INFORMATION TECHNOLOGY

Paper 9626/11
Theory

Key messages

Candidates are required to show a good, general, level of understanding and to have detailed knowledge of all areas of the syllabus.

On much of the paper some expansion and detail are required. It is not sufficient to give brief answers.

Evaluation requires candidates to discuss the importance, weigh up the advantages and disadvantages, judge the overall effectiveness, and weigh up their opinions, of a number of options. It is important that comparisons are made, rather than just giving features or uses.

Questions that required simple and straightforward answers were often well answered, while the answers to more demanding questions sometimes needed to contain more explanation or evaluation.

General comments

Concepts that candidates found particularly challenging were computer simulations, normalisation and Management Information Systems. Candidates also found the topics of sorting data in a spreadsheet and disk formatting quite difficult.

Candidates should answer all the questions as fully as they can and in sentence form, expanding on their thoughts wherever possible. Candidates should also use technical terms accurately when answering questions.

Rather than rush into giving an answer, candidates could improve their answers by listing their thoughts in rough before choosing, and elaborating on, items appropriate to the question.

Comments on specific questions

Question 1

(a) This question was very well answered.

(b) This question was well answered, although less so than **part (a)**.

(c) This question proved challenging, with many responses giving answers about validation rather than verification. Some responses provided brief descriptions of visual verification and/or double data entry but did not analyse their effectiveness. Other responses referred to proof reading, rather than verification by comparing two versions, and were therefore unable to gain credit.

Question 2

(a) Although many responses selected the correct response, incorrect responses were seen on some scripts.

(b) This question was less well-answered than **part (a)** with a reasonable number of scripts giving incorrect responses.

(c) Correct answers to this question included data entry using MICR being quicker than typing. However, some responses showed a misunderstanding of what MICR is, and many responses did not contain a detailed evaluation.

Question 3

Many responses referred to the word processor allowing text to be entered and the spreadsheet allowing numbers to be entered. Others mentioned that spreadsheets allow the use of tables, graphs, and formulae, without realising that a word processor allows for the same. Differences were better identified than similarities. Candidates are reminded that brand names must not be used in responses.

Question 4

Some very strong answers to this question were seen. Many responses explained that sensors send data to a computer. However, some responses did not name any sensors or give detail about the conversion of data or storage.

Question 5

Many responses to this question correctly identified that that network computers can access the internet. However, a number of responses misunderstood the question and detailed the advantages of computers being able to access the internet compared with those that cannot. Some responses mentioned the sharing of files/data but omitted the key words easier/faster. Even with non-networked computers it is possible to share files using a memory stick; it is just not as easy or convenient. A common error was not realising that both classrooms would have access to the software available in the school

Question 6

This question proved challenging for candidates, with many responses not seeming to fully understand what the world wide web consists of, or its structure. Some responses confused the world wide web with the internet and described the hardware involved.

Question 7

This question was generally well answered, with many valid points given relating to the setting up of the video-conference. Points that were commonly made included agreeing a date and time with the other participants, sending a reminder or invite to the other participants, needing to purchase extra equipment and ensuring the video conferencing software or internet connection are running properly.

Question 8

This question was reasonably well answered, though **part (d)** proved more difficult than the preceding parts.

(a) Many responses gained credit for explaining that the three right hand characters are extracted. However, some responses referred to cell references and very few responses explained that a number would be returned from the VALUE expression; often they just wrote that a value would be returned.

(b) Many responses gained credit for correctly referencing the Month of Jan and explaining that all the corresponding Prices were added together. A sizeable number of responses, however, referred to cell references.

(c) This part of the question was well answered, with good descriptions of the missing items from the chart.

(d) This question proved challenging because many responses concentrated on the make up of the spreadsheet such as formulae, functions and charts, instead of giving advantages and disadvantages. Advantages such as automatic recalculation, automatic chart production and easy replication of formulae were sometimes, but rarely, referred to.

Question 9

(a) (i) Many responses gained credit for either saying what was going to be shown or for Last name begins with B. Many candidates seemed to be unfamiliar with the inequality <>.

(ii) Very few responses provided full details of the required 3 records. Some responses identified the 3 correct family names, but did not include the first names and the town they lived in. Many responses simply repeated the answer provided for **Question 9(a)(i)**.

(b) (i) Many responses correctly identified that the name should end in son, although a number thought it meant 'include' son. They also tended to identify that the replacement cost should be <10. However, many responses did not include details of the fields which would be shown. Another common error was not realising the significance of using OR.

(ii) Very few responses provided full details of the required 3 records. Where an attempt was made to provide the required records, the information relating to these records was generally incomplete. Many responses repeated the answer provided in **Question 9(b)(i)** for this part.

Question 10

This question was reasonably well answered with many candidates gaining at least partial credit. However, several responses suggested including extra data rather than concentrating on improvements which would make the data entry more accurate. Some confusion was seen, with several responses referring to creating a spreadsheet and making use of columns and rows.

Question 11

Many responses included examples of generic file formats, usually .txt and .csv although these examples were seldom expanded upon. The term 'generic file format' was often not well explained.

Question 12

This question proved very challenging, with the majority of responses referring to the general use/creation of a database, for example creating table, queries and reports.

INFORMATION TECHNOLOGY

Paper 9626/12
Theory

Key messages

Candidates showed a fairly high level of general understanding but there were areas of the syllabus where more detailed knowledge was required.

On much of the paper some expansion and detail are required. It is not sufficient to give brief answers.

Evaluation requires candidates to discuss the importance, weigh up the advantages and disadvantages, judge the overall effectiveness, and weigh up their opinions, of a number of options. It is important that comparisons are made rather than just giving features or uses. 'Analyse the effectiveness of' something requires candidates to explain the effectiveness in detail as well as identifying the main characteristics. Analyse and evaluate questions proved challenging and candidates are advised to develop these higher order thinking skills so that answers go beyond just recalling information.

Questions that required a recall response were generally answered well, particularly those which required short answers. Questions that required candidates to apply their knowledge and understanding proved more challenging, with many responses needing greater accuracy and detail.

Candidates should ensure that handwriting is clear in order that all responses can be read and given appropriate credit.

General comments

Rather than rush into giving an answer, candidates could improve their answers by listing their thoughts in rough before choosing, and elaborating on, items appropriate to the question.

Candidates are reminded that brand names must not be used for software and that technical terms should be used accurately when answering questions.

Comments on specific questions

Question 1

Responses indicated that the topic of validation was unfamiliar to some candidates, with many incorrect responses seen, particularly in **parts (b)** and **(c)**.

(a) Many correct responses to this question were seen. The incorrect answers were spread out among the other three options.

(b) Few correct responses to this question were seen. A popular incorrect answer was 'It checks that a number is above a certain limit'.

(c) This part proved very challenging, with few responses containing more than two valid points. Many answers were vague and covered range, consistency and presence checks, thus not answering the question. Responses that gained credit related the format check to the Product number and Year patented fields and/or indicated that type check could be used to check the Weight field was numeric. The difference between type check and format check was frequently not well understood. In general, few responses presented convincing examples of the two checks in relation to the fields given.

Question 2

Responses often provided a general overview of monitoring and control systems, but many answers to **part (c)** did not provide a detailed understanding of the processes involved.

(a) The majority of responses to this question selected the correct response. The incorrect answers were spread out among the other three options.

(b) Few correct responses to this question were seen. A common incorrect answer arose from candidates thinking an actuator was an input device.

