

# INFORMATION TECHNOLOGY

---

**Paper 9626/11**  
**Theory**

## **Key messages**

In order to be fully prepared for this examination, candidates must make sure they cover all areas of the syllabus in sufficient depth.

Some candidates gave brief answers when, on much of the paper, some expansion and detail was required.

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

Questions which required a recall response were handled well by most candidates, particularly questions which required short answers, though there were few on this paper. Questions which required candidates to apply their knowledge and understanding were found to be more challenging by many candidates, with responses being seen which were not sufficiently accurate or detailed.

This paper involves a lot of handwriting. It is very important that the handwriting is not rushed and can be easily read. Rushed scripts and poor handwriting make it very difficult for an examiner to understand what the candidate has written down. This can lead to the candidate not being awarded a mark when what they have written down cannot be understood.

Candidates found questions which required higher order thinking skills, and the ability to evaluate, challenging. Teachers are advised to further develop the skills of their learners beyond recalling points of information to enable them to gain better results at this examination level.

It was apparent that many candidates were relying heavily on past paper mark schemes in formulating their answers. Mark schemes are intended to be a guide to teachers as to how to assess a script. They are not intended to be model answers. Examiners saw many scripts where candidates listed sets of bullet points that appeared to have been learnt directly from previous mark schemes. This is not likely to be a successful strategy for two main reasons. Firstly, