

# COMPUTER STUDIES

Paper 0420/11

Written Paper

## General comments

The standard of candidates' work was better in many respects than in previous years. There is a continued move to provide questions where candidates have to apply their knowledge rather than just show their ability to simply remember facts. There is strong evidence that this is producing candidates who are now exhibiting a far better understanding of many of the topics than in past exam papers.

One final note regards the exam papers themselves; candidates and Centres are reminded that written papers are now scanned in and marked on computer screens by Examiners. Consequently, if a candidate writes the answer to a question on an additional page they must indicate very clearly to the Examiner where their revised answer is to be found. Also, if answers have been crossed out, the new answers must be written very clearly so that Examiners can easily read the text and award candidates the appropriate mark.

## Comments on specific questions

### Question 1

This question was reasonably well answered. The majority of candidates supplied a suitable and correct method of protection against the threat, but descriptions of the security issue could have been improved. The following additional comments may prove useful:

- many candidates still think that encryption will stop hacking; it will certainly make information difficult or impossible to understand once "hacked", but it will not stop hacking since the data can still be deleted or corrupted or changed by the hacker
- there is still confusion between phishing and pharming; the former requires the recipient to open an email or attachment and then click on the link to the "fake" website; pharming is basically code stored on the user's hard drive or on the web server which redirects the user to the "fake" website when they try to log on to the "real" website, without their knowledge
- many candidates omitted to say that hacking is illegal or unauthorised access

### Question 2 (a)

Candidates needed to improve their understanding for part (i); the most common mistake was to suggest that the mobile phone can guess what you are about to type. When the first characters are typed in, the mobile phone predicts the rest of the word.

Part (ii) caused no real problems with many candidates gaining full marks. Some candidates did not read the beginning of the question carefully – it stated that text messaging was one of the features and these candidates included that as one of their answers.

### Question 2 (b)

In part (i), many candidates stated VoIP was faster, but did not say why. Also a significant number of candidates seem to believe that VoIP always involves seeing each other during the conversation. If this feature was offered, candidates needed to explain that a webcam was required since a video call is a special function rather than a standard function.

In part (ii), many candidates stated it was necessary to have the Internet; whilst this is true, it was necessary to explain that a fast or high speed broadband connection was needed, to gain the mark.

In part (iii), many candidates gave either a microphone or a speaker rather than both. Consequently, one mark was lost.

### Question 3 (a) (b)

There were no problems with this part of the question.

### Question 3 (c)

Generally reasonable, but the following were very common mistakes:

- not using exactly the same field names as shown in the database when writing down the search condition
- incorrect use of brackets; for example, (silver = "Y") OR (grey = "Y") was a very common error – correct use of brackets should give ((silver = "Y") OR (grey = "Y"))
- incorrect use of words in the search condition; for example, it was common to see AND EITHER rather than just AND
- incorrect phrases in the search condition; for example, (silver, grey = "Y")

### Question 3 (d)

Candidates needed to develop their understanding of this search command. The simple command: green = "N" would have given all the items which were not a possible combination with green paint.

### Question 3 (e)

Candidates needed to improve their understanding for this question as it was far too common to see "uses less space" to mean memory. Use of the word "space" for "memory" will never gain any credit.

### Question 4 (a)

This was well answered. Some candidates needed to improve their knowledge of CAD and virtual reality as they confused the terms.

### Question 4 (b)

Many candidates gave one of the items already linked in part (a) of the question. If monitor or screen was chosen for CAD or video conferencing, then it was necessary to say large screen to gain the mark. In virtual reality, the answer "sensor" was not enough and the type of sensor had to be named.

### Question 5

Candidates need to remember to write down every value of a variable that appears in the flowchart. Many marks were lost by candidates who missed out values or included zeroes in the table if the variable value did not change. It is important to carefully trace through the flowchart and write down a variable value every time it changes.

### Question 6 (a)

This question caused no problems for the majority of the candidates.

### Question 6 (b) (c)

No real problems, but the following two mistakes were fairly common:

- use of "x" instead of "\*" in formulas
- incorrect use of brackets; for example: (A2 + C2) \* B2

### Question 6 (d)

Candidates needed to improve their understanding of this question; essentially the value 9.81 replaced B2 or C2 in the formula in part (b) to give (A2 + 9.81 \* B2) or (A2 + 9.81 \* C2) depending on how the spreadsheet was set up. The most common mistakes were: (A2 + C2) or (A2 \* C2).

### Question 7 (a)

There were no problems to report here; most candidates seemed fully aware of the health and safety issues, their cause and how the issue could be alleviated.

### Question 7 (b)

This again was well answered.

### Question 8

The full range of marks from 0 to 8 were seen here; many candidates found 4 of the errors in the algorithm (lines 20, 30, 50, 60 and 70) and made good suggestions on how to remove the error.

A large number who did well on this question also did well in **Question 16(a)**.

### Question 9

This question was well answered by many candidates with most aware of what causes problems with email attachments.

### Question 10 (a)

Part (i) was very well answered. The most common mistake in part (ii) was to suggest that the circuit represented a NOT gate. The fact that there were two inputs should have allowed candidates to totally dismiss this choice.

### Question 10 (b)

This was very well answered with many candidates gaining maximum marks.

### Question 11 (a) (b) (c)

This was well answered by the better candidates; weaker candidates struggled to understand the significance of shifting bits in registers. Many correctly calculated the value 54 and realised that each shift to the left was equivalent to a multiplication by 2.

### Question 11 (d)

Parts (i) and (ii) were generally well attempted. However, part (iii) was very challenging to most candidates and only a small number realised that the number would exceed the maximum value of 255 (i.e. 368) which would cause an overflow or the 1-bit would be lost.

### Question 11 (e)

Those candidates who understood question parts (b) and (c) also realised that shifting a binary number to the right was equivalent to dividing by 2 for each shift position. A large number of candidates made the mistake of shifting the value in part (d)(ii) to the right and lost their mark. The question asked very clearly about what would happen to any 8-bit binary number following the right shift operation.

### Question 12 (a)

A significant number of candidates gave "electrical goods", "furniture" and "stationery" as the answers to this question. Candidates had mis-read the question which asked for interface devices such as a touch screen or trackerball.

### Question 12 (b)

Candidates needed to have read the question carefully as they did not provide a different check in each case and gave the same validation check more than once. Overall, the question was reasonably well answered.

**Question 13 (a)**

About half the candidates gained full marks here. Most understood the difference between download and upload. Some candidates had not realised this question was asking about download/upload speed. Some made no mention of rate of data transfer.

**Question 13 (b)**

Many candidates thought that broadband did not need a telephone line or that it was always WiFi. There were also many imprecise answers such as *it is faster* or *it is cheaper* with no further explanation of what they meant.

**Question 13 (c)**

This was well answered with many good responses.

**Question 13 (d)**

The most common answer here was 32 (presumably 128/4). The correct answer was 4 since 128 megabits/second equates to 16 megabytes per second.

**Question 14 (a)**

Many candidates gave the general features of a laptop (i.e. portable, use a battery or easy to carry). Desirable features would be a cool-running processor, lightweight construction or long battery life.