(c) This part proved challenging, with few responses containing two valid points. Responses did not indicate understanding of the inputs, processing and outputs involved in cooking a meal using a microprocessor-controlled oven. Some responses contained the correct technical terms such as sensors, actuators and microprocessors, but did not put them together to provide a coherent description. Others concluded that the raw food was the input and the cooked food the output or contained descriptions of actually making the food. Few responses described the microprocessor sending signals to the actuators and the actuators turning devices on or off. Strong answers included the sensor in the oven, sending the signal to the microprocessor via the ADC, comparing the readings with pre-set values and then sending a signal to the actuator to turn the heater on or off. There was often a lack of technical detail, such as using the wrong term for a temperature sensor (heat sensor and thermometer).

Question 3

This question was fairly well answered, particularly **parts (a)** and **(c)**.

(a) Many responses contained at least two good answers and many responses gained full credit. A common correct answer seen was ‘saving storage space’. A small number of responses confused coding with encryption and referred to unauthorised users.

(b) This part proved more challenging than **part (a)** with many responses requiring more detail or not providing any drawbacks. Answers were often of the type ‘codes may be the same’ but did not specify the category, for example the colours, or state what the drawback was.

(c) The strongest answers were seen on this part of the question, with many responses gaining full credit. The most common correct answers provided two separate examples correctly. Few candidates gave correct answers based on having narrower ranges for size.

Question 4

This question was also fairly well answered with many responses gaining at least partial credit. Stronger responses were seen to **part (b)** than **part (a)**.

(a) A lot of responses identified what a worm does though some confused this with a virus or spyware. Most stated that a worm replicates itself and that it slows down a network or computer. Fewer responses explained how it exploits security holes.

(b) Many responses gained at least partial credit for this question. Several strong responses that were seen mentioned keyloggers. A common answer was based around capturing users’ personal data. A minority of responses confused spyware with anti-spyware.

Question 5

Overall, this question proved challenging, with few responses analysing the effectiveness of line graphs and bar charts for showing shopping trends. Responses gained credit for describing the two types of charts and/or for pointing out that the line graph was better at showing trends and the bar chart better for comparisons. Some responses mentioned the axes for the line graph, with only very few describing it for the bar chart.

Question 6

This question was quite well answered, with the majority of responses gaining at least partial credit. Both parts of the question were answered equally well.

(a) There were some strong answers concerning the characteristics of a LAN. However, few technical terms were used and when switches, hubs, transmission rates etc. were mentioned it was not always clear that the meaning or purpose was understood.

(b) Most responses gained credit for naming correct methods of communication from one country to another. A few responses used the examples mentioned in the question, for which they did not gain credit. Few responses described a realistic drawback for the stated methods and not all responses took account of the question requirement that all drawbacks should be different. A significant minority of responses used brand names when giving their methods. Brand names should not be used when writing examination answers for this syllabus.

Question 7

This question was quite well answered. However, this question included the information that the necessary equipment and software had already been purchased and tested. Many responses described in detail the equipment needed, for which no credit was given. Despite this, most responses gained at least partial credit. Common correct answers were based on sending an email to the team informing them of the conference, sharing the link and sharing the log in details. Other popular correct answers included participants clicking the link to enter the conference and then entering the password/log in details.

Question 8

This proved to be a very challenging question and a significant number of candidates omitted it. Where responses did not demonstrate understanding of what switchboards are, they could not go on to evaluate their use.

Question 9

Both parts of this question proved very challenging.

(a) Very few responses gained credit. Many responses referred to removing duplicated data, confusing this process with that of creating a relational database.

(b) This question proved to be one of the most challenging on the paper. Responses were often too vague and not technically accurate, for example mixing field with records or not referring to the ID number of a record when it was required. A significant number of responses erroneously referred to spreadsheets, while others discussed creating the database structure around the data or creating a query. Several responses showed the correct calculation when referring to a particular ID and were able to gain credit for this, but generally the process of updating a master file from a transaction file was not understood. To gain credit, responses had to refer to the records given.

Question 10

Overall, this question proved challenging, although stronger responses were seen to **part (a)** than **part (b)**.

(a) Many responses gained credit for referring to simulations being safer. However, a lot of responses were too vague, for example they identified that using simulations cuts costs but not the reason why. Some responses just described what a simulator could do.

(b) The most common correct answer to this question was that models cannot recreate exactly the real-world experiment. Some responses mentioned costs but did not qualify this.

Question 11

This question was quite well answered, with the majority of responses gaining at least partial credit. Candidates performed best on **part (c)** and found **part (d)** the most difficult.

(a) Many responses gained credit. Where they did not, it was usually because the responses did not specify the column or thought it was column C. A few responses confused column with row.

(b) Responses that did not gain credit usually did not name the correct row or cell or describe that the double-click expanded the cell or increased the height.

(c) This question was very well answered. Responses that did not gain credit had usually not described the formatting in the correct level of detail.

(d) This was the most challenging part of the question and few responses gained credit. Responses suggested confusion about the different types of validation check and what each does. A few responses correctly chose limit check but not many were able to describe it correctly in context.

Question 12

This question was very challenging for candidates, particularly **part (a)**.

(a) Many responses indicated a lack of understanding of what proprietary software is. However, the most common correct answer was 'software that is owned by an individual or a company'. Some responses mentioned copyright. The question asked for three features, but several responses were seen that gave more than three answers.

(b) This question was slightly better answered than **part (a)**. However, many responses referred to software rather than a file format. The most common correct answer was that open-source file formats can be used and accessed by anyone. Lots of responses listed more than two answers and/or said that the file could be opened in any software.

INFORMATION TECHNOLOGY

Paper 9626/13
Theory

Key messages

Questions requiring simple and straightforward answers were done fairly well, while the answers to more demanding questions needed to contain more explanation or evaluation. There were areas of the syllabus of which candidates appeared to lack detailed knowledge.

On much of the paper some expansion and detail is required. It is not sufficient to give brief answers.

Evaluation requires the candidate to discuss the importance, weigh up the advantages and disadvantages, judge the overall effectiveness, and weigh up their opinions, of a number of options. It is important that comparisons are made rather than just giving features or uses. 'Analyse the effectiveness of' something requires candidates to explain the effectiveness in detail as well as identifying the main characteristics. Analyse and evaluate questions proved challenging and candidates are advised to develop these higher order thinking skills so that answers go beyond just recalling information.

Candidates should ensure that handwriting is clear in order that all responses can be read and given appropriate credit.

General comments

Rather than rush into giving an answer, candidates could improve their answers by listing their thoughts in rough before choosing, and elaborating on, items appropriate to the question.

Candidates must read questions carefully before answering. A number of questions required detailed descriptions, but responses often listed the basics or gave a very brief outline without explaining or describing in sufficient detail.

Comments on specific questions

Question 1

Most candidates did well on **part (a)** but less so on **part (b)**, and **part (c)** was the least well-answered part.

(a) The majority of responses had the correct option ticked. The incorrect responses were spread evenly among the other three options.

(b) A significant proportion of responses had an incorrect option ticked, with the third and fourth options being chosen quite frequently.

(c) Few responses correctly described SSL/TLS. Of those that attempted to expand the initials, not all were successful. Many responses homed in on the word encryption and mentioned asymmetric and symmetric, private and public, and so on but did not link these together. Few responses described using these protocols in the security of data transmission. Several candidates omitted this question.

