INFORMATION TECHNOLOGY

Paper 9626/11
Theory

Key messages

Candidates showed a fairly good 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 were required to achieve the higher marks.

Questions which asked for a discussion of the advantages and disadvantages of a method required the candidates to give both sides of the argument and be in continuous prose rather than listing points.

Analyse questions required a response which examined detail, showed meaning of the topic and typically needed expansions of a main point.

Discuss questions and analyse questions proved challenging and candidates are advised to develop these higher order thinking skills so that responses go beyond recalling information.

Questions that required a recall response were generally well answered, particularly those which required short responses.

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 a response, candidates could improve their responses by listing their thoughts in rough before choosing and elaborating on items appropriate to the question.

Some responses contained points from previous mark schemes, which appeared to have been learned by rote. Questions and scenarios change from year to year and responses which were applicable to past scenarios may not be relevant to the current question. Candidates should read the question carefully and ensure they understand what it requires before answering.

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

Comments on specific questions

Question 1

This question was reasonably well answered. ‘Data is processed all at once’ was a popular response. Another popular answer related to the master file being updated using a transaction file, although these answers were rarely seen together.

Question 2

This question produced slightly better responses with most responses gaining at least partial credit. Many responses included at least two good points. Most of these correctly identified the makeup of the cockpit and sometimes the conditions that were being simulated.

Question 3

This question was reasonably well answered with the majority of responses gaining at least partial credit. Responses often consisted of lists of the features of encryption. Popular correct responses included the 'scrambling of data' and 'mention of symmetric and asymmetric encryption'. Candidates needed to expand on these features to gain the higher marks required for an analyse question.

Question 4

This question was quite well answered. Most responses showed a basic understanding of the process involved. Typically, candidates who achieved the higher marks included details about each part of the process. Responses gained credit for the effect on the Number_in_stock and use of the Reorder_level. Many candidates identified the necessity of the link between the two files.

Question 5

(a) This question proved to be the most challenging question on the paper. Typically, where credit was awarded, it was usually for successfully naming three of the components. Some responses contained descriptions of the components and were typically awarded higher marks.

(b) Although still a very challenging question many of the responses gained partial credit. The most commonly occurring correct answer was based on the rearranging of files on the disk. Some responses mentioned creating larger regions of free space. Candidates who discussed the read/write heads movement over different areas of the disk when accessing fragmented files being slower, typically gained higher marks.

Question 6

This question was reasonably well answered by most candidates. The topic of algorithms was only recently introduced to this syllabus and proved challenging to candidates who wrote their answer in prose rather than using algorithmic constructs.

Candidates need to read the question carefully to ensure all elements and details are fully noted to achieve higher marks.

Question 7

This question proved very challenging. Responses tended to give general answers about what a spreadsheet does but not related to its characteristics which make it suitable for creating models. To achieve the higher marks, candidates typically needed to describe or expand upon the identified characteristics.

Question 8

This question, although it proved to be challenging, produced some better responses with many candidates gaining at least partial credit. Some good responses were seen with answers such as 'data obtained from the banks was collected for a different purpose' and 'there may be too much data' were common along with recognising the expense involved in either purchasing it from the bank or collecting it themselves.

Question 9

This question was answered reasonably well with many gaining at least partial credit. Typically, correct points related to the relative concentration of people in rural and city areas and to the lack of infrastructure in rural areas. Candidates who achieved the higher marks typically also referred to the expense to providers of supplying services in rural areas.

Question 10

This question proved very challenging. Some of the candidates were able to identify and describe the role the computer takes in the scenario as well as describing analogue to digital conversion. Many responses, however, were unable to correctly identify two sensors that could be used. In answering this question students who invented sensors or who did not consider the scenario on the question paper were limited to low band marks.

Question 11

There were responses that included very good descriptions of what a gesture-based interface is and does. Fewer responses compared it with any other named type of interface. Candidates need to answer the question set; those who provided an answer they had prepared for rather than the question on the question paper, were limited to low band marks.

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 were required to achieve the higher marks.

Questions which ask for a discussion of the advantages and disadvantages of a method requires the responses to give both sides of the argument and be in continuous prose rather than just listing points. Responses should contain expansions of a main point. Discuss questions proved challenging and candidates are advised to develop these higher order thinking skills so that responses go beyond recalling information.

Questions that required a recall response were generally answered well, particularly those which required short responses.

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 a response, candidates could improve their responses by listing their thoughts in rough before choosing and elaborating on items appropriate to the question.

Some responses contained points from previous mark schemes, which appeared to have been learned by rote. Questions and scenarios change from year to year and responses which were applicable to past scenarios may not be relevant to the current question. Candidates should read the question carefully and ensure they understand what it requires before answering.

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

Comments on specific questions

Question 1

This question was quite well answered with many responses making at least two good points. ‘Information on the census is two years old and could be out of date’ was a popular response, as was ‘the students would be able to collect only as much information as they required’. Some candidates mentioned using data loggers or paying people to collect data which were not relevant to this scenario.

Question 2

This question was quite well answered with most responses gaining at least partial credit with some gaining full credit. Many responses included at least two good points. Most of these correctly identified that it was ‘the data on the disk that was being encrypted’ as well as the fact that ‘only people with the decryption key would be able to understand the data on the disk’. A small minority of responses confused encryption with fragmentation.

