAPs enable a connection into a wired network and allow connected devices to be mobile.

(b)   This question required candidates to describe how a WAP could be configured to improve security. Some responses correctly referred to the use of encryption and the requirement that users enter a 'network key' when connecting devices, but other good answers could have included the filtering of MAC addresses, the restricting of IP addresses to known devices only and the use of the latest security protocols.

INFORMATION TECHNOLOGY

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Key messages

Candidates should attempt to reproduce examples or screenshots shown in the question paper very accurately. They must pay close attention to the colour, size, position and proportions of the components of any images, and to the font attributes and alignment of the text, shown in the examples for any task.

General comments

Most candidates attempted the graphics and animation tasks, but many solutions lacked the required level of accuracy. Candidates would have benefitted from additional practice of the skills required for the database and JavaScript tasks.

Comments on specific questions

Task 1(a)

This task required candidates to cut out a cluster of four leaves from an image of a bush. Accuracy in the use of the editing tools was crucial. Clean and complete selection of the four leaves was essential. Candidates would benefit from more practice with these techniques and should be aware of the importance of providing solutions exactly matching any image shown in the question paper.

Task 1(b)

Many good solutions to this task were seen. The task required candidates to create a vector image of one of the leaves from a cluster. A variety of shapes were acceptable provided the leaf had simple, even curves in a tear-drop shape with a wide bottom and a sharp tip. The central vein was required to be a single smooth line that tapered to a tip before the end of the leaf. The central vein also had to have 2 or 3 barbs as shown in the question paper.

Solutions that met all of these requirements achieved high marks for this part of the task.

Task 1(c)

For this task candidates had to use their leaf image to populate an image of some branches. The question paper showed that there were three differently sized leaves and that some were positioned behind branches. The size, position and orientation of the leaves was important. Many candidates either did not notice that some leaves needed to be shown behind branches or were unable to use layers to achieve the desired effect. Candidates would benefit from practice in the use of layers in graphics tasks.

Task 2

This animation task had two stages: The first stage was to animate a leaf turning brown; the second stage was the leaf falling to the ground.

Many good solutions to the leaf falling stage were seen. These demonstrated that candidates were competent using 'tweening'. Animating the change of colour proved more challenging. In many cases, the colour change was abrupt, rather than being a gradual colour change over 1 second. Another common error was that many animations looped continuously instead of finishing when the leaf reached the ground.

Task 3

This task required candidates to create a relational database. Many candidates succeeded with the first part of the task, creating the required tables and setting the relationship. However, data types in the table holding records of the art work were often incorrect. In particular, the 'Sold' field needed to be set to 'Yes/No' and the Price field set to 'Currency'.

The task also required candidates to design a form with two subforms. The simplest way to determine the data for the subforms was to create two queries to list the sold and unsold items. This proved challenging for candidates, with many not realising this method was required or not being able to apply it successfully.

The Art Work Sold subform needed to include a field for the commission earned when art work was sold. Since only the art work which had been sold earned commission, this calculation needed to be done in the query. The IIF() function was required to determine the commission. Many candidates either left out the commission field or calculated the values in a spreadsheet. Since any additions or amendments to the data would be carried out in the database, this method was incorrect.

Marks were available for accurately reproducing the layout, inclusions and formatting shown in the example in the question paper. Candidates should be are aware of the importance of fulfilling these requirements.

Task 4

The JavaScript task was well done by candidates who attempted it. Candidates had to be careful to set the correct threshold values for the levels of the commission, and many working solutions produced incorrect results. Arithmetic checks could have enabled candidates to make the necessary adjustments to the values in the code.

Some candidates did not appear to be familiar with displaying results on the current page, instead displaying results in 'Alerts' or on a new page.

The HTML supplied included the code *id="display here"* set as the placeholder so candidates needed to use the statement:
*document.getElementById("display here").innerHTML= "Commission for a sale of £"+**price**+" will be £"+**commission***

In this case, **price** and **commission** are the names of the variables used to hold the price of the item and the calculated commission.

In conclusion

Areas where candidates would benefit from additional practice include:

- extracting objects from images accurately

- using layers in graphics tasks

- animating changes of colour

- using subforms in database tasks and the inclusion of run-time calculations

- displaying the output of JavaScript code in the current page.

Candidates are also reminded of the importance of providing solutions that exactly match any images shown in the question paper. In particular, they must pay close attention to the colour, size, position and proportions of the components of any image, and to the font attributes and alignment of any text, shown in the examples for any task.