Question 2

Many responses gained full credit for this question. Overall, **part (a)** was the best answered, followed by **part (b)** and then **part (c)**.

(a) The vast majority of responses had the correct option ticked. The incorrect responses were spread evenly among the other three options.

(b) The most commonly ticked incorrect answer was that a hard disk drive is an optical method of storage.

(c) Many responses contained at least two valid points. However, few responses showed clear understanding of the concept of magnetic tape. Where responses did identify characteristics that could be compared, not all made the comparison. For example, it was not enough to say that SSD had no moving parts. This does not make it an advantage or a disadvantage unless it is compared to a magnetic tape drive. A lot of 'faster', 'cheaper' answers with no justifications or explanations were seen. Many responses indicated unfamiliarity with magnetic tape for use a storage medium and wrote about magnetic strips.

Question 3

Some responses indicated a lack of familiarity with utility software. Credit was most commonly gained in **part (a)**, with **parts (b)** and **(c)** proving to be equally difficult for candidates.

(a) Where responses gained credit, it was usually for describing what data compression is. Few responses clearly explained how data compression is carried out.

(b) This part was less well answered than **part (a)**. Some responses explained that disk formatting would apparently remove all data from the disks and revert them back to factory settings, but very little technical language was used. There was rarely any mention of sectors or tracks. Many responses indicated confusion between formatting and defragmenting.

(c) Many responses explained what deletion is, but not how it is carried out. Credit was gained by responses that wrote about the concept of a temporary folder for holding files prior to permanent deletion. However, few responses included detailed technical explanations.

Question 4

This question asked about advantages and disadvantages for the employer, However, some responses detailed the advantages and disadvantages to the employee, while others mistakenly wrote about a computerised supermarket system which operated without human operators. While some responses gained partial credit, few detailed responses were seen.

Question 5

Some strong responses to this question were seen, with many gaining at least partial credit. However, some responses confused safety problems with health problems. If all three of the issues described related to health problems, no credit could be gained. Some responses included a mix of health and safety issues. A few responses repeated the tripping hazard that had been mentioned in the scenario and could not gain credit for this. Of those responses that correctly identified the issue, some did not expand the issue sufficiently, for example 'fire' or 'electrocution' was not enough; what caused the fire needed to be mentioned. Similarly, 'overloading sockets' was not enough as the issue is not fully explained.

Question 6

This question was reasonably well answered. Candidates who gained credit found all parts to be of equal difficulty.

(a) Many responses included just one valid point. Stronger responses detailed several differences between peer-to-peer networks and client-server networks. However, other responses lacked detail or displayed confusion between these network configurations and a LAN and a WAN.

(b) While some responses made several valid points, in general using the internet for business was not clearly understood, with many responses detailing the benefits of using computers rather than the internet. Many responses said that no office buildings would be needed but did not give a reason. Others wrote that using the internet to conduct a business would be 'free'.

(c) Some of the responses lacked detail, such as saying 'hackers stealing data' rather than giving a full explanation of what hackers might do.

Question 7

This question proved very challenging for candidates and many omitted this question. Few responses showed understanding of the concepts of ISDN or SDSL, though SDSL was better understood than ISDN.

(a) Very few correct responses were seen, with many responses incorrectly referring to the security of video conferencing. While some responses attempted to expand the initials ISDN, few correctly recalled this as Integrated Services Digital Network.

(b) As with **part (a)**, many responses thought SDSL concerned the security of video conferencing, and few responses correctly expanded the initials as Symmetric Digital Subscriber Line.

Question 8

This was reasonably well answered, with many responses gaining credit. **Part (a)** was answered better than **part (b)** which, in turn, was answered better than **part (c)**.

(a) Many responses gained at least partial credit. Most had a good idea of what a formula is without going into much detail. However, not all answers referred to the spreadsheet given.

(b) Many responses gained at least partial credit. Most described what a spreadsheet function is and were able to pick the example ROUND() from the provided spreadsheet. Fewer responses provided a detailed explanation to gain full credit.

(c) The concept of sorting the spreadsheet using levels was not well understood. While some responses identified that the data had initially been sorted using the Car make column and then the Car model column, very few identified that the final step was using sort ascending on the Car value column.

Question 9

While several responses gained some credit, this question proved challenging for many candidates. The commonly provided correct answers either referred to the smaller file size or the file being able to be opened by other applications.

Question 10

Responses to this question displayed some confusion, with many describing what a simulation is but not answering the question set. Other responses were unclear about what a simulation is, and some thought that a fire drill might involve setting fire to the building thus making a simulation cheaper.

Question 11

Although a reasonable number of candidates omitted this question, some strong answers were seen that gained credit. Generally, the process of normalisation was not generally well understood, with some responses referring to spreadsheets. Some responses included normalisation terms but did not explain them.

Question 12

This question proved very challenging, with few responses describing the features of a management information system. Some responses repeated information from the question, for which no credit was given.

INFORMATION TECHNOLOGY

Paper 9626/02
Practical

Key messages

For this examination, the main issues to note are as follows:

- Candidates need to apply their knowledge to the solution of spreadsheet problems.
- Candidates need a strong understanding of applying appropriate validation rules to spreadsheet cells.
- Candidates need to take care to format spreadsheet layouts to match the task requirements.

General comments

Most candidates performed well on the audio editing questions but less so on the spreadsheet questions, where the application of knowledge was not always applied to solve a given problem. Modelling the data was very challenging for candidates.

Comments on specific questions

Question 1

Almost all solutions created a spreadsheet resembling the one shown in the question paper. Most merged the cells in rows 1 and 3 as shown and the majority set the orange background, although fewer set the text height to the required point sizes for these two merged cells. Few solutions successfully merged and wrapped the text in cells L6 and L7 as shown in the diagram. While all solutions left aligned the cells in column C, fewer right aligned those cells in column A and fewer still centre aligned cells B6 to B20. Some solutions did not embolden the contents of the required cells. Many inserted items in the footer, but not all used automated functions to perform this task. Some solutions erroneously included the file name twice on the right in the footer, once before and once with the file path.

Question 2

Many candidates found this question more challenging than **Question 1**. There were a variety of excellent solutions using the OR function and a single statement of the displayed text or blank cell, and many more solutions used nested IFs to test each condition with repeated text strings for the results. Of those solutions that successfully attained working formulae, most successfully created the conditional formatting required to display the error message in white text on a red background. A few solutions did not embolden or centre align this text. Not all of these used the criterion ‘if the contents of the cell was not displayed as blank’. Those that used other methods such as ‘if cell contains the text ‘Strip foundations…’ had solutions that worked for this cell but did not allow for follow through on cell A21 when attempting **Question 5**.

Question 3

The start of this step was omitted by a significant number of candidates who did **not** display a blank cell in each of cells B15 to B19 inclusive if the error message in C14 was visible as ‘strip foundations are not suitable for this site’, rendering the following formulae unnecessary. For the formulae used in cells B15 and B16 the return column in the formula was dependent upon the contents of cell B12. Different successful approaches were seen; weaker solutions did not factor in the different foundation requirements for wet or dry soils (as indicated in cell B12). A significant number of solutions did not change the values to metres (leaving them set in millimetres) which gave some very large results in subsequent calculations. In cells A21, B15 and B16, a number of solutions used an incorrect range in the LOOKUP functions, often starting the range at E3 or E5 instead of E8. With the exception of displaying as blank cell (as mentioned earlier), most solutions

were 100 percent successful in their formulae in cells B17 and B18. B19 appeared more challenging to candidates, who did not identify that a 7 per cent increase was 1.07* the calculation.