Question 3

This question was fairly well answered, although **part (a)** proved to be more challenging for many.

(a) There were some good responses which correctly explained the need for the last bit to be set to either 1 or 0 and why. Very few responses appeared to have understood the concept of a parity bit. Of those that did, many confused the terms bits and 1s. Candidates should be aware of the suitability of parity checking and that this type of check is only useful in transferring data from one device to another.

(b) This part of the question produced some good responses with both visual checking and double data entry being understood. However, visual checking was sometimes confused with proof reading with both methods incorrectly described as being used to ensure that data is correct.

Question 4

This question proved challenging. Some responses did show an understanding of MIPS and FLOPS used to measure performance speeds of mainframe computers and supercomputers, with many of these able to expand the acronyms. However, many responses referred to the difference between supercomputers and mainframes, rather than the performance metrics so did not answer the question asked.

Candidates should read the question carefully and ensure they understand what it requires before answering.

Question 5

This question was fairly well answered. It was pleasing to see most responses written in full prose with many expanding on the points they made. For example, commenting on the speed of the process and expanding this by explaining ‘compilers translate a program all in one go whereas interpreters translate one line at a time’. Other popular responses related to how errors are dealt with.

Question 6

(a) This part of the question proved challenging. Few responses described the sensors themselves but relied more on what those sensors measure. Some good responses were seen with a variety of well-reasoned uses given, particularly regarding the sound sensor. Candidates should avoid simply repeating the question in their response without further expansion; for example, a humidity sensor measures humidity and a sound sensor measures sound.

(b) This part of the question was reasonably well answered, but few responses contained more than one valid point. The most common correct response related to improving the accuracy of sensor readings.

(c) Few responses contained more than one valid point. The most common correct response related to ‘one reading or measurement is required for one point calibration whereas two point calibration requires at least two readings to be taken’. There were some good responses which included descriptions of how to calculate the offset and the sensitivity. Candidates should avoid rewording the question without elaboration.

Question 7

This question proved quite challenging. The topic was only recently introduced to this syllabus and unfamiliarity with completing flowcharts was evident in some responses. Despite this, some responses were excellent and achieved full credit. Candidates who showed little understanding of the meaning of the flowchart symbols were typically limited to partial credit.

Question 8

(a) Some responses gained credit for at least two good points. Candidates generally showed a good understanding of the involvement of a website. Candidates need to be aware of the differences between pharming and phishing as many confused the two in their responses.

(b) This part of the question proved to be more challenging. Candidates should avoid vague phrases such as '*use anti-virus*', '*use firewall*', '*make sure it is https'* as these lacked enough detail to gain credit. In answering this question candidates need to explain how these features provide protection. Many responses seemed to describe ways to avoid receiving spam email which was not part of the question.

Question 9

(a) Most responses gained some credit with many containing at least two valid statements. Whilst some understanding of updating a master file with a transaction file was apparent, the process of putting this into pseudocode did not appear to be fully understood. Where responses gained credit, it was usually for setting out the wage calculation correctly and appreciating the need for an ENDIF statement to close the IF condition.

(b) This part of the question proved to be a little more challenging. Many responses were awarded partial credit, usually for appreciating that payroll only needs to be run on a weekly or monthly basis and consequently, batch processing can take place at less busy times. Some understanding of batch processing was evident. Typically, responses that gained the higher marks compared batch processing with other types of processing.

INFORMATION TECHNOLOGY

Paper 9626/13
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 responses.

Questions which ask for a discussion of the advantages and disadvantages of a method requires the responses to give both sides of the argument and be in continuous prose rather than listing points. Responses should contain expansions of a main point. Discuss questions proved challenging and candidates are advised to develop these higher order thinking skills so that responses go beyond just recalling information.

Questions that required a recall response were generally fairly well-answered, particularly those which required short responses.

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 a response, candidates could improve their responses by listing their thoughts in rough before choosing, and elaborating on, items appropriate to the question. This approach, although not seen in many responses, appears to more prevalent than in previous years.

Some responses contained points from previous mark schemes, which appeared to have been learned by rote. Questions and scenarios change from year to year and responses which were applicable to past scenarios may not be relevant to the current question. Candidates should read the question carefully and ensure they understand what it requires before answering.

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

Comments on specific questions

Question 1

(a) The majority of responses gained credit for being able to describe direct data.

(b) This part of the question produced some good responses with most candidates gaining at least partial credit. Many described how direct data sources could be used but some only identified methods of collecting the data without saying how they would be used for example, what data would be collected or who it would be collected from.

Question 2

This question proved to be extremely challenging. Few responses showed an understanding of the limitations of interpreters and compilers in this scenario. Candidates need to focus their answer on the question set and avoid vague descriptions of compilers and interpreters without describing the limitations in this scenario.

Question 3

This question was fairly well answered. Responses showed a good understanding of the prevention, detection and removal of malware. Although firewalls were often mentioned, their function did not seem to be fully understood. Candidates who expanded their response to explain how a firewall protects against malware, typically gained higher marks.