**Question 14 (b)**

Candidates needed to develop their understanding of this question. The better candidates realised that the Expert System would not work without the extra files on the memory stick – in other words, a security issue. The most common mistake was to suggest that the memory stick was used as a memory stick. Considering the huge memory requirements of an Expert System this would not be a very practical solution.

**Question 14 (c)**

Candidates needed to improve their understanding of the typical features of an input/output interface for a typical Expert System. The input would consist of Yes-No/multi-choice type questions and the output would be the % probability of the accuracy of the suggested solution to the problem.

**Question 14 (d)**

This was very well answered with many candidates gaining full marks.

**Question 15**

There were no real problems with this question. The full range of marks from 0 to 6 was seen.

**Question 16 (a)**

Candidates needed to develop their understanding of this question. Better candidates realised that it was quite a simple problem involving READ sensor 1 and 2, check the sensor value to see if it was an error condition, input key value and control the loop by checking to see if the input key was equal to <escape>.

**Question 16 (b)**

Many candidates thought that sensors controlled the greenhouse environment therefore a DAC was needed so that they could understand the computer.

# COMPUTER STUDIES

Paper 0420/12

Written Paper

## General comments

The standard of candidates' work was better in many respects than in previous years. There is a continued move to provide questions where candidates have to apply their knowledge rather than just show their ability to simply remember facts. There is strong evidence that this is producing candidates who are now exhibiting a far better understanding of many of the topics than in past exam papers.

One final note regards the exam papers themselves; candidates and Centres are reminded that written papers are now scanned in and marked on computer screens by Examiners. Consequently, if a candidate writes the answer to a question on an additional page they must indicate very clearly to the Examiner where their revised answer is to be found. Also, if answers have been crossed out, the new answers must be written very clearly so that Examiners can easily read the text and award candidates the appropriate mark.

## Comments on specific questions

### Question 1

This question was reasonably well answered. The majority of candidates supplied a suitable and correct method of protection against the threat, but descriptions of the security issue could have been improved. The following additional comments may prove useful:

- many candidates still think that encryption will stop hacking; it will certainly make information difficult or impossible to understand once "hacked", but it will not stop hacking since the data can still be deleted or corrupted or changed by the hacker
- there is still confusion between phishing and pharming; the former requires the recipient to open an email or attachment and then click on the link to the "fake" website; pharming is basically code stored on the user's hard drive or on the web server which redirects the user to the "fake" website when they try to log on to the "real" website, without their knowledge
- many candidates omitted to say that hacking is illegal or unauthorised access

### Question 2 (a)

Candidates needed to improve their understanding for part (i); the most common mistake was to suggest that the mobile phone can guess what you are about to type. When the first characters are typed in, the mobile phone predicts the rest of the word.

Part (ii) caused no real problems with many candidates gaining full marks. Some candidates did not read the beginning of the question carefully – it stated that text messaging was one of the features and these candidates included that as one of their answers.

### Question 2 (b)

In part (i), many candidates stated VoIP was faster, but did not say why. Also a significant number of candidates seem to believe that VoIP always involves seeing each other during the conversation. If this feature was offered, candidates needed to explain that a webcam was required since a video call is a special function rather than a standard function.

In part (ii), many candidates stated it was necessary to have the Internet; whilst this is true, it was necessary to explain that a fast or high speed broadband connection was needed, to gain the mark.

In part (iii), many candidates gave either a microphone or a speaker rather than both. Consequently, one mark was lost.

### Question 3 (a) (b)

There were no problems with this part of the question.

### Question 3 (c)

Generally reasonable, but the following were very common mistakes:

- not using exactly the same field names as shown in the database when writing down the search condition
- incorrect use of brackets; for example, (silver = "Y") OR (grey = "Y") was a very common error – correct use of brackets should give ((silver = "Y") OR (grey = "Y"))
- incorrect use of words in the search condition; for example, it was common to see AND EITHER rather than just AND
- incorrect phrases in the search condition; for example, (silver, grey = "Y")

### Question 3 (d)

Candidates needed to develop their understanding of this search command. The simple command: green = "N" would have given all the items which were not a possible combination with green paint.

### Question 3 (e)

Candidates needed to improve their understanding for this question as it was far too common to see "uses less space" to mean memory. Use of the word "space" for "memory" will never gain any credit.

### Question 4 (a)

This was well answered. Some candidates needed to improve their knowledge of CAD and virtual reality as they confused the terms.

### Question 4 (b)

Many candidates gave one of the items already linked in part (a) of the question. If monitor or screen was chosen for CAD or video conferencing, then it was necessary to say large screen to gain the mark. In virtual reality, the answer "sensor" was not enough and the type of sensor had to be named.

### Question 5

Candidates need to remember to write down every value of a variable that appears in the flowchart. Many marks were lost by candidates who missed out values or included zeroes in the table if the variable value did not change. It is important to carefully trace through the flowchart and write down a variable value every time it changes.

### Question 6 (a)

This question caused no problems for the majority of the candidates.

### Question 6 (b) (c)

No real problems, but the following two mistakes were fairly common:

- use of "x" instead of "\*" in formulas
- incorrect use of brackets; for example: (A2 + C2) \* B2

### Question 6 (d)

Candidates needed to improve their understanding of this question; essentially the value 9.81 replaced B2 or C2 in the formula in part (b) to give (A2 + 9.81 \* B2) or (A2 + 9.81 \* C2) depending on how the spreadsheet was set up. The most common mistakes were: (A2 + C2) or (A2 \* C2).

### Question 7 (a)

There were no problems to report here; most candidates seemed fully aware of the health and safety issues, their cause and how the issue could be alleviated.

### Question 7 (b)

This again was well answered.

### Question 8

The full range of marks from 0 to 8 were seen here; many candidates found 4 of the errors in the algorithm (lines 20, 30, 50, 60 and 70) and made good suggestions on how to remove the error.

A large number who did well on this question also did well in **Question 16(a)**.

### Question 9

This question was well answered by many candidates with most aware of what causes problems with email attachments.

### Question 10 (a)

Part **(i)** was very well answered. The most common mistake in part **(ii)** was to suggest that the circuit represented a NOT gate. The fact that there were two inputs should have allowed candidates to totally dismiss this choice.

### Question 10 (b)

This was very well answered with many candidates gaining maximum marks.

### Question 11 (a) (b) (c)

This was well answered by the better candidates; weaker candidates struggled to understand the significance of shifting bits in registers. Many correctly calculated the value 54 and realised that each shift to the left was equivalent to a multiplication by 2.

### Question 11 (d)

Parts **(i)** and **(ii)** were generally well attempted. However, part **(iii)** was very challenging to most candidates and only a small number realised that the number would exceed the maximum value of 255 (i.e. 368) which would cause an overflow or the 1-bit would be lost.

### Question 11 (e)

Those candidates who understood question parts **(b)** and **(c)** also realised that shifting a binary number to the right was equivalent to dividing by 2 for each shift position. A large number of candidates made the mistake of shifting the value in part **(d)(ii)** to the right and lost their mark. The question asked very clearly about what would happen to any 8-bit binary number following the right shift operation.