Question 4

A significant number of candidates found this question challenging because there were a number of permutations required to obtain the answer. Two tests were required within the formulae (which was not always recognised by candidates); one to test the thickness of the wall and one to test whether it was a wall or a building. The core calculation of length*height*3.5*55 was relevant to all calculations but would be multiplied by 1.5,2 or 3 (1.5*2) depending on the contents of B7 and B11. Solutions that recognised all of this were usually successful, but the question did generate a large variety of responses and a full spread of marks. Often the calculation only worked for the wall and not the building.

Question 5

This step also gave a full range of results, with some solutions only identifying that a test of B20/B8 was required and others completing the whole formula, often using the correct VLOOKUP function for the second part of the test. A number of solutions did not place this formula in cell A2. Those solutions that had successfully created the conditional formatting using the 'is blank' criterion in step 2 were frequently successful in applying a similar function for the conditional formatting in cell A21. Those that were less successful in step 2 found this more of a challenge although some gained all the marks for this despite errors in C14. There were some errors in the accuracy of the error message.

Question 6

This challenged all candidates and elicited a number of responses with a wide range of marks attained. A number were very successful for all values where a single concrete lorry was required but did not consider values where more than one lorry was required in their calculations. This question discriminated well between candidates.

Question 7

Many complete solutions using appropriate formatting in all cells containing currency values were seen.

Question 8

A wide range of responses was seen to this question. Candidates were required to identify which cells validation rules would be appropriate for, with the vast majority applying these rules to cells B7 and B9:B12. Some solutions correctly identified that cells B8 and B9 could not have negative values and also applied validation to these cells, although some set the criteria to > 0 instead of > = 0. At AS level appropriate validation should include error messages and prompts to the user indicating the type of values (or list of values) that would be acceptable. Many solutions that included some or all of the validation as specified omitted these error messages or did not give the user sufficient guidance where a validation error had occurred.

Question 9

Most solutions applied protection to the work, but not all did so to the specified areas. Many protected the whole spreadsheet, making data entry in cells B7 to B12 (and use of the sheet) impossible. Candidates were required to submit two files, one before protection was added and one after, both with different filenames. A very small number of candidates did not save both files and submitted a single protected workbook with a different password which meant that examiners could not access their formulae.

Question 10

Not all solutions produced the required data models in pdf format. The majority of those who submitted all 4 files had correct data entry, although some omitted entering whether it was a wall or a building being constructed.

Question 11

Many strong solutions to this task were seen. However, a number of solutions did not set the music track to twice its original speed and several solutions spliced the audio track on the end of the music track rather than

the two playing alongside each other. Some solutions did not have the audio transformed into a mono track from the stereo tracks provided. Most solutions had the length set to 29.5 seconds, but not all exported the completed track into both .mp3 and .ogg formats.

INFORMATION TECHNOLOGY

Paper 9626/31
Advanced Theory

Key messages

Many responses demonstrated good subject knowledge. However, some responses were vague with insufficient detail to gain credit. At A Level, responses should include more detail than single word lists or very brief statements; such responses usually do not gain credit. Single words, or very short statements, do not adequately 'describe' or 'explain' as required by the questions. Questions using the command words 'discuss', 'evaluate' or 'analyse' cannot be answered with single words or brief statement and in-depth knowledge of the topics in the syllabus and their use to formulate responses that address these command words is required.

Some responses did not apply knowledge of the topics to the given scenarios or context in the questions. A number of candidates still appear to look for, or 'spot', key words in the question and then write answers based on or around those keywords. These responses are often generic and therefore gain little credit. For example, **Question 1(b)** was about the worries that an IT manager may have about storing data in the cloud. This question was only about the drawbacks of cloud storage, but some candidates wrote about both benefits and drawbacks.

It is vital that candidates read the information given in the introductory stem, or short scenarios, at the beginning of a question very carefully. This will enable them to apply their knowledge when answering the subsequent question. Candidates should also carefully read the whole of each question. Answering questions without referring to the scenario, or merely writing about a topic with little reference to the question as set, will not give access to the full range of available marks. For example, **Question 2** asked about the use of satellite communication for *providing internet access to users.* Responses detailing satellite communications, however valid, without any reference to the provision of internet access did not answer the actual question and could not gain credit.

A number of questions produced responses that restated the question and this should be discouraged. Many candidates wrote out the question as an introduction to their answer, but this is not necessary, wastes time in an examination and does not gain credit.

General comments

The syllabus contains a list of 'command words' that are used in the questions. The list explains what each command word requires. It is very important that, when answering questions, candidates read the rubric and answer the question in the appropriate manner. When answering questions that ask candidates to 'explain', 'describe', 'evaluate', 'analyse' or 'discuss' a topic, candidates should write in continuous prose to be able to expand and elaborate their discussions.

Attention is drawn to the glossary on p.45 in the 2022 – 2024 syllabus as the meanings for the command words have changed in the syllabus for March/June 2022 onwards.

When answering questions about new and emerging technologies, responses should be restricted to what is actually possible. Answers should be sensible, credible and not stray into the realms of fantasy. At A Level, it is expected that candidates have a knowledge of how new and emerging technologies are increasingly being used in today's world.

Candidates should always attempt all of the questions and, if using the spare pages or additional pages, candidates must properly cross-reference their answers. Answers that candidates do not want to be marked should be clearly crossed through and a note added to indicate where the intended answer is written.

'Rough' notes, 'aide-de-memories' or planning notes that are not part of the final answer should be crossed through.

Comments on specific questions

Question 1

(a) Most responses explained what is meant by storing data in the cloud although many answers referred only to how data is stored and not what the cloud is. Strong answers referred to the use of networked storage devices accessed from the internet and managed by third parties.

(b) This question was about the drawbacks of storing data in the cloud from the perspective of an IT manager. However, many responses referred to the benefits. Strong answers referred to data being more susceptible to cyber-attack, not being under direct control of the company and being more difficult to permanently delete as there are multiple copies.

Question 2

Most responses described some of the aspects of the use of satellite communications, but few referred specifically to its use for internet access provision. Strong answers included references both to how satellites are set up and how they can provide access to the internet.

Question 3

Responses to this question demonstrated the importance of reading questions carefully. A common error was to write about project management software in general rather than focus on web-based PMS. Both advantages and disadvantages were required to gain full credit. Answers should have referred to project data being stored on central servers so data and amendments are accessible to all team members immediately, the centralisation of the software and data meaning that backups are taken out of the user control, software updates being immediately available for all users and there usually being no steep learning curve because the user interfaces are intuitive. Disadvantages include web-based Project Management tools often not being compatible with offline PM tools, some basic Project Management functionality being missing from web-based versions and web-based Project Management tools not being available without internet access.

Question 4

(a) Strong answers to this question referred to the timeline, the bars showing the durations of tasks, and the arrows showing the dependencies and critical path. However, some responses showed that more careful reading of the question was required. Common errors were to describe any of the possible components of Gannt charts or to describe how they would be derived or used rather than what could be seen.

(b) Answers that gained credit included the use of a percentage bar within the task bar or the use of different colours to highlight overdue tasks.