Question 4

(a) Many responses to this part of the question gained credit. Popular correct responses contained references to being made to 'accommodate the customer's preferences', 'needs support being obtained directly from the creators' and that 'the development costs have to be paid for by client'. Some weaker responses contained responses such as 'more expensive' which is not enough at this level and statements such as this should always be expanded.

(b) Many responses to this part of the question also gained credit. Popular correct responses contained references to being 'ready for use' and 'available to the general public' and that 'support is obtained from help desks'. Again, some weaker responses contained responses such as 'cheaper' which is not enough at this level and statements such as this should always be expanded.

Question 5

This question produced some reasonable responses with most responses gaining at least partial credit. It was pleasing to see most responses written in full prose with expansions of some points in evidence. For example, commenting on the dialogue interface being 'unable to operate reliably if there is background noise' and then going on to say that this would result in 'commands being misinterpreted'. Generally, the idea of 'multitasking', 'various voice impediments' or 'background noise' were good points seen in responses.

Question 6

This question proved quite challenging. However, a few excellent responses were seen concerning the use of SSL/TLS protocol. These responses often referred to digital certificates, handshakes and the use of session keys. Responses containing more than one valid point were limited in number with some responses containing the correct names for the technical terms but not being able to describe them.

Question 7

This question proved quite challenging. Where responses did gain credit, it was usually for mentioning the safety aspect. Typically, some of the stronger responses did refer to other aspects such as 'not having to pay as much money for materials to replace damaged reactors'. Many responses referred to a physical model rather than the computer model asked in the question. Candidates need to read the question carefully to ensure all elements and details are fully noted to achieve higher marks.

Question 8

This question proved quite challenging. The topic of algorithms was only recently introduced to this syllabus and unfamiliarity with the topic was evident. Candidates should be aware of how a microprocessor operates and typically stronger responses made reference to sending signals or the use of comparisons.
Many responses appeared to have taken account of the need to use IF…THEN statements but contained a succession of these with little reason for them.

Question 9

(a) There were some strong responses to this part of the question with good descriptions of the other components of an expert system. Many responses indicated that candidates knew the names of the components but were unable to describe them in the detail required to gain the higher marks.

(b) This part of the question proved to be a little more challenging. Many responses showed an understanding of insurance but few of these were able to expand on how an expert system could help the consultant assess the risk.

Question 10

This question proved challenging. Many responses indicated that the process of normalisation itself was understood but this did not often result in them being able to describe the advantages and disadvantages of normalisation. As a result, many filled the response space with a description of the normalising process rather than writing about the advantages and disadvantages. A popular correct response stated that 'removing duplicated data would reduce the storage space used'. Other responses gained credit for 'greater expertise being needed' and the resulting cost of this.

Question 11

This question proved quite challenging. The topic was only recently introduced to this syllabus and unfamiliarity with completing flowcharts was evident in some responses. Despite this, some responses were excellent and achieved full credit. Candidates who showed little understanding of the meaning of the flowchart symbols were typically limited to partial credit.

INFORMATION TECHNOLOGY

Paper 9626/02
Practical

Key messages

In order to demonstrate good performance for this question paper:

- candidates need to identify and use the most efficient spreadsheet formulas to solve each task
- candidates need to take care when entering data into a spreadsheet
- candidates need to take care to format the spreadsheet layout to match the task requirements.

General comments

The spreadsheet tasks gave a full range of candidate responses involving a wide range of formulas and functions used. There were many different correct solutions presented by candidates and many were well constructed.

Comments on specific tasks

Task 1

One of the initial instructions given in **Task 1** was 'Do not edit either of these data files' which was sometimes ignored by candidates with one or both files being saved in spreadsheet format, sometimes with edited data.

Most candidates created a spreadsheet to look like the diagram given in the question paper, although there were some errors in text alignment both horizontally and vertically. The narrowing of rows 2, 4 and 6 caused some candidates a problem as they only narrowed two of the three rows.

Few candidates set the gridlines as shown in the question paper. Most candidates merged cells A1 to G1 and A3 to G3 as specified but fewer candidates did the same for A7 to G7. Almost all candidates set the merged cells in rows 1 and 3 with a dark blue background and yellow text.

Most candidates inserted the correct text with an automated date and time on the left in the header. There were a small number of typographical errors seen in the header text. Most candidates placed the automated file name on the right in the header although some candidates included the file path. Almost all candidates completed the footer as specified although there were a few typographical errors, usually in the spacing used.

The majority of candidates saved the work with the specified filename.

Task 2

The requirement for this cell was the formula =D5**,** which most candidates created successfully. Although there were a number of more complex formulas used to perform the same function. At AS level it is expected that candidates can determine and use the most efficient method of solution. This formula was often enhanced in step 9 to set it to a blank cell with the formula like =IF(D5="","",D5) or with the use of error trapping functions to perform the same task.

Task 3

This task was answered well by most candidates. Typically, the majority of candidates successfully used a VLOOKUP function in cell D9 to display the name of the port, using the cell C9 as a relative reference. Some candidates used the correct cell range within the source file and almost all candidates used the correct return column.

Task 4

Some of the responses to this task showed candidates found this task more challenging.