### Question 12 (a)

A significant number of candidates gave “electrical goods”, “furniture” and “stationery” as the answers to this question. Candidates had mis-read the question which asked for interface devices such as a touch screen or trackerball.

### Question 12 (b)

Candidates needed to have read the question carefully as they did not provide a different check in each case and gave the same validation check more than once. Overall, the question was reasonably well answered.

**Question 13 (a)**

About half the candidates gained full marks here. Most understood the difference between download and upload. Some candidates had not realised this question was asking about download/upload speed. Some made no mention of rate of data transfer.

**Question 13 (b)**

Many candidates thought that broadband did not need a telephone line or that it was always WiFi. There were also many imprecise answers such as *it is faster* or *it is cheaper* with no further explanation of what they meant.

**Question 13 (c)**

This was well answered with many good responses.

**Question 13 (d)**

The most common answer here was 32 (presumably 128/4). The correct answer was 4 since 128 megabits/second equates to 16 megabytes per second.

**Question 14 (a)**

Many candidates gave the general features of a laptop (i.e. portable, use a battery or easy to carry). Desirable features would be a cool-running processor, lightweight construction or long battery life.

**Question 14 (b)**

Candidates needed to develop their understanding of this question. The better candidates realised that the Expert System would not work without the extra files on the memory stick – in other words, a security issue. The most common mistake was to suggest that the memory stick was used as a memory stick. Considering the huge memory requirements of an Expert System this would not be a very practical solution.

**Question 14 (c)**

Candidates needed to improve their understanding of the typical features of an input/output interface for a typical Expert System. The input would consist of Yes-No/multi-choice type questions and the output would be the % probability of the accuracy of the suggested solution to the problem.

**Question 14 (d)**

This was very well answered with many candidates gaining full marks.

**Question 15**

There were no real problems with this question. The full range of marks from 0 to 6 was seen.

**Question 16 (a)**

Candidates needed to develop their understanding of this question. Better candidates realised that it was quite a simple problem involving READ sensor 1 and 2, check the sensor value to see if it was an error condition, input key value and control the loop by checking to see if the input key was equal to <escape>.

**Question 16 (b)**

Many candidates thought that sensors controlled the greenhouse environment therefore a DAC was needed so that they could understand the computer.

# COMPUTER STUDIES

Paper 0420/13

Written Paper

## General comments

There was a wide range of marks with most candidates attempting all of the questions. The questions allowed candidates the opportunity to show their understanding and apply their knowledge across a wide range of different topics within the syllabus.

The quality of work was of a similar standard to previous years.

Most candidates used generic terms when necessary and avoided the use of brand names.

## Comments on Specific Questions

### Question 1

- (a) This question was generally well answered with many candidates being aware of some features of a typical data protection act. A few candidates described data security techniques such as the use of passwords, firewalls and encryption.
- (b) The majority of candidates were able to correctly give two examples of personal data.
- (c) Candidates would have benefited from better understanding of this question as there were very few correct responses. Examples of acceptable sensitive personal data are an individual's race, politics, religion, trade union membership, health, criminal record and sexual orientation. Most candidates assumed, incorrectly, that sensitive personal data referred to passwords and bank accounts.

### Question 2

- (a) The advantages of computer based training were often described well. Most candidates understood that the airline crew could learn at their own pace and that it was not necessary to have teachers or classrooms for computer based training.
- (b)(i) Many candidates correctly identified flight simulation as the correct answer.
- (ii) Candidates needed to improve their knowledge of training and of the advantages of using simulators. Although it was often stated that using a flight simulator was much safer than using a real aircraft, few candidates provided a second benefit such as the possibility of repeating different scenarios.

### Question 3

- (a) To improve on their marks, candidates would have benefited from better understanding of how GPS navigation systems work. Some incorrectly, believed that the GPS navigation system in a car sends signals to satellites and that it is these satellites that perform a calculation to work out the location of the car.
- (b)(i) Candidates were often able to apply their knowledge to the given scenario to provide both a benefit and a drawback of verbal instructions.

- (ii) Candidates would have further improved on their marks if they had read the question carefully. The question asked for an explanation and two marks were available. Candidates rarely obtained both marks as they often stopped their explanations after making the first point. The maps in the question showing a satellite navigation system being out of date or a new road having been built were the most popular responses. Other responses could have included the loss of signals or software faults.

#### Question 4

- (a) This question required candidates to apply their knowledge to what was probably an unfamiliar situation involving the use of a limited number of drop-down boxes as part of bank website security. Some candidates realised that the method employed did not enable others (such as a hacker or shoulder surfer) to obtain the customer's full password. Better understanding of this question would have led to candidates realising that this method also helps to neutralise spyware. Answers that gained no credit included "stop hackers" and "saves the customer time".
- (b) Most candidates were able to give at least one example of acceptable authentication information. The use of biometrics, PINs and memorable words were all popular responses.

#### Question 5

- (a) (i) A straightforward question with most candidates choosing a mouse. A few candidates appeared to consider that a hyperlink was an input device.
- (ii) Again, straightforward for those candidates who read the question carefully and realised that their description must match the input device selected in **part (a)(i)**.
- (b) There were many acceptable answers which compared the advantages of finding information via the website compared to finding it from books. Answers, such as 'faster' without further explanation, gained no credit.
- (c) The disadvantages often included those related to accuracy issues and Internet access being required.

#### Question 6

- (a) There were some good answers to this question. Many candidates clearly understood the link between the sensors, a computer system and the output via a monitor within the context of the given hospital scenario. The idea that sensors are continually sending signals to the computer system needed better understanding. Some candidates even thought that it was the sensors that made output decisions.
- (b) There were many correct advantages that could have been given, but most candidates confined their responses to issues involving nurses' physical well-being.
- (c) Candidates would have improved on their mark if they had better understanding of this question. They were often unable to explain clearly why the output is provided in both graphical and numerical form.

#### Question 7

- (a) Candidates needed to improve their knowledge of streaming video. One mark was sometimes obtained because of an appropriate reference to the Internet.
- (b) Candidates needed to improve their knowledge of true streaming and on demand streaming. Some candidates did understand that an on demand video requires files to be saved on the server before being viewed when required.
- (c) Some candidates mentioned the need for media player or decompression software. The use of buffers for temporary storage was only occasionally stated.
- (d) Candidates would have benefited from improving their understanding of the benefits and drawbacks of using streaming to play videos. The benefit of 'saving on memory space' was often abbreviated to 'saves space' thereby gaining no credit. The drawbacks were often listed as involving virus or health and safety concerns with very few candidates mentioning creditworthy responses such as buffering or the need for high speed broadband.

#### Question 8

- (a) Candidates needed to improve their knowledge of this question. Few candidates were able to list two advantages and two disadvantages to the designer although most candidates were able to obtain one or two marks. Candidates often mistakenly considered that the disadvantages centred on data loss and hacking.
- (b) (i) The most popular correct responses included 24/7 customer support and reduced costs due to lower labour costs.  
(ii) Acceptable drawbacks usually involved a brief description of language problems, start-up costs or the need for training programmes. Answers concerning the cost of overseas telephone calls gained no marks.