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The command word 'Evaluate' in this syllabus requires candidates to '*discuss the importance of, weigh up the advantages and disadvantages, judge the effectiveness, weigh up your opinions*'. For this question, advantages and disadvantages were required but, in addition, responses needed to expand on these to explain why these are important or what effect they have. Strong responses included references to questionnaires being less expensive than other methods of gathering information so being more suitable for a small enterprise, the sample size being controlled with ease compared to interviews and the results being gathered more quickly than reading documents or interviews so decisions being able to be made sooner and any changes to the library occurring rapidly. Disadvantages include anonymous respondents potentially not providing honest answers or not completing all questions, questionnaire being difficult to access by disabled people and being boring to answer. The manager of the library may not get valid data which makes decision-making based on the views of users difficult.

Question 6

The introductory statement made the point that 5G cellular communications provide increased bandwidth so references to this improvement did not gain credit.

(a) A common error was to describe the reduction or removal of buffering artefacts when watching streamed video, but this was stated in the question so did not gain credit. Strong answers described other improvements such as the low latency/near-instant connectivity between devices making possible developments such as self-driving cars or robots assembly machines.

(b) Strong answers should have included detailed descriptions of two drawbacks. One example would be the reduced coverage of 5G meaning that more cell towers, which can be considered unsightly and have higher installation costs, are needed.

Question 7

The command word analyse expects candidates *to 'explain the main points or effectiveness in detail, identify their main characteristics, examine closely'*. To gain credit on this question, responses should have described a characteristic of phased implementation and then commented on it with regard to its effectiveness in this scenario. For example, the implementation/changeover will be done in stages so time is available for adjustments, users have more time to adapt to the new system and technical staff can concentrate on part of the system so the changeover will run more smoothly. However, several changes in documentation are often required so more time/effort/resources are used and the duration of the changeover can be much longer so there is more disruption over a longer time period.

Common errors included muddling phased with other methods of implementation and not giving an analysis but only describing the process of phased implementation.

Question 8

Answers to this question needed to describe how blogs are used and relate this to their use in social networking. Strong answers should have described that blogs are made up of posts that are discrete diary style text entries for others to read, that the posts are in reverse chronological order and that posts can be open for everybody to read and add comments to. This means that posts can lead to a proliferation of threads on other topics and allow authors to build social networks with others online.

A common error was to describe a blog but not refer to its use.

Question 9

(a) Candidates were required to describe the steps in RAD and some good answers were seen. However, some responses did not properly describe RAD steps but provided vague and inaccurate answers. A common error was to confuse RAD with the different methods of development and the system life cycle stages.

(b) Reasons for using RAD and not the traditional waterfall method include that the project is divided into smaller sub-tasks that specialised teams of developers can work on concurrently, prototypes are created quickly so the client can see progress and the working sections, the waterfall method needs to start again if the project fails but RAD can adapt to changes in user requirement. Many answers were vague e.g. *'RAD is more organised'* and lacked sufficient detail to be awarded credit.

Question 10

This question required candidates to describe how the `onerror()` function in JavaScript can be used to locate mistakes in JavaScript code and assist a user in dealing with them. Common errors were to repeat the statement given in the question about it trapping errors or to give vague descriptions of finding an error but not describe how this is reported to the user. Strong answers included descriptions of the fact that trapping an error is not sufficient to enable a user to find it but it is also necessary to have a method of reporting the error so it can be corrected, the `onerror()` function can pass or place the error details into variables which are used to pass parameters of the error to the program for further processing and can be displayed to the user via an alert box.

Question 11

This question, using the command words 'compare' and 'contrast', required both similarities and differences about hubs and switches. Responses that did not describe both similarities and differences could not gain full credit. Strong answers included the similarity that both hubs and switches allow multiple nodes to connect together in a network and a difference is that hubs broadcast all received data to all devices on a network whereas switches examine the MAC address in data packets to determine where to send them. At A Level, candidates are expected to know and understand the roles of network devices and to be able to apply their understanding. The effects of using hubs and switches in a network could also have been considered, e.g. using hubs can reduce the network performance because they use all of the available bandwidth but switches make more efficient use of network bandwidth than hubs because they do not send all data to all the nodes.

Question 12

The focus of this question was not about securing the data but about preventing it from being accessed using the network. Encrypting the data is an effective method of preventing it being understood but it does not secure a network. Common errors included vague references to cloud storage which were not relevant to this question and inaccurate references to firewalls blocking internet access. Descriptions of firewalls controlling inward and outward data flow, the use of VPNs for remote access by authorised users and the proper training of all employees or staff in network and data security and ensuring that all are also properly trained in identifying and reporting threats or breaches should have appeared in strong answers.

Question 13

GPS appears as a topic on both the current syllabus, ***Section 13.3*** on page 24, and in the 2022 – 2024 syllabus, ***Section 14.11*** on page 31. At A Level, while not necessarily having a complete technical understanding of GPS technology, candidates are expected to understand its workings and those of satellite communication systems. A GPS receiver works by monitoring and using the data in signals broadcast from multiple dedicated satellites to calculate its location and overlaying the details on maps stored in the receiver. Good answers should have included details of how the satellites are deployed, the contents of the relevant signals, an outline description of the calculation that derives the location and the use by the receiver to show a visual representation of the position of the location of the car amongst images of a terrain on a screen.

INFORMATION TECHNOLOGY

Paper 9626/32
Advanced Theory

Key messages

Many responses demonstrated good subject knowledge. However, some responses were vague with insufficient detail to gain credit. At A Level, responses should include more detail than single word lists or very brief statements; such responses usually do not gain credit. Single words, or very short statements, do not adequately 'describe' or 'explain' as required by the questions. Questions using the command words 'discuss', 'evaluate' or 'analyse' cannot be answered with single words or brief statement and in-depth knowledge of the topics in the syllabus and their use to formulate responses that address these command words is required.

Some responses did not apply knowledge of the topics to the given scenarios or context in the questions. A number of candidates still appear to look for, or 'spot', key words in the question and then write answers based on or around those keywords. These responses are often generic and therefore gain little credit. For example, **Question 1** was about the limitations of using WAPs to connect portable computers. A number of responses focused on 'portable computers' and gave the limitations of these rather than describing the limitations of WAPs.

It is vital that candidates read the information given in the introductory stem, or short scenarios, at the beginning of a question very carefully. This will enable them to apply their knowledge when answering the subsequent question. Candidates should also carefully read the whole of each question. Answering questions without referring to the scenario, or merely writing about a topic with little reference to the question as set, will not give access to the full range of available marks. For example, **Question 10** asked about the use of pilot implementation when installing broadband in rural areas, but many responses compared different implementation methods and their benefits and drawbacks with little or no analysis of the effectiveness of pilot implementation for the broadband installation.

A number of questions produced responses that restated the question and this should be discouraged. Many candidates wrote out the question as an introduction to their answer, but this is not necessary, wastes time in an examination and does not gain credit.

General comments

The syllabus contains a list of 'command words' that are used in the questions. The list explains what each command word requires. It is very important that, when answering questions, candidates read the rubric and answer the question in the appropriate manner. When answering questions that ask candidates to 'explain', 'describe', 'evaluate', 'analyse' or 'discuss' a topic, candidates should write in continuous prose to be able to expand and elaborate their discussions.

Attention is drawn to the glossary on p.45 in the 2022 – 2024 syllabus as the meanings for the command words have changed in the syllabus for March/June 2022 onwards.

When answering questions about new and emerging technologies, responses should be restricted to what is actually possible. Answers should be sensible, credible and not stray into the realms of fantasy. At A Level, it is expected that candidates have a knowledge of how new and emerging technologies are increasingly being used in today's world.

Candidates should always attempt all of the questions and, if using the spare pages or additional pages, candidates must properly cross-reference their answers. Answers that candidates do not want to be marked should be clearly crossed through and a note added to indicate where the intended answer is written.

'Rough' notes, 'aide-de-memories' or planning notes that are not part of the final answer should be crossed through.

Comments on specific questions

Question 1

This question asked about the limitations of WAPs when they are used to connect portable computers into a cabled network. A number of responses wrote about 'portable computers' and their limitations or about networks in general, which did not answer the question. Strong answers referred to a limited effective distance with connection issues increasing with increasing distance from, and with obstacles between, the WAP and the computer, interference due to the presence of other wireless devices that are transmitting on close, or on the same, frequencies and a lower available bandwidth compared to wired connections. Correct terminology should be used. For example, at A Level it is expected that responses refer to e.g. 'low signal strength' or 'high bandwidth' rather than to 'bad internet' or 'strong internet'.

Question 2

A common error was to confuse the use of IT to enhance vision with laser surgery or making objects such as 'glass lenses by 3D printing'. ***Section 11*** of the 2021 syllabus, page 22, lists 'vision enhancement' as an emerging technology, so strong answers should have referred to e.g. the use of smart glasses using screens in front of the eyes to enhance visual acuity, the use of augmented reality systems in head-sets or goggles to add to visual experiences, or to experimental techniques that help macular degeneration sufferers. References to the built-in magnifier tools available on computing devices to assist when reading text were also given credit. It should be noted that text-to-speech systems designed to assist visually impaired persons in reading do not *enhance* vision but *replace* vision and, as such, do not answer the question.

Question 3

There were a number of responses about losing the credit card in the street or having its details stolen by 'shoulder surfing' or by theft in a shop, without further description of the use of the stolen card details. The question was about using credit cards for online shopping, so such incomplete references did not answer the question. Loss of the card and then having its details used for fraud were valid answers but needed to be described. Strong answers should have referred to 'cardholder not present' transactions made using details of the card that had been dishonestly obtained, merchants fraudulently using card details, unexpected repeat billing by a merchant, charges made to check the validity of the account by hotels or petrol/gas stations not being cancelled by the merchant when full payment is made. Fraud as a result or consequence of pharming or phishing was given credit if appropriately described by the candidate.

Question 4

The command word 'Evaluate' in this syllabus requires candidates to *'discuss the importance of, weigh up the advantages and disadvantages, judge the effectiveness, weigh up your opinions'.* Advantages and disadvantages are required but, in addition, expansion is needed to explain why these are important or what effect they have. Strong answers could have included references to encryption requiring an encryption key meaning that that stolen data cannot be understood by unauthorised persons. Other examples include the data remaining confidential because it can only be understood by the intended recipient who has the key to opening up the and encryption requiring more processing time to exchange data because of the encryption/decryption process itself. Further examples can be found in the mark scheme

Question 5

A common error was to limit descriptions to the benefits and drawbacks of online shopping. ***Section 12.2***, page 22, is about eBusiness and as well as online shopping encompasses online banking and digital currencies. Strong answers could have referred to electronic funds transfer in any of these situations e.g. the benefits include that transactions can be carried out at any time, can be carried out with ease and more quickly across international borders and there is no need to travel to purchase goods. Drawbacks include having the amount of a transaction limited by the funds available or laws regarding payments across international borders, the risk of cyber-crime and a lack of compatibility between e-payment systems preventing the transfer of funds. While generic answers such as there being no need to carry money to retailers or financial institutions and the requirement for internet access and a suitable device were also accepted, responses should provide detailed descriptions rather than brief statements.

Question 6

Some responses to this question were vague or inaccurate. Common errors included confusing switches with hubs or with routers and making comparisons between them. A good answer to this question would have included the technical details of what a network switch does and how it does it, with no need to mention or compare with other devices. The role of a network switch is to connect network devices or nodes together by receiving, processing and forwarding (IP) data packets from and to network devices. A network switch operates at the data link layer by creating a table in its Content Addressable Memory (CAM) of MAC addresses and ports of received network frames. It uses this table when examining Ethernet frames so it can send them to a known port or address or, if not known, to all ports or addresses on the network.

Question 7

(a) Responses to this question were varied but mostly referred to which parts of the computer game could be translated e.g. the menus, instructions and on-screen dialogue. Few responses went further to describe how this could be accomplished. Strong answers could have referred to the translation tools that use parsers and filters to detect translatable strings, using translation memory systems to reuse previous translations, to the built-in quality assurance and checking tools used to check the spelling and grammar of the translations and to using these to adjust and amend translations to the cultural background or local norms of global customers.

(b) Consequential benefits such as 'selling more games' were considered too vague. References to the reduced need for human input resulting in the decrease in the time taken for a translation or improved consistency of the terminology translation were strong answers.

(c) Descriptions were required so brief statements about translations 'being wrong' were too vague. Strong answers included references to the occurrences of contextual errors because computers cannot yet be programmed to fully understand the context of words or phrases in every language, and imperfect localisation resulting in the target audience not understanding the game instructions.

Question 8

In this question, responses needed to be realistic for the given scenario. Answers describing DNA profiling and blood sampling are unrealistic in a school situation.

(a) Some responses described the process rather than, or as well as, giving a description of the components. Many responses listed three types of biometric reader but gained credit for only one since the question asked for the components of the system rather than just types of reader. Other components that could have been included in answers are the software for converting the scanned biometric data into a standardised digital format, a database to securely store biometric data for comparison and a payment system to transfer funds in payment for the food purchases. *Relevant* physical components could also have gained credit.

(b) This question elicited some very good responses with step-by-step descriptions of how a biometric payment system is used, although some weaker answers were also seen.

Question 9

(a) This question proved challenging for candidates. While many responses provided some detail about what incremental prototyping involved, most did not give reasons why it might be used when developing a spreadsheet for managing finances. Strong answers could have included references to it being used when the requirements of the complete spreadsheet are clearly defined and understood but minor details can be decided and incorporated during the development, user feedback being obtained early in the development process and the spreadsheet being developed in a modular manner.

(b) Some responses confused 'using test data' with the process of 'testing' so explained why testing is necessary. The question required an explanation of the purpose of test data so strong answers were those that referred to locating or discovering errors in the logic, calculations or formulae in the spreadsheet, showing what the errors were, and confirming that any validation rules worked.

Question 10

The command word analyse requires candidates to *'explain the main points or effectiveness in detail, identify their main characteristics, examine closely'.* For this question, strong answers should have given a description of a characteristic of pilot implementation and then commented on it with regard to its effectiveness or how useful, or otherwise, it is for the stated purpose. For example, the fact that feedback can be obtained from real users is characteristic of pilot implementation and a comment about the effectiveness of this would be that the feedback can be used to improve the rest of the implementation or installation. Drawbacks should also have been included for consideration in order to gain full credit. For example, pilot implementation can take a long time to complete – a drawback – so the overall installation to all areas may be delayed, causing frustration or annoyance to prospective customers or widening a digital divide.