A number of different methods were seen in candidate responses in cell B9. Some responses made good use of the WEEKDAY function for the contents of cell A9. Although other responses used VLOOKUP or XLOOKUP functions as the second half of an IF function.

If these matched then candidates who attempted this method often set the date to the next day using A9 + 1, or where it did not match, set the date to A9 to return the same date.

Other solutions were seen using alternative methods such as multiple nested IF functions or IF and OR functions. Few of these alternative methods gave the correct results for all the different ports.

Candidates can improve on their answers by considering the use of alternative functions rather than favouring VLOOKUP and IF functions as other functions may provide a simpler solution.

Task 5

Many candidates found this task challenging, giving a variety of solutions. Typically, successful responses made good use of the INDEX and MATCH functions, with most solutions selecting the most efficient ranges from the 'port' source file.

Other efficient solutions were attempted by using HLOOKUP and MATCH or VLOOKUP and MATCH functions. For example, HLOOKUP(C10,j22port.csv!$D$2:$M$12,MATCH(C9,j22port.csv!$A$3:$A$12+1) or VLOOKUP(C9,j22port.csv!$A$3:$M$12,MATCH(C10,j22port.csv!$D$2:$M$2+3).

Other responses could have been improved by reducing the reliance on using a large number of nested IF functions.

Candidates need to ensure they are entering the formula in the correct cell.

Task 6

The majority of candidates who attempted this task were successful in performing the calculation using either VLOOKUP or LOOKUP functions Although a number did not divide their calculation by 24 to calculate the number of days from the number of hours.

A few candidates used a function to round up the results of this calculation to the nearest whole day, using ROUNDUP or alternative similar function.

As with **Task 5**, candidates need to ensure they are entering the formula into the correct cell.

Task 7

The formula of =B9+F10 in cell G10 attained candidates' full marks.

Candidates should attempt to use the simplest solution and those who nested together multiple functions unnecessarily typically gained lower marks.

Two common mistakes were to select incorrect cell references or enter the formula in the incorrect cell.

Task 8

Candidates who had placed a formula in cell G10 were largely successful with this task using a formula like =G10+2 or =SUM(G10,2). There were a few variations where incorrect cell references were used.

Task 9

Typically, the best solutions involved either testing to see if another cell contained data to determine whether to display a null string or using an IFERROR function to display a null string.

Task 10

Although many candidates applied replication to their formulae, only those that followed the instructions and replicated the formula to row 24 were successful at this task.

Candidates need to ensure that all parts of the instructions are followed accurately.

Task 11

Many candidates placed a formula in this cell to display the correct ship's name, depending on the code placed in cell B5. Many concatenated this to the correct text using either the '&' operator or the CONCATENATE/CONCAT function.

Candidates who included an IF function to test if there was no data in cell B5, typically gained higher marks.

Some candidates entered the text 'No ship selected' in this cell without using a formula and a number of scripts contained typographical errors.

Candidates need to take care to ensure the outputs are accurately entered to be able to access the higher marks.

Task 12

Most candidates identified all the cells that required formatting in date format. A few candidates had a mixture of date formats on display.

The majority of candidates saved the spreadsheet as specified.

Task 13

Most candidates entered the correct data to model the spreadsheet and indicated that the ship was the Harriette, with many responses also displaying the correct departure date.

Fewer candidates were able to display all the correct ports or indicated the ship would arrive in Tawara on the 11/7/2022 with all the correct stage results.

Task 14

Most candidates entered the correct data to model the spreadsheet. Many candidates had identified the ship as the Ulyssess.

Some identified the correct ports (many used F rather than Z for the port code) but fewer candidates attained all the correct results.

INFORMATION TECHNOLOGY

Paper 9626/31
Advanced Theory

Key messages

In Paper 3, it is expected at A level that candidates have a depth of knowledge of the subject topics and can customise their responses according to the command words in the questions. While there are questions that do require the recall of facts, Paper 3 provides opportunities for candidates to demonstrate that they have a 'greater depth as well as breadth of subject knowledge, confidence in applying knowledge and skills in new situations and the vocabulary to discuss their subject conceptually and show how different aspects link together'. The command words given in the syllabus are used in questions to give candidates the opportunity to do this. Centres are reminded to advise their candidates to target their responses to the command word in the question. For example, where a question asks why a protocol or process would be used, there is usually little or no credit given for describing the protocol or process itself since this does not answer the question 'why?'.

Questions can be set on any, and all, areas of the A Level topic syllabus so it is important that centres ensure that their candidates are conversant with the content of all the topic areas and that they study all the topics in the syllabus in some depth.

General comments

Centres are advised to remind their candidates to read the whole of each question carefully and apply their knowledge to the scenario in the question set and not to write answers based solely on words that they have 'spotted' or on 'key words'. The full range of marks is only available to candidates for answers referring to the scenario in the questions. It was noted that fewer candidates were omitting whole questions, but centres are again advised to continue to encourage their candidates to attempt all questions.

Candidates should write full sentences and avoid bulleted short statements in their responses. It was a good to see far fewer one-word answers as these rarely, if ever, score marks. Descriptions or explanations can only be conveyed in full sentences. Analyses, discussions and evaluations should also be in free response with full sentences to properly answer the question.