#### Question 9

- (a) The difference between records, fields and data items was well understood with most candidates correctly stating the number of records shown.
- (b) (i) Most candidates followed the instruction to use **item code** only, thereby obtaining the correct answers.  
(ii) Whilst many candidates provided the correct information others provided a literal translation of the search.
- (c) The most common error was due to incorrect syntax such as not copying the field name correctly. The wording in the search condition should exactly match the field headings in the table. For example, the (\$) was frequently omitted from the field heading **Price of item (\$)**.

#### Question 10

- (a) (i) Whilst most candidates realised that there was an error in the count, many were unable to fully explain that, as a consequence, there were only 999 iterations.  
(ii) Both the location and the change were required.
- (b) The question asks candidates to name different types of test data and to provide an example of each type. Candidates who answered the question were able to obtain high marks. A common error was to give validation types instead of types of test data. Another incorrect response was to provide a description of the test data and not an example.

#### Question 11

- (a) There were many completely correct answers with candidates frequently using the correct logic gate symbols.
- (b) The truth table was often correct with many candidates using the space provided for their working.

#### Question 12

- (a) Candidates used a variety of acceptable methods to calculate the average. These included correct use of the AVERAGE function, dividing the SUM function by 3 or a simple addition divided by 3. The most common incorrect responses included the use of use of “÷” instead of “/” or the incorrect placement of brackets.
- (b) Candidates would have benefited from better understanding of the MAX function. Some candidates who were aware of the MAX function were not always familiar with the necessary format required.
- (c) (i) A straightforward question with most candidates obtaining the correct answer. A few candidates did not realise that an uppercase output was essential.  
(ii) Most candidates understood replication and were able to obtain the correct output.

- (d)(i) Another straightforward question with most candidates obtaining the correct numerical answer.
- (ii) Candidates needed to improve their understanding of the COUNTIF function and how it is used.

### Question 13

- (a) The correct denary screen locations were usually accurately calculated.
- (b) The correct option was usually stated.
- (c)(i) Candidates needed to improve their knowledge of the term pixel as few appreciated that pixel is short for 'picture element'.
- (ii) There were numerous good attempts at this question. Many candidates did not realise that there are actually 1024 bytes in a kilobyte.

### Question 14

This question enabled candidates the opportunity to show their understanding of a microprocessor controlled situation and apply their solution in a ready-made flowchart. There were many completely correct answers.

### Question 15

About equal quantities of candidates elected to write their algorithms using pseudocode and flowcharts. Whilst there were some excellent responses in both formats other candidates demonstrated a weaker grasp of this problem-solving exercise.

Where initialisation of the variables was included, frequently one of the variables was omitted. Most candidates realised that a loop structure was essential, but did not implement it correctly either by not terminating the loop or by not ensuring the correct number of iterations.

Where the calculation of the out of range percentage was included in the algorithm, it was often calculated correctly. However, this percentage was not always then included in the output.

# COMPUTER STUDIES

Paper 0420/02

Project

## General comments

The coursework projects consisted of a wide variety of appropriate topics with the majority of Centres basing the work mainly upon the construction and operation of a relational database system. An increasing number of Centres chose to submit projects involving the creation of websites.

Presentation of the A4 portfolios was often of a very high quality, with many candidates routinely using common and advanced features regularly found in modern word-processing software. A helpful contents page was nearly always included.

Centres are reminded that each submitted project must be the unaided work of that candidate. The teacher is responsible for supervising the candidates throughout as outlined in the syllabus.

Centres will need to obtain the centre-specific individual moderation report for details of both their candidates' performance and also the Centre's assessment of the projects. Moderators provide quality feedback in these reports in order that Centres can make future improvements. It is hoped that Centres will act upon this feedback to improve the standard of future coursework.

## **Administration**

The coursework projects are internally assessed by each Centre and a sample of these projects is externally moderated. Centres must follow the process for submitting internally-assessed marks and selecting and submitting coursework samples for moderation as detailed in the *Cambridge Administrative Guide*. It is important to include the coursework projects of the candidates with both the highest and lowest marks in the sample.

The Individual Candidate Record Cards, the Summary Sheets and the MS1 mark sheet copy (or CIE Direct / CAMEO equivalent) should all be included with the coursework. These documents are required in order to ensure that results are issued on time.

The Individual Candidate Record Card should be fully completed for each candidate. It is important that the page numbers are entered correctly as this enables the Moderator to more easily locate the evidence in each candidate's coursework. The Summary Sheet should be accurately completed and the Centre is advised to keep a copy for future reference. The copy of the MS1 mark sheet (or equivalent) should be legible and list all candidates' marks. Centres should ensure that the marks have been correctly transcribed between the various documents.

The vast majority of the coursework was received by the due date. The moderation process was able to proceed smoothly where Centres met the deadline, included the correct documentation and provided the correct sample.

Most Centres followed the instructions in the *Cambridge Administrative Guide* for providing a coursework sample and moderation was therefore able to ensure that candidates were not unfairly penalised. The sample should include the full range of marks that have been awarded by the Centre and therefore the coursework of the candidates with the highest and lowest marks should always be selected. If there is more than one teacher involved in the marking of the coursework then the sample should include approximately equal samples of the marking of both teachers. The only occasion when the entire Centre's coursework should be submitted to the Moderator is when there are 10 or fewer candidates entered in total. Additional work usually had to be requested where the sample was incorrect.

## Standardising marking within Centres

Centres are required to standardise assessments across teachers and teaching groups to ensure that all candidates in the Centre have been judged against the same standards. If marks for some teaching groups have been altered to ensure consistency for the whole Centre then this should be clearly indicated to the Moderator.

## Choice of Task

There was a variety of well-chosen tasks which gave candidates the opportunity to score highly and achieve their potential. The quality of work was of a similar standard to previous years and there was a very wide range of suitable topics presented.

The purpose of the project is to allow candidates to demonstrate their ability to undertake a complex piece of work, which is a computer-based solution to a significant problem, and to complete the solution and present their results. This project should enable the candidate to use a computer to solve a significant problem commensurate with the age and ability of the candidate, be fully documented and contain sample output for the proposed solution. Candidates had mostly been well advised to undertake tasks which were realistic rather than trying to create systems intended for large existing organisations.

## Assessment

The assessment criteria are clearly stated in the syllabus. There are many Centres that understand and interpret these assessment criteria correctly and consequently award marks accurately for each section. Each section is progressive i.e. a candidate must evidence the 1 mark criterion before consideration is given to the 2 mark criterion.

The standard of assessment by Centres for each section was often accurate. On occasion, some Centres awarded a higher mark than that warranted by the work submitted. Centres should only award marks where there is clear, relevant evidence in the paper documentation. If there is no paper evidence then no marks can be awarded. Most candidates made good use of appropriate annotated screenshots and printouts to provide the necessary evidence.

Some Centres occasionally provided a framework/template for candidates to use. This can usually be considered as part of the normal teaching process, but candidates do need to complete each part of these frameworks/templates themselves. Marks can only be awarded for each candidate's own original work. Centres should also be aware that sometimes these templates can be restrictive and not allow the better candidates to provide the relevant detail often necessary for the higher marks.

## Analysis

### **Section 1 Description of the problem**

The problem definition section was well done with candidates adequately describing the background to the business or organisation as well as outlining the nature of the problem to be solved.

### **Section 2 Objectives**

This is an extremely important part of the coursework as the objectives set the direction for the work as a whole. The qualitative business-related objectives and the quantitative computer-related objectives are best considered separately.

The better candidates provided detail and justifications for each of their objectives and stated each objective in relation to their own specific proposed solutions. Candidates who provided generic objectives that could apply to any solution could not access the higher marks.

The computer-related objectives set here, are those objectives which need to be shown to have been successfully achieved in **section 12**, tested in **sections 14** and **15** and referred to in the evaluation of **section 18**. It is advisable to number the objectives. This allows each of the tests in the test strategy to be linked to the appropriate objective being tested and also allows the evaluation points to link to the objectives and the evidence.

### **Section 3 Description of the existing solution**

Many candidates provided an appropriate description. Others needed to develop a more detailed description containing all the details necessary for full marks as listed in the specification. For maximum marks, candidates should provide evidence of exactly how the present solution works. Many candidates included details of interviews and/or questionnaires. The better projects included sample documents with descriptions of their use in the present system.

### **Section 4 Evaluation of the existing solution**

Most candidates provided an evaluation. The better evaluations made explicit reference to the existing solution and often provided explanations by means of examples.

For full marks candidates need to suggest at least one realistic improvement in addition to providing advantages and disadvantages directly related to the present solution.

### **Section 5 Description of other possible solutions**

Candidates often provided reasonably detailed relevant descriptions of the proposed new solution and at least one other solution. Descriptions must be relevant to the specific problem being solved.

Continuing with the present system is not considered to be a possible solution unless some reasonable improvements are adequately described.

## **Design**

### **Section 6 Action plan**

Candidates often produced some good Gantt charts to supplement their detailed tabular action plans. For the full marks to be awarded, both a detailed formal action plan, including a time schedule and a Gantt chart must be included. A basic Gantt chart alone can be awarded one mark only. It is perfectly acceptable to include a PERT chart instead of, or as well as, a Gantt chart.

A detailed action plan should consider more than the time to be spent on each of the areas characterised in the specification – analysis, design, implementation, testing, documentation, evaluation and further development. Each of these areas should be subdivided to create more detail. Contingency time should also be included.

### **Section 7 Systems flowchart**

Many candidates achieved full marks by producing a relevant systems flowchart using the correct systems flowchart symbols. Some candidates gained full marks by using more than one systems flowchart. Acceptable systems flowchart symbols are listed on page 9 of the *Support Booklet Part 2* on the *Cambridge Teacher Support Site* for Computer Studies.

Generic systems flowcharts and other types of flowcharts, such as program flowcharts and data flow diagrams, are not creditworthy in this section as they are not systems flowcharts. They should, however, be included in the next section, the method of solution.

### **Section 8 Description of the method of solution**

Many candidates provided a full and detailed description of the proposed method of solution. For full marks, this description must also include an explanation of at least one module of coding, such as a query or macro, to be used in a candidate's solution.

This section is about 'design'. Screenshots illustrating the final solution should be placed in the Implementation section. It is in this section that candidates should be describing in detail what they are going to do. Database relationships should be planned and tables, forms, queries and reports designed. Website plans should be drawn up and web pages, navigation bars, interactive features, etc. designed.

## **Section 9 Hardware**

Many candidates failed to realise that all hardware listed must be relevant to the particular system developed. In order to achieve full marks, a detailed technical specification is required as well as reasons why such hardware is needed in the context of the proposed solution.

## **Section 10 Software**

Candidates were usually able to list and describe the software to be used. Software descriptions should contain reference to the actual problem to be solved and explain why certain facilities are needed within the context of the proposed solution.

## **Implementation**

### **Section 11 Method of solution**

This section was often done very well with candidates usually providing comprehensive descriptions supplemented by suitably annotated screenshots and printouts.

### **Section 12 Accurate method solution**

Many candidates provided evidence by listing each of the previously stated computer-related objectives together with a relevant annotated screenshot or printout. Other candidates, quite acceptably, referenced their objectives to evidence found elsewhere in their portfolios. Marks could only be awarded where evidence was provided to indicate that the objectives had been met.

It was extremely helpful to the Moderator where a Centre indicated on the Individual Candidate Record Card where any evidence could be located in the project.

### **Section 13 Programming code**

Most candidates were able to gain one mark by using macros that they had created themselves. Many of these candidates then went on to gain two marks by including annotated coding for these macros. In order to achieve full marks, candidates have to code and annotate the complete solution themselves.

## **Testing**

### **Section 14 Test strategy**

Some candidates achieved very good marks on this section with test strategies clearly covering all of the previously stated computer-related objectives. A few candidates demonstrated no test strategy at all. Other candidates could not obtain full marks, even with a comprehensive test strategy, because this strategy was not linked to their objectives.

The test strategy must include the data to be tested together with the expected results. For full marks, the strategy must be complete and also be linked to the computer-related objectives previously set.

### **Section 15 Test results**

Most candidates managed to provide evidence for the testing of normal and unacceptable data. A number of candidates appeared to misunderstand the term 'extreme data'. Extreme data are chosen to be at the limits of the normal range, but are still acceptable data and therefore no error messages should occur. Aspects of functionality, such as data input and processes, should also be tested.

It is not necessary to include evidence for every single test especially where tests are similar. Careful selection of screenshot evidence to provide a reasonable variety of suitable examples for different types of testing is perfectly acceptable.

## **Documentation**

### **Section 16 Technical documentation**

The better candidates produced technical documentation which would enable maintenance or modification of the system by a competent technician. An index, together with suitable descriptions, annotated screenshots and printouts, were usually provided by these candidates.

Technical documentation should be contained as a separate section within the project report. This documentation can include clear and specific referencing to relevant work contained elsewhere in the project report, but explanations and descriptions are still likely to be necessary.

The inclusion of pages of software generated code is not suitable as technical documentation and should not be included in the project.

### **Section 17 User guide**

Many candidates provided excellent user guides which were both clear and complete. These often contained full descriptions (including start-up instructions) and appropriate screenshots.

## **System evaluation and development**

### **Section 18 Evaluation**

The better candidates provided a reasonable evaluation clearly linking their comments to the previously stated objectives and to their tests.

### **Section 19 Developments**

Most candidates mentioned some minor, but relevant possible improvements. Some candidates listed realistic and meaningful possible developments which were subsequently justified and explained.

# COMPUTER STUDIES

Paper 0420/31

Written Paper

## General comments

This paper provided an alternative to submitting coursework. The candidates were advised to spend at least 20 minutes reading the information about the existing system and the proposed web-based system. It is really important that the candidates carefully studied the information provided at the start of the paper, since answers to all parts of the single compulsory question on this paper required reference to the web-based semi-automatic School Trip booking and payment system described.

Candidates who did not use the information provided at the start about the web-based semi-automatic School Trip booking and payment system could not obtain full marks for their answers.

## Comments on Specific Questions

### Question 1

(a) Some candidates explained why the systems analyst had chosen to use a Gantt chart rather than a PERT chart to check the progress of the project. Many candidates stated the features of a Gantt chart, this was not creditworthy. An example of an answer that would gain both the marks on offer; 'Gantt charts are suitable for development of small simple systems such as School Trip booking whereas PERT charts are suitable for complex systems with many task dependencies.'

(b) Better candidates explained why each method of fact finding was suitable for each identified group of people. A popular correct answer for the interview was 'The analyst could tailor the questions for different members of the School office staff and follow up questions could be asked depending upon the response given.'

An alternative method was usually correctly identified.

(c) (i) Generally well answered with some good screen designs drawn showing details of the School trip. Better candidates explained what they had done to make the screen user friendly for example 'I used a large size of font to make the details readable.'

(ii) Candidates needed to ensure that the consent form included details that matched the paper form but would work on a screen. For example, asking for a signature was not suitable; having a tick box or radio buttons was suitable for use on any screen.

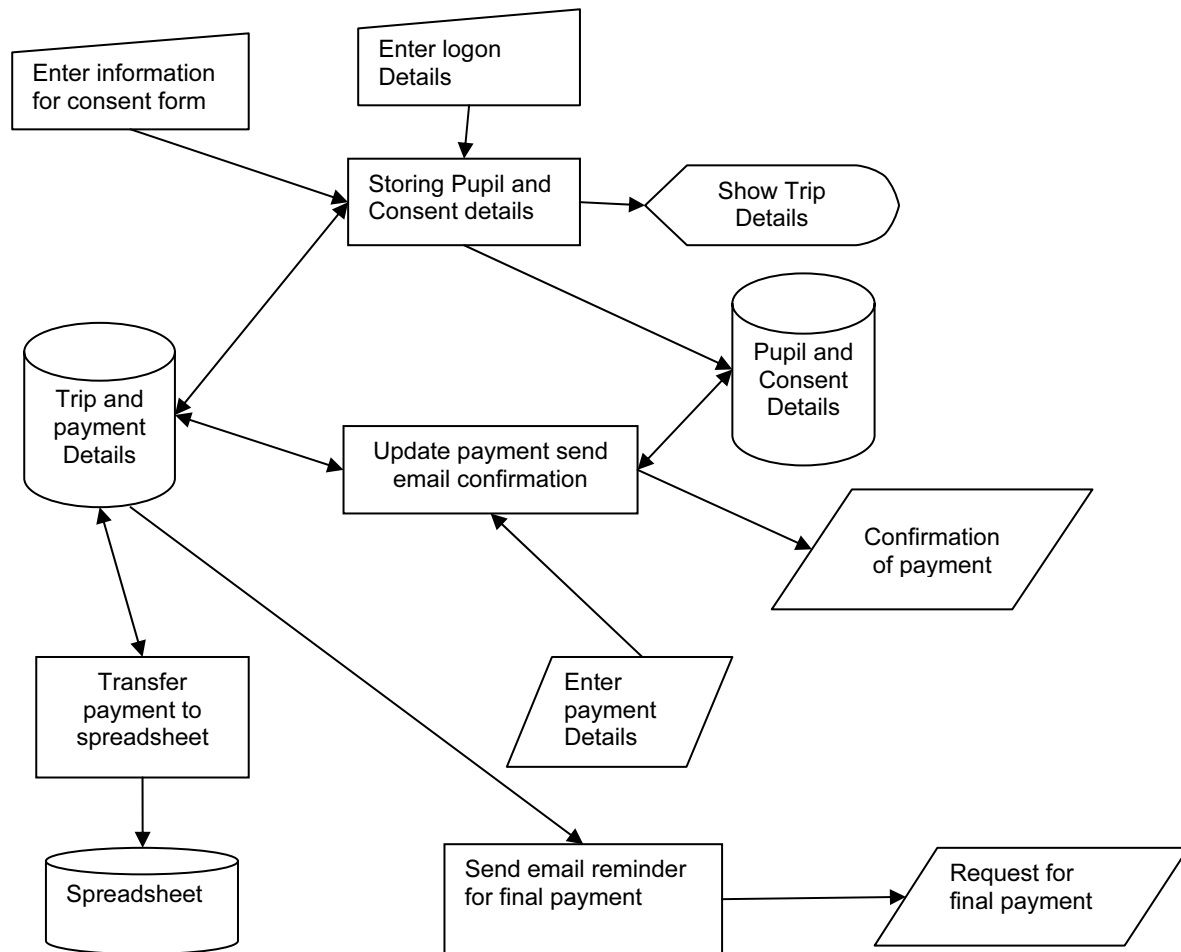
(d) Most candidates could correctly identify some steps including the use of passwords and antivirus software. Some candidates incorrectly wrote about securing data by using encryption rather than securing access to the intranet.

(e) (i) Most candidates could correctly identify at least two symbols they were going to use in their systems flowchart. Candidates needed to include systems flowchart symbols not those just used in a program flowchart, for example, a decision box would not be creditworthy here. Candidates could gain no credit for processes that were not required by the semi-automatic School Trip booking and payment system such as merging and sorting.

(ii) Better candidates provided excellent responses for this part of the question that showed a clear understanding of how the proposed system could work. Candidates needed to take care to only include processes, data stores, inputs and outputs that were described as part of the semi-automatic School Trip booking and payment system at the start of this examination paper.

Candidates should draw a systems flowchart as stated in the question rather than a flowchart, which is not appropriate.

There were many ways of drawing a systems flowchart for the semi-automatic School Trip booking and payment system; the example below would have gained full marks.



- (f) Most candidates attempted to write an algorithm to input and check a payment made by a parent. Both flowcharts and pseudocode were seen. Candidates, who provided good answers, usually used the variables suggested in this part of the question.
- (g) Most candidates were able to identify at least one value for AmountToPay that would be suitable to use as test data for the algorithm in (f).
- (h) Candidates who identified a suitable method for provision of software, for example purchasing an off-the shelf package or employing a programmer to write some bespoke software, could usually correctly identify at least one reason for their choice.
- (i) There were some excellent responses for this question with candidates showing good understanding of the strategy required for testing. Candidates who only considered one aspect of testing for example choice of test data were unable to gain full marks for their answers.
- (j) Many candidates could correctly identify four items to be included in the technical documentation. The reason given for the inclusion of each item needed to be accurate in the context of the web-based School trip booking and payment system. Some candidates incorrectly chose hardware items for the system and could gain no credit.

- (k) Candidates who explained the way that the evaluation would take place for the web-based trip booking and payment system gained good marks. An example of a good answer would be to discuss with parents and School office staff whether the new system was easy to use, get feedback and then check that the requirements have been met by examining printouts from the system runs.

# COMPUTER STUDIES

Paper 0420/32

Written Paper

## General comments

This paper provided an alternative to submitting coursework. The candidates were advised to spend at least 20 minutes reading the information about the existing system and the proposed web-based system. It is really important that the candidates carefully studied the information provided at the start of the paper, since answers to all parts of the single compulsory question on this paper required reference to the web-based semi-automatic School Trip booking and payment system described.

Candidates who did not use the information provided at the start about the web-based semi-automatic School Trip booking and payment system could not obtain full marks for their answers.

## Comments on Specific Questions

### Question 1

(a) Some candidates explained why the systems analyst had chosen to use a Gantt chart rather than a PERT chart to check the progress of the project. Many candidates stated the features of a Gantt chart, this was not creditworthy. An example of an answer that would gain both the marks on offer; 'Gantt charts are suitable for development of small simple systems such as School Trip booking whereas PERT charts are suitable for complex systems with many task dependencies.'

(b) Better candidates explained why each method of fact finding was suitable for each identified group of people. A popular correct answer for the interview was 'The analyst could tailor the questions for different members of the School office staff and follow up questions could be asked depending upon the response given.'

An alternative method was usually correctly identified.

(c) (i) Generally well answered with some good screen designs drawn showing details of the School trip. Better candidates explained what they had done to make the screen user friendly for example 'I used a large size of font to make the details readable.'

(ii) Candidates needed to ensure that the consent form included details that matched the paper form but would work on a screen. For example, asking for a signature was not suitable; having a tick box or radio buttons was suitable for use on any screen.

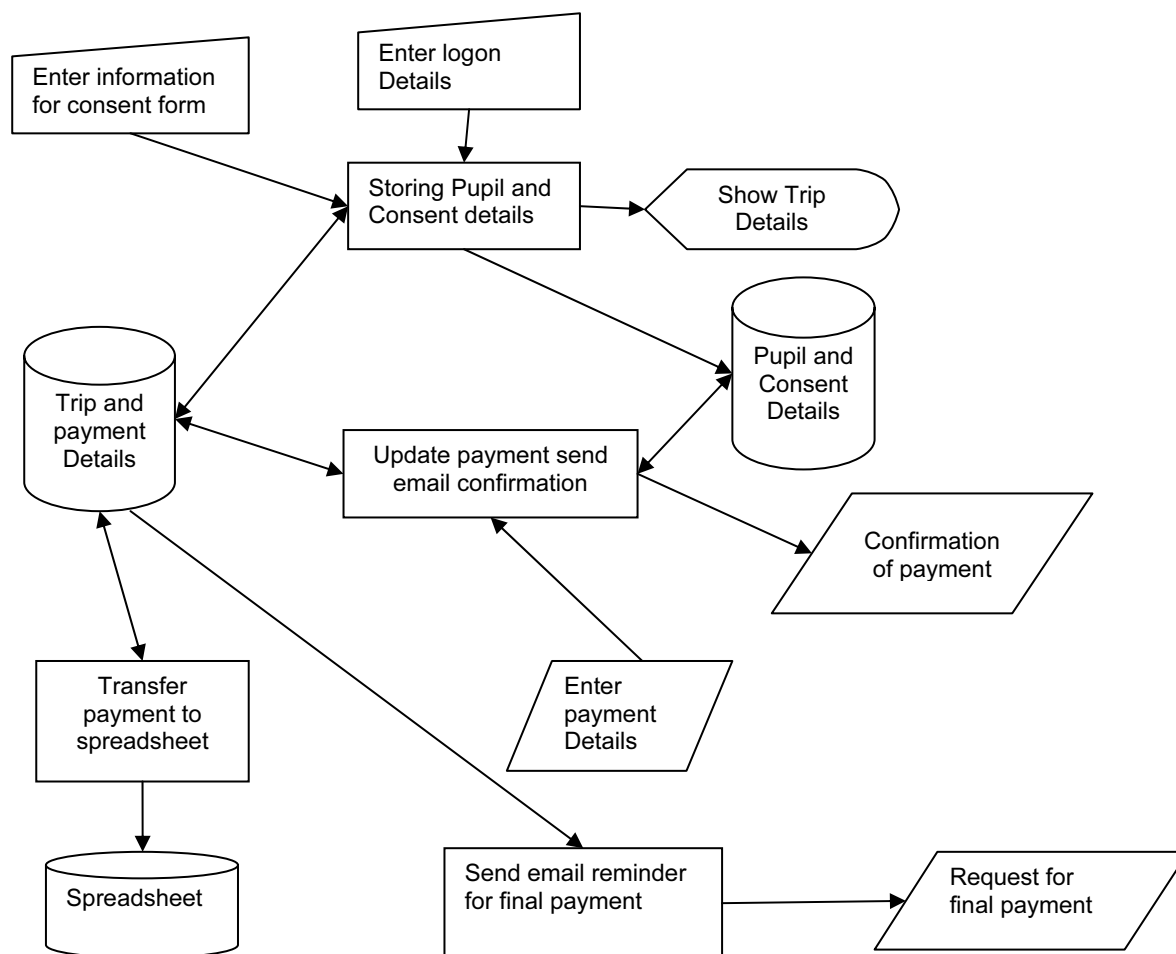
(d) Most candidates could correctly identify some steps including the use of passwords and antivirus software. Some candidates incorrectly wrote about securing data by using encryption rather than securing access to the intranet.

(e) (i) Most candidates could correctly identify at least two symbols they were going to use in their systems flowchart. Candidates needed to include systems flowchart symbols not those just used in a program flowchart, for example, a decision box would not be creditworthy here. Candidates could gain no credit for processes that were not required by the semi-automatic School Trip booking and payment system such as merging and sorting.

(ii) Better candidates provided excellent responses for this part of the question that showed a clear understanding of how the proposed system could work. Candidates needed to take care to only include processes, data stores, inputs and outputs that were described as part of the semi-automatic School Trip booking and payment system at the start of this examination paper.

Candidates should draw a systems flowchart as stated in the question rather than a flowchart, which is not appropriate.

There were many ways of drawing a systems flowchart for the semi-automatic School Trip booking and payment system; the example below would have gained full marks.



- (f) Most candidates attempted to write an algorithm to input and check a payment made by a parent. Both flowcharts and pseudocode were seen. Candidates, who provided good answers, usually used the variables suggested in this part of the question.
- (g) Most candidates were able to identify at least one value for AmountToPay that would be suitable to use as test data for the algorithm in (f).
- (h) Candidates who identified a suitable method for provision of software, for example purchasing an off-the shelf package or employing a programmer to write some bespoke software, could usually correctly identify at least one reason for their choice.
- (i) There were some excellent responses for this question with candidates showing good understanding of the strategy required for testing. Candidates who only considered one aspect of testing for example choice of test data were unable to gain full marks for their answers.
- (j) Many candidates could correctly identify four items to be included in the technical documentation. The reason given for the inclusion of each item needed to be accurate in the context of the web-based School trip booking and payment system. Some candidates incorrectly chose hardware items for the system and could gain no credit.

- (k) Candidates who explained the way that the evaluation would take place for the web-based trip booking and payment system gained good marks. An example of a good answer would be to discuss with parents and School office staff whether the new system was easy to use, get feedback and then check that the requirements have been met by examining printouts from the system runs.