Question 11

The command word 'Evaluate' in this syllabus requires candidates to *'discuss the importance of, weigh up the advantages and disadvantages, judge the effectiveness, weigh up your opinions'.* Advantages and disadvantages are required but, in addition, responses needed to expand on these to explain why these are important or what effect they have. In this question, responses should have referred to the various methods of protecting data stored on stand-alone computers in a computer room. The scenario was carefully chosen to exclude network or internet issues – the computers were described as standalone – and the room was mentioned to allow candidates to refer to physical methods.

The responses to this question illustrate the need for candidates to read questions carefully. Any reference to network or to internet issues did not answer the question so did not gain credit. Similarly, responses that concentrated or focused on a single method of protection did not answer the question properly so could not gain full credit.

Strong answers covered a range of methods and included the use of passwords, PINs, login details or biometrics, the use of dongles, tokens or USB devices to create one-time-passwords (OTP), and physical barriers e.g. tethers on the equipment or locks on doors which are cheap to install and impede intruders but are useless if the key is lost or stolen or an intruder does not care how much damage they cause when gaining entry. Passwords become less effective if they are shared and tokens cannot usually be used on other systems so have limited use where there are many computers in a room.

Question 12

Most responses described the makeup of bitmaps and thumbnails but few *analysed* the use of bitmaps for the purpose of displaying portraits on a website. Some responses compared bitmaps to vector images and some confused vector graphics with bitmaps in terms of their structure, none of which gained credit. Some responses described the different file types that could be used for bitmap graphics. This did not gain credit unless there were further comments as to why this is useful e.g. some allow transparency but some do not.

Strong answers should have referred to bitmap files translating well to the dot-format of raster-based output devices and to printers, bitmap files being very large so they can take a long time to display or download or to data compression being possible and useful for a number of reasons but introducing artefacts that 'spoil' the photographs, and the fact that bitmaps do not scale without the possible introduction of pixellation.

Question 13

This question required candidates to describe the differences, not the similarities, between the use of Bluetooth® and infrared as a means of data transfer. Many strong responses that identified the differences between the use of Bluetooth® and infrared were seen.

Common errors were to transpose the features of Bluetooth® and infrared or to vaguely describe their use in terms of what devices use them e.g. 'Bluetooth is for phones but infrared is for TVs' and to list features rather than differences.

The wording of this question included the requirement to 'describe the differences' because the command word in the 2021 syllabus does not include this but simply asks that differences be identified. This is not the case in the 2022 – 2024 syllabus where 'contrast' is defined as *'identify/comment upon differences'* so question setters may not be obliged to include the phrase in future questions.

Question 14

(a) Strong answers to this question described bit streaming as the sending or receiving of a sequence of bits over a communications network. At A Level, candidates are expected to be able to define such terms in technical language and the important points are the 'sending/receiving' and the 'sequence' of bits.

Many answers repeated the question e.g. 'sending steams of bits' or were very vague e.g. 'watching online videos'. Such answers did not gain credit.

(b) Responses needed to describe differences between real-time and on demand bit streaming. However, some answers lacked the essential points, or were vague or inaccurate e.g. references to network or internet issues. Essentially the differences are that real-time bit streaming is from a 'live' event and cannot be accessed at a later date while on demand bit streaming is from a recorded event and can be accessed at any time.

INFORMATION TECHNOLOGY

Paper 9626/33
Advanced Theory

Key messages

Many responses demonstrated good subject knowledge. However, some responses were vague with insufficient detail to gain credit. At A Level, responses should include more detail than single word lists or very brief statements; such responses usually do not gain credit. Single words, or very short statements, do not adequately 'describe' or 'explain' as required by the questions. Questions using the command words 'discuss', 'evaluate' or 'analyse' cannot be answered with single words or brief statement and in-depth knowledge of the topics in the syllabus and their use to formulate responses that address these command words is required.

Some responses did not apply knowledge of the topics to the given scenarios or context in the questions. A number of candidates still appear to look for, or 'spot', key words in the question and then write answers based on or around those keywords. These responses are often generic and therefore gain little credit. For example, **Question 1(b)** was about the worries that an IT manager may have about storing data in the cloud. This question was only about the drawbacks of cloud storage, but some candidates wrote about both benefits and drawbacks.

It is vital that candidates read the information given in the introductory stem, or short scenarios, at the beginning of a question very carefully. This will enable them to apply their knowledge when answering the subsequent question. Candidates should also carefully read the whole of each question. Answering questions without referring to the scenario, or merely writing about a topic with little reference to the question as set, will not give access to the full range of available marks. For example, **Question 2** asked about the use of satellite communication for *providing internet access to users.* Responses detailing satellite communications, however valid, without any reference to the provision of internet access did not answer the actual question and could not gain credit.

A number of questions produced responses that restated the question and this should be discouraged. Many candidates wrote out the question as an introduction to their answer, but this is not necessary, wastes time in an examination and does not gain credit.

General comments

The syllabus contains a list of 'command words' that are used in the questions. The list explains what each command word requires. It is very important that, when answering questions, candidates read the rubric and answer the question in the appropriate manner. When answering questions that ask candidates to 'explain', 'describe', 'evaluate', 'analyse' or 'discuss' a topic, candidates should write in continuous prose to be able to expand and elaborate their discussions.

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When answering questions about new and emerging technologies, responses should be restricted to what is actually possible. Answers should be sensible, credible and not stray into the realms of fantasy. At A Level, it is expected that candidates have a knowledge of how new and emerging technologies are increasingly being used in today's world.

Candidates should always attempt all of the questions and, if using the spare pages or additional pages, candidates must properly cross-reference their answers. Answers that candidates do not want to be marked should be clearly crossed through and a note added to indicate where the intended answer is written.

'Rough' notes, 'aide-de-memories' or planning notes that are not part of the final answer should be crossed through.

Comments on specific questions

Question 1

(a) Most responses explained what is meant by storing data in the cloud although many answers referred only to how data is stored and not what the cloud is. Strong answers referred to the use of networked storage devices accessed from the internet and managed by third parties.

(b) This question was about the drawbacks of storing data in the cloud from the perspective of an IT manager. However, many responses referred to the benefits. Strong answers referred to data being more susceptible to cyber-attack, not being under direct control of the company and being more difficult to permanently delete as there are multiple copies.

Question 2

Most responses described some of the aspects of the use of satellite communications, but few referred specifically to its use for internet access provision. Strong answers included references both to how satellites are set up and how they can provide access to the internet.

Question 3

Responses to this question demonstrated the importance of reading questions carefully. A common error was to write about project management software in general rather than focus on web-based PMS. Both advantages and disadvantages were required to gain full credit. Answers should have referred to project data being stored on central servers so data and amendments are accessible to all team members immediately, the centralisation of the software and data meaning that backups are taken out of the user control, software updates being immediately available for all users and there usually being no steep learning curve because the user interfaces are intuitive. Disadvantages include web-based Project Management tools often not being compatible with offline PM tools, some basic Project Management functionality being missing from web-based versions and web-based Project Management tools not being available without internet access.

Question 4

(a) Strong answers to this question referred to the timeline, the bars showing the durations of tasks, and the arrows showing the dependencies and critical path. However, some responses showed that more careful reading of the question was required. Common errors were to describe any of the possible components of Gannt charts or to describe how they would be derived or used rather than what could be seen.

(b) Answers that gained credit included the use of a percentage bar within the task bar or the use of different colours to highlight overdue tasks.

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A common error was to describe a blog but not refer to its use.

Question 9

(a) Candidates were required to describe the steps in RAD and some good answers were seen. However, some responses did not properly describe RAD steps but provided vague and inaccurate answers. A common error was to confuse RAD with the different methods of development and the system life cycle stages.