Comments on specific questions

Question 1

Both parts of this question were well answered by most candidates.

(a) The best answers identified ways data could be lost and described the implications. Candidates need to read the question carefully to ensure all elements and details are fully noted to achieve higher marks.

(b) Typically, some of the stronger responses did include sensible and valid instructions that could be given to a technician. Weaker answers stated what should be done when creating backups without making it clear that these were instructions, so did not answer the question. Candidates need to read the question carefully to ensure all elements and details are fully noted to achieve higher marks.

Question 2

Most candidates demonstrated that they knew what a proxy server was, but many confused its use with a firewall or with protection against malware. Candidates need to focus their answer on the question set and avoid vague descriptions of a proxy server in businesses or to circumvent regional restrictions, both of which

are not relevant to this question. Weaker answers did not provide the detail required to evaluate the use and candidates should read the question carefully and ensure they understand what it requires before answering.

Question 3

(a) This question was challenging. Candidates should be aware of the svg file and typically stronger responses included explanations of why the svg format is used by the designer.

(b) Many candidates could answer this question well with good answers that included a range of technical detail. Weak answers referred to 'calculations' and 'compression' which were too vague or inaccurate. In order to achieve the higher marks candidates typically needed to identify the type of information that is stored.

Question 4

Most candidates answered this question well and typically, candidates who discussed both advantages and disadvantages gained higher marks. Weaker responses were either too vague and generic for example, 'are free', 'need the internet' or inaccurate in that the descriptions were of other forms of IT-based learning. To achieve the higher marks candidates typically needed to expand upon the advantages and disadvantages they had identified.

Question 5

In this question, there were many good answers, with well thought out comments. Answers ranged from discussions of the e-waste that is produced to its effects on water, land and air environments. Good answers detailed the types of e-waste for example, plastics, rare and harmful metals and how these can affect the environment in which they end up. Weaker responses referred to pollution in general terms and 'animals being made sick' without any specific details or reference to e-waste.

Question 6

(a) Good answers described data mining as the process of analysing a large quantity of data to discover trends and patterns. Candidates need to focus their answer on the question set and avoid vague descriptions such as 'finding data' and 'analysing'.

(b) Some responses indicated that candidates knew about data mining but were unable to describe how the information obtained by data mining could be used by the owners of a retail store to increase profits. Sometimes the question was not adequately addressed with some responses giving vague responses such as 'to use for advertising', 'to discover what customers like'. To gain the higher marks, candidates need to read the question carefully to ensure all elements and details are fully noted.

Question 7

(a) Typically, some of the stronger responses did outline the stages of how cell animation is created. Weaker answers were either too vague or muddled the process with time-lapse or stop-motion animation.

(b) As in **part (a)**, good answers included details of the stages of how stop motion animation is created but weaker answers were either too vague or muddled the process with other animation methods.

Question 8

Candidates were expected to be able to explain concisely how each of the given operators works in JavaScript. In both **parts (a)** and **(b)**, some candidates showed that they had some understanding of the operators. Weaker responses did not properly explain the actions of the operators. Good answers referred to the comparison being made on the values and when TRUE or FALSE is returned back to the JavaScript code.

Question 9

While many candidates could answer the questions, some confused the design specification with other specifications and listed contents that would be found in other documentation. In this type of question, accurate and specific details are required to gain the marks.

(a) Candidates need to focus their answer and avoid vague descriptions such as ‘show the features’. Candidates who discussed the reasons for having a design specification, typically gained higher marks.

(b) The most common mistake in this question was to confuse the design specification with other documentation. Good answers gave details of what would be included in a design specification. Weaker answers were, either too vague for example, ‘some input boxes’ or inaccurate for example, ‘the passwords of doctors’. Candidates need to answer the question set; those who provided an answer they had prepared for, rather than for the question on the paper, were limited to low band marks.

INFORMATION TECHNOLOGY

Paper 9626/32
Advanced Theory

Key messages

In Paper 3, it is expected at A level that candidates have a depth of knowledge of the subject topics and are able to customise their responses according to the command words in the questions. Paper 3, while including questions that do require the recall of facts, provides the opportunity for candidates to demonstrate that they have a 'greater depth as well as breadth of subject knowledge, confidence in applying knowledge and skills in new situations and the vocabulary to discuss their subject conceptually and show how different aspects link together'. A Level candidates should be able to show their understanding by applying their knowledge of the syllabus topics with detailed responses. The command words given in the syllabus are used in questions to give candidates the opportunity to do this. Centres are reminded to advise their candidates to target their responses to the command word in the question. For example, where a question asks why a protocol or process would be used, there is usually little or no credit given for describing the protocol or process itself since this does not answer the question 'why?'.

Questions can be set on any, and all, areas of the A Level topic syllabus so it is important that centres ensure that their candidates are conversant with the content of all the topic areas and that they study all of the topics in the syllabus in some depth.

General comments

Centres are advised to remind their candidates not to write answers based solely on words that they have 'spotted' or on 'key words' in the question. Candidates should read the whole of each question carefully and apply their knowledge to the scenario in the question set. The full range of marks is only available to candidates for answers referring to the scenario in the questions. It was noted that fewer candidates were omitting whole questions, but centres are again advised to continue to encourage their candidates to attempt all questions.

Candidates should write full sentences and avoid bulleted short statements in their responses. This year there was a distinct improvement in candidates avoiding giving one-word answers as these rarely, if ever, are awarded marks. Descriptions or explanations can only be conveyed in full sentences. Analyses, discussions and evaluations should also be in free response with full sentences to properly answer the question.

Comments on specific questions

Question 1

This question was about mobile electronic wallets and their use. Many candidates confused these wallets with online shopping and banking.

(a) Many candidates could properly describe a mobile electronic wallet but too many repeated the details in the question with little additional information. Candidates should avoid simply repeating the question in their response without further expansion. Typically, responses that gained good marks described a mobile electronic wallet as 'an application (app) storing debit or credit card information or digital currency'.

(b) This question was about the setting up of a mobile electronic wallet on a smartphone. Answers that referred to online shopping or banking did not answer the question. Good answers detailed the steps that would be taken to set up an electronic wallet. No details of the use of the wallet were required to gain marks. Most candidates could describe the downloading/installing of the app and

the initial setup but many confused the setup with online or telephone banking. Candidates should read the question carefully and ensure they understand what it requires before answering.

Question 2

This question was about compression and its effect on digital images. Good explanations of why compression is necessary were seen but many responses to the question about the effect of compression on images lacked detail and were repetitive.

(a) This question was answered well with answers referring to 'reducing the file size so that less space is taken up on a storage device'. Questions where candidates are asked to explain, require a statement and at least one reason to score both marks.

(b) Most candidates could provide an outline of what compression does to digital images with statements referring to the loss of quality. However, to gain more marks candidates should have referred to the effects in more detail. Typically, some of the stronger responses did include good explanations of the effects, expanding on points and giving relevant examples.

Question 3

This question was about corrective maintenance. A number of candidates confused this with other forms of maintenance and some referred to stages in the system life cycle such as testing. The question referred specifically to the type of maintenance undertaken to correct system errors or faults that occur after deployment. Candidates need to read the question carefully to ensure all elements and details are fully noted to achieve higher marks.

(a) Good answers to this question referred to correcting a problem in the system after the system has already broken down, to restore the system to full functionality.

(b) Most candidates could describe the steps that a technician would take. Good answers described more detail on at least three of the steps to gain the full three marks.

Question 4

The question asked candidates to consider the confirm() method in JavaScript. **Part (a)** was about the elements that make up the structure of the resulting dialog box and **parts (b)** and **(c)** asked about the usage of the box. This type of dialog box is in common use in JavaScript and its use should be well known to candidates.

(a) A number of candidates muddled their answers with references to other forms of dialog box in which the user types responses. A confirm() box has only two options and these were typically identified in good answers. A few candidates also correctly referred to the customisable message that the programmer can put in the box, to inform the user of their choices.

(b) Typically, some of the stronger responses did refer to the use of the dialog box. Some responses referred to 'crashing the web page' and 'errors in the coding', both of which do not answer the question.

(c) The technicalities of the use of a confirm() box are important because the result of a user choice can be used to determine the flow of the script. In this question, candidates were asked only to explain how the result of a user choice was returned to the code for later use and no details of how the result would later be used were required. Despite this, candidates described in some detail what the result would be used for and therefore did not gain marks. Good answers explained that 'the return value will be stored in a declared variable and is a Boolean result i.e. TRUE or FALSE. If user clicks the OK button then TRUE is returned to the variable but if user clicks the cancel button then FALSE is returned to the variable'.

Question 5

In this question, candidates were asked to use their knowledge of frame relay to explain why it is used and about its drawbacks. Details of what frame relay is or how it works without referring to the question specifics did not score marks.

(a) Good answers typically referred to how frame relay is used. Candidates need to focus their answer on the question set and avoid vague descriptions of what frame relay is without describing why it is used.

(b) Many responses indicated that candidates had knowledge of networking technologies but were unable to describe the drawbacks of using frame relay in the detail required to gain the higher marks. Vague references to 'cost' and 'networks not working well' were common and scored no marks. Candidates need to read the question carefully to ensure all elements and details are fully noted to achieve higher marks.

Question 6

Candidates gave good answers to this question about a method of changeover from an old system to a new system. Candidates who discussed both benefits and drawbacks, typically gained higher marks.

Question 7

This question was answered well by candidates who could focus on the specifics of computer-based training and differentiate it from other IT-based learning methods. Many candidates confused different IT-based methods of teaching/learning and gave vague, muddled answers which were often generic and not focused on CBT. To achieve the higher marks, candidates typically included both positive and negative impacts.

Question 8

The focus of this question was the client-server model of networking. Generic answers about how email is used and how it works did not answer the question. Candidates need to answer the question set; those who provided an answer they had prepared for, rather than for the question on the paper, were limited to low band marks. Generic answers describing how users created, sent and received emails did not gain credit because they did not answer the question.

While candidates could gain a few marks for a description of email, answers that focused on how email makes use of the client-server were necessary to gain the full marks.

Question 9

Candidates who gave vague references to managing projects, to PERT and Gannt charts or to other aspects of project management were limited to low band marks.

Typically, some of the stronger responses did detail the good and the bad aspects and explain them in detail to show meaning for example, 'the reliance on estimates of the duration of task means that the whole process can be invalid if the estimates are wrong/inaccurate'.

Question 10

Both **parts (a)** and **(b)** were more challenging. The syllabus details the phases of data mining so candidates should be aware the phases involved.

(a) Some responses tended to give general answers about the gathering of the data required for each phase but many responses made vague references to 'check it', 'making sure…' or muddled the tasks with those from other phases. Candidates need to read the question carefully to ensure all elements and details are fully noted to achieve higher marks.

(b) This question proved difficult for most candidates with many describing the use and results of data mining rather than the tasks in the phase. Good answers referred to 'reporting back to stakeholders', 'planning how the data mining results will be used and reported' and 'deciding how to monitor and maintain the data model to ensure it remains useful'.

INFORMATION TECHNOLOGY

Paper 9626/33
Advanced Theory

Key messages

In Paper 3, it is expected at A level that candidates have a depth of knowledge of the subject topics and can customise their responses according to the command words in the questions. While there are questions that do require the recall of facts, Paper 3 provides opportunities for candidates to demonstrate that they have a 'greater depth as well as breadth of subject knowledge, confidence in applying knowledge and skills in new situations and the vocabulary to discuss their subject conceptually and show how different aspects link together'. The command words given in the syllabus are used in questions to give candidates the opportunity to do this. Centres are reminded to advise their candidates to target their responses to the command word in the question. For example, where a question asks why a protocol or process would be used, there is usually little or no credit given for describing the protocol or process itself since this does not answer the question 'why?'.

Questions can be set on any, and all, areas of the A Level topic syllabus so it is important that centres ensure that their candidates are conversant with the content of all the topic areas and that they study all the topics in the syllabus in some depth.

General comments

Centres are advised to remind their candidates to read the whole of each question carefully and apply their knowledge to the scenario in the question set and not to write answers based solely on words that they have 'spotted' or on 'key words'. The full range of marks is only available to candidates for answers referring to the scenario in the questions. It was noted that fewer candidates were omitting whole questions, but centres are again advised to continue to encourage their candidates to attempt all questions.

Candidates should write full sentences and avoid bulleted short statements in their responses. It was a good to see far fewer one-word answers as these rarely, if ever, score marks. Descriptions or explanations can only be conveyed in full sentences. Analyses, discussions and evaluations should also be in free response with full sentences to properly answer the question.

Comments on specific questions

Question 1

Both parts of this question were well answered by most candidates.

(a) The best answers identified ways data could be lost and described the implications. Candidates need to read the question carefully to ensure all elements and details are fully noted to achieve higher marks.

(b) Typically, some of the stronger responses did include sensible and valid instructions that could be given to a technician. Weaker answers stated what should be done when creating backups without making it clear that these were instructions, so did not answer the question. Candidates need to read the question carefully to ensure all elements and details are fully noted to achieve higher marks.

Question 2

Most candidates demonstrated that they knew what a proxy server was, but many confused its use with a firewall or with protection against malware. Candidates need to focus their answer on the question set and avoid vague descriptions of a proxy server in businesses or to circumvent regional restrictions, both of which

are not relevant to this question. Weaker answers did not provide the detail required to evaluate the use and candidates should read the question carefully and ensure they understand what it requires before answering.

Question 3

(a) This question was challenging. Candidates should be aware of the svg file and typically stronger responses included explanations of why the svg format is used by the designer.

(b) Many candidates could answer this question well with good answers that included a range of technical detail. Weak answers referred to 'calculations' and 'compression' which were too vague or inaccurate. In order to achieve the higher marks candidates typically needed to identify the type of information that is stored.

Question 4

Most candidates answered this question well and typically, candidates who discussed both advantages and disadvantages gained higher marks. Weaker responses were either too vague and generic for example, 'are free', 'need the internet' or inaccurate in that the descriptions were of other forms of IT-based learning. To achieve the higher marks candidates typically needed to expand upon the advantages and disadvantages they had identified.

Question 5

In this question, there were many good answers, with well thought out comments. Answers ranged from discussions of the e-waste that is produced to its effects on water, land and air environments. Good answers detailed the types of e-waste for example, plastics, rare and harmful metals and how these can affect the environment in which they end up. Weaker responses referred to pollution in general terms and 'animals being made sick' without any specific details or reference to e-waste.

Question 6

(a) Good answers described data mining as the process of analysing a large quantity of data to discover trends and patterns. Candidates need to focus their answer on the question set and avoid vague descriptions such as 'finding data' and 'analysing'.

(b) Some responses indicated that candidates knew about data mining but were unable to describe how the information obtained by data mining could be used by the owners of a retail store to increase profits. Sometimes the question was not adequately addressed with some responses giving vague responses such as 'to use for advertising', 'to discover what customers like'. To gain the higher marks, candidates need to read the question carefully to ensure all elements and details are fully noted.

Question 7

(a) Typically, some of the stronger responses did outline the stages of how cell animation is created. Weaker answers were either too vague or muddled the process with time-lapse or stop-motion animation.

(b) As in **part (a)**, good answers included details of the stages of how stop motion animation is created but weaker answers were either too vague or muddled the process with other animation methods.

Question 8

Candidates were expected to be able to explain concisely how each of the given operators works in JavaScript. In both **parts (a)** and **(b)**, some candidates showed that they had some understanding of the operators. Weaker responses did not properly explain the actions of the operators. Good answers referred to the comparison being made on the values and when TRUE or FALSE is returned back to the JavaScript code.

Question 9

While many candidates could answer the questions, some confused the design specification with other specifications and listed contents that would be found in other documentation. In this type of question, accurate and specific details are required to gain the marks.

(a) Candidates need to focus their answer and avoid vague descriptions such as ‘show the features’. Candidates who discussed the reasons for having a design specification, typically gained higher marks.

(b) The most common mistake in this question was to confuse the design specification with other documentation. Good answers gave details of what would be included in a design specification. Weaker answers were, either too vague for example, ‘some input boxes’ or inaccurate for example, ‘the passwords of doctors’. Candidates need to answer the question set; those who provided an answer they had prepared for, rather than for the question on the paper, were limited to low band marks.

INFORMATION TECHNOLOGY

Paper 9626/04
Advanced Practical

Key messages

It is clear that familiarity with practice tasks and extensive experience of the required skills is necessary for achieving the higher grades for this paper. Centres would benefit from developing a library of practice tasks that involve the necessary skills in problem solving contexts.

General comments

The extent to which candidates were able to prepare for each of the tasks was variable. Many candidates probably had personal experience with bitmap editing with fewer candidate demonstrating a high ability of editing vector graphics.

Most candidates were able to demonstrate an appreciation of the skills and stages required for each task to achieve marks even where they were not able to provide complete solutions to all the tasks.

Comments on specific tasks

Task 1

The removal of the balloon from the bitmap image was managed by all candidates and the precision of the cut-out was usually very good. Even tiny pieces of sky showing on the outside of the balloon were not acceptable, but most candidates produced a balloon with a smooth outline. Very few candidates, however, ensured the area between the basket and the balloon was transparent. Small details like this are issues that centres might like to stress when preparing candidates for tasks like these.

Success in repairing the sky for the next stage varied considerably. There was very little difficulty in this part of the task and many candidates seemed to have attached too little importance to making the sky look intact and leaving no visible evidence of it having been repaired. Painting over the space in a similar colour was not sufficient if the repair.

The second part of the task involved removing the overhead wires and all posts and fences. Attention to accuracy in the removal of objects and care in retouching the image were the important factors. Many candidates did not remove all the objects or retouched and repaired the image casually. To achieve good marks for tasks, it must be impossible to detect any blemishes in the image without ‘zooming in’.

For the last part of the task candidates had to replace the original sky with part of the sky from another image.

This could be achieved by removing a selected range of colours in the original layer and inserting a background layer using the Sunset image. All candidates managed to submit an attempt however, in order to typically gain the highest marks, candidates needed to select a sufficient range of colours to erase all the original sky and allow all gaps in the foliage of the trees to display the new background.

Task 2

This task required candidates to create a vector image based upon the balloon seen in **Task 1**.

The vector balloon needed to consist of distinct panels and panes with various colour fills. The shape of each panel and pane needed to be exactly as shown in the question paper and fit together precisely. A few candidates managed to fit the panes and panels together with sufficient accuracy to gain the highest marks, typically with the best answers using layers to create and position the panels and panes.

Centres would benefit from providing additional experience of the use of layers in vector graphics.

Task 3

Candidates were required to create a dashboard to display totals of merit marks and demerit marks awarded to groups of students in various categories. Most candidates realised that using pivot charts or SUMIF() formulas would be suitable methods. For those candidates using SUMIF() formulas, it was important to ensure the formulas were replicable in each block on the dashboard. Some candidates missed marks by using the name of the house or member of staff as the criteria instead of the cell reference. Centres should stress the importance of replicating cell references accurately to ensure that solutions are efficient.

Formatting the dashboard was completed accurately by nearly all candidates. Although the formatting was fairly simple, candidates clearly recognised the importance of the attention to the specifications provided.

Very few candidates used linked worksheets in the same workbook.

When linking separate workbooks together using formulas, the links may become invalid when files are uploaded.

Unless it is specified that data will be updated to a specific source, it is recommended that centres should stress to their candidates the importance of using a single workbook containing multiple worksheets to preserve the links.

Also worthy of note is that a significant number of candidates saved the worksheet with the data as a .csv file. This meant that there was often no record of their method since .csv files save only text and numbers and all formulas are lost.

Task 4

This task was an extension to the dashboard task in which candidates were required to append the data for March to the original data for January and February. Candidates were required to display field buttons on the charts to enable the selection and display of data for individual months.

The best candidates appended the data to the original file correctly which enabled them to correctly select the monthly data.

Most of the candidates who managed to append the data completed the rest of the task well. Fewer candidates were able to change the labels in the tables and the chart titles to reflect the month chosen using the field buttons on the charts.

Centres would benefit from preparing practice tasks with these elements involved.

Again, as in Task 3, very few candidates used linked worksheets in the same workbook and it is recommended that centres should stress to their candidates the importance of using a single workbook containing multiple worksheets to preserve the links.