# COMPUTER STUDIES

Paper 0420/33

Written Paper

## General comments

This paper provided an alternative to submitting coursework. The candidates were advised to spend at least 20 minutes reading the information about the existing system and the proposed web-based system. It is really important that the candidates carefully studied the information provided at the start of the paper, since answers to all parts of the single compulsory question on this paper required reference to the web-based semi-automatic School Trip booking and payment system described.

Candidates who did not use the information provided at the start about the web-based semi-automatic School Trip booking and payment system could not obtain full marks for their answers.

## Comments on Specific Questions

### Question 1

(a) Some candidates explained why the systems analyst had chosen to use a Gantt chart rather than a PERT chart to check the progress of the project. Many candidates stated the features of a Gantt chart, this was not creditworthy. An example of an answer that would gain both the marks on offer; 'Gantt charts are suitable for development of small simple systems such as School Trip booking whereas PERT charts are suitable for complex systems with many task dependencies.'

(b) Better candidates explained why each method of fact finding was suitable for each identified group of people. A popular correct answer for the interview was 'The analyst could tailor the questions for different members of the School office staff and follow up questions could be asked depending upon the response given.'

An alternative method was usually correctly identified.

(c) (i) Generally well answered with some good screen designs drawn showing details of the School trip. Better candidates explained what they had done to make the screen user friendly for example 'I used a large size of font to make the details readable.'

(ii) Candidates needed to ensure that the consent form included details that matched the paper form but would work on a screen. For example, asking for a signature was not suitable; having a tick box or radio buttons was suitable for use on any screen.

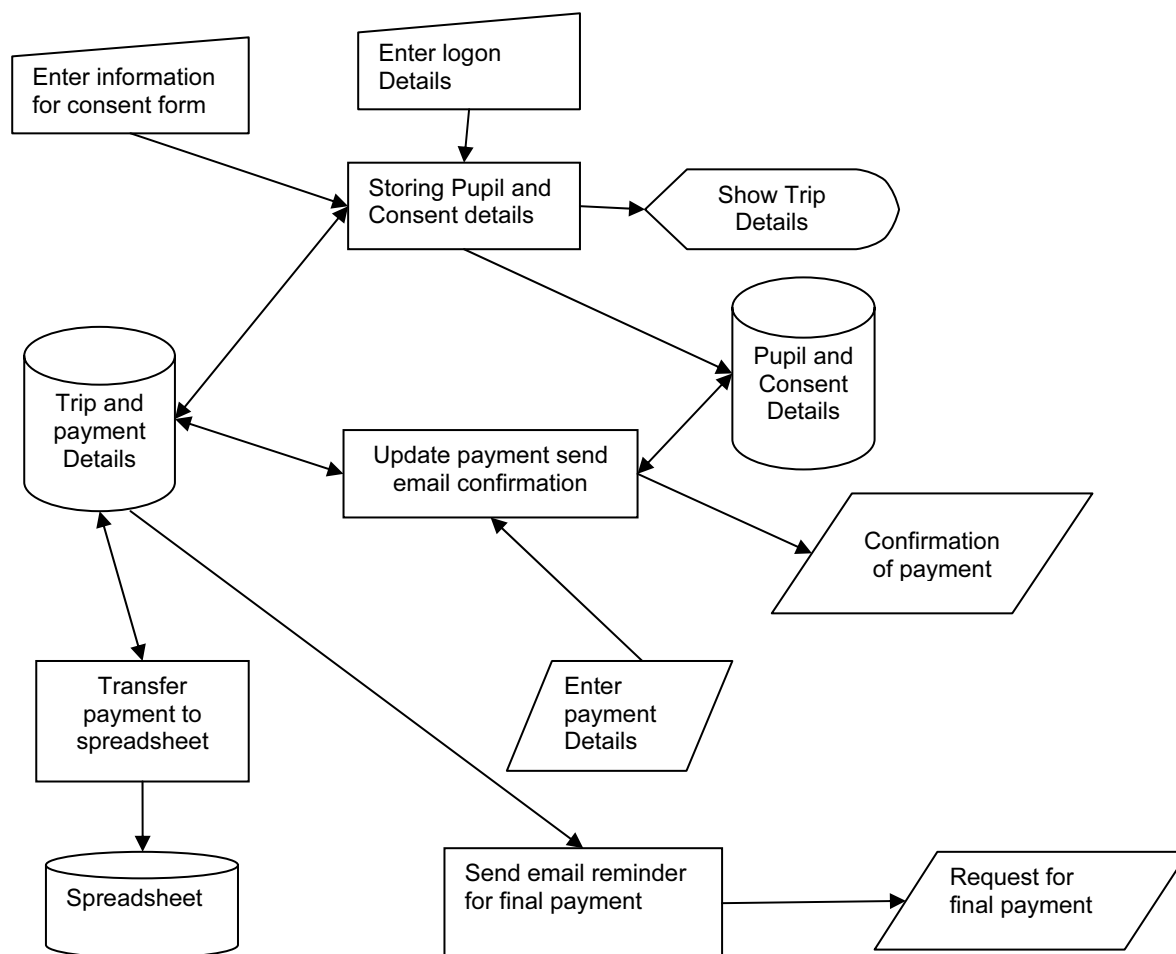
(d) Most candidates could correctly identify some steps including the use of passwords and antivirus software. Some candidates incorrectly wrote about securing data by using encryption rather than securing access to the intranet.

(e) (i) Most candidates could correctly identify at least two symbols they were going to use in their systems flowchart. Candidates needed to include systems flowchart symbols not those just used in a program flowchart, for example, a decision box would not be creditworthy here. Candidates could gain no credit for processes that were not required by the semi-automatic School Trip booking and payment system such as merging and sorting.

(ii) Better candidates provided excellent responses for this part of the question that showed a clear understanding of how the proposed system could work. Candidates needed to take care to only include processes, data stores, inputs and outputs that were described as part of the semi-automatic School Trip booking and payment system at the start of this examination paper.

Candidates should draw a systems flowchart as stated in the question rather than a flowchart, which is not appropriate.

There were many ways of drawing a systems flowchart for the semi-automatic School Trip booking and payment system; the example below would have gained full marks.



- (f) Most candidates attempted to write an algorithm to input and check a payment made by a parent. Both flowcharts and pseudocode were seen. Candidates, who provided good answers, usually used the variables suggested in this part of the question.
- (g) Most candidates were able to identify at least one value for AmountToPay that would be suitable to use as test data for the algorithm in (f).
- (h) Candidates who identified a suitable method for provision of software, for example purchasing an off-the shelf package or employing a programmer to write some bespoke software, could usually correctly identify at least one reason for their choice.
- (i) There were some excellent responses for this question with candidates showing good understanding of the strategy required for testing. Candidates who only considered one aspect of testing for example choice of test data were unable to gain full marks for their answers.
- (j) Many candidates could correctly identify four items to be included in the technical documentation. The reason given for the inclusion of each item needed to be accurate in the context of the web-based School trip booking and payment system. Some candidates incorrectly chose hardware items for the system and could gain no credit.

- (k) Candidates who explained the way that the evaluation would take place for the web-based trip booking and payment system gained good marks. An example of a good answer would discuss with parents and School office staff whether the new system was easy to use, get feedback and then check that the requirements have been met by examining printouts from the system runs.