(b) Reasons for using RAD and not the traditional waterfall method include that the project is divided into smaller sub-tasks that specialised teams of developers can work on concurrently, prototypes are created quickly so the client can see progress and the working sections, the waterfall method needs to start again if the project fails but RAD can adapt to changes in user requirement. Many answers were vague e.g. *'RAD is more organised'* and lacked sufficient detail to be awarded credit.

Question 10

This question required candidates to describe how the `onerror()` function in JavaScript can be used to locate mistakes in JavaScript code and assist a user in dealing with them. Common errors were to repeat the statement given in the question about it trapping errors or to give vague descriptions of finding an error but not describe how this is reported to the user. Strong answers included descriptions of the fact that trapping an error is not sufficient to enable a user to find it but it is also necessary to have a method of reporting the error so it can be corrected, the `onerror()` function can pass or place the error details into variables which are used to pass parameters of the error to the program for further processing and can be displayed to the user via an alert box.

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This question, using the command words 'compare' and 'contrast', required both similarities and differences about hubs and switches. Responses that did not describe both similarities and differences could not gain full credit. Strong answers included the similarity that both hubs and switches allow multiple nodes to connect together in a network and a difference is that hubs broadcast all received data to all devices on a network whereas switches examine the MAC address in data packets to determine where to send them. At A Level, candidates are expected to know and understand the roles of network devices and to be able to apply their understanding. The effects of using hubs and switches in a network could also have been considered, e.g. using hubs can reduce the network performance because they use all of the available bandwidth but switches make more efficient use of network bandwidth than hubs because they do not send all data to all the nodes.

Question 12

The focus of this question was not about securing the data but about preventing it from being accessed using the network. Encrypting the data is an effective method of preventing it being understood but it does not secure a network. Common errors included vague references to cloud storage which were not relevant to this question and inaccurate references to firewalls blocking internet access. Descriptions of firewalls controlling inward and outward data flow, the use of VPNs for remote access by authorised users and the proper training of all employees or staff in network and data security and ensuring that all are also properly trained in identifying and reporting threats or breaches should have appeared in strong answers.

Question 13

GPS appears as a topic on both the current syllabus, ***Section 13.3*** on page 24, and in the 2022 – 2024 syllabus, ***Section 14.11*** on page 31. At A Level, while not necessarily having a complete technical understanding of GPS technology, candidates are expected to understand its workings and those of satellite communication systems. A GPS receiver works by monitoring and using the data in signals broadcast from multiple dedicated satellites to calculate its location and overlaying the details on maps stored in the receiver. Good answers should have included details of how the satellites are deployed, the contents of the relevant signals, an outline description of the calculation that derives the location and the use by the receiver to show a visual representation of the position of the location of the car amongst images of a terrain on a screen.

INFORMATION TECHNOLOGY

Paper 9626/04
Advanced Practical

Key messages

Many strong solutions were seen, but the problem-solving elements of this paper proved most challenging for candidates. This was particularly evident within the spreadsheet and mail merge tasks. Candidates are advised to prepare for this component using tutorial material that enables them to demonstrate their Information Technology practical skills by solving problems.

General comments

There was very little that was consistently a problem for candidates apart from the extraction of the required data in the last part of **task 3** and the selection of recipients for the mail merge.

Comments on specific questions

Task 1 – Vector graphics

This task required candidates to use vector graphics tools to create an image of a shield. With a task such as this, accuracy in the detail was the determining factor.

The basic shape should have been constructed entirely of curves, and symmetry was crucial. The inner panel needed to be a replication of the shape, reduced, and centred carefully enough so the rim always appeared to be the same width. The studs had to appear domed and placed with precision.

The fills for the rim, the panel, the studs and the lightning bolt were rarely a problem and many solutions demonstrated good manipulation of gradients.

In general, the task was completed well, but to gain full credit candidates must ensure they apply their skills accurately and replicate the graphic from the question paper precisely.

Task 2 – Animation

The animation task required another copy of the shield that appeared to have been turned slightly. The required distortion should have raised the right shoulder and narrowed the shape but kept to a vertical axis of rotation. This was rarely seen in the submitted solutions. Many solutions only narrowed the shield and/or rotated the shield from a central point. The careful distortion required proved to be challenging for many candidates.

Candidates should be familiar with the use of shear, envelope, and perspective tools.

For the animation, the stream of digits had to appear to disappear into the shield. Very few solutions created the necessary layers or masks. Many managed to use layers to show the digits running behind the shield and most then positioned the ‘pop’ image at the left of the shield. Most solutions, therefore, gained credit for obscuring the red digits with the ‘pop’ image, but many did not have a correctly sized ‘pop’ image placed with sufficient precision to completely obscure the red digits.

An optimum solution required the stream of digits to be duplicated so it could be doubled in length and a similar stream created with no red digits. Without these two new images it was difficult to create a seamless animation with undetectable loops. Very few animations without obvious restarts were seen.

It was clear that many candidates appreciated the need for masks but were unable to apply them properly in this task. Almost all knew how to use layers, so candidates would benefit from further experience in the creation and use of masks.

Task 3 – Spreadsheets

This was a spreadsheet task and in the first part candidates were required to add some rows, format some cells, and use conditional formatting to highlight selected rows in a table.

All solutions demonstrated familiarity with conditional formatting but very few used a formula to determine which cells to format. This meant that only cells in one column were highlighted. The use of a formula in conditional formatting is an essential skill for candidates to master.

The next part of the task required candidates to sequentially number the rows with the selected data. There were many ways to achieve this successfully, but most involved the use of a formula with carefully created absolute and relative references. Mixing absolute and relative references within a formula range is a very important skill that was not often seen in submissions for this task.

The extraction of the required rows into the new table was not completely achieved in many solutions though it really only required 'lookups' using the INDEX(,Match(, ,)) combination. Solutions that did manage to extract the data also correctly used an error trap such as IFERROR() in order to blank other cells.

Task 4 – Mail merge

Preparing the data for the merge had to be done in a spreadsheet and involved using dates to calculate the duration of an anti-virus subscription. Almost all solutions successfully calculated a value for subscribers, but many did not take account of the fact that the calculation was not valid for those listed as using the free version since there was no expiry date recorded for non-subscribers. The other field required was the Offer_code which needed the concatenation of the first letter of the name of the virus suite and an integer for the length of subscription in years. This was successfully achieved in the majority of solutions.

All solutions used the mail merge template provided with mergefields inserted from the newly created data source but very few correctly selected the required records. The majority merged the full set of records. Such an extensive merge is unlikely to be correct. In most cases a relatively small selection of records will be required.

The conditional mergefields needed to use the Offer_code as the criterion for determining the correct text for the letters. Many solutions were unsuccessful in attempting to nest the fields and candidates would benefit from experience with nesting and the logic involved.

In conclusion

For this session, the main issues to bear in mind are:

- The importance of determining and satisfying all requirements detailed or shown in the question paper
- The importance of precision in replicating elements of a drawing
- Experience of shear, envelope, and perspective tools in graphics applications
- The use of masks in an animation
- Ensuring that 'restarts' in looping animations are undetectable
- The use of conditional formatting and in particular the use of a formula to determine which cells to format
- Mixing absolute and relative references within a formula range
- Mail merge skills, particularly the logic of nesting conditional fields and the selection and exclusion of recipients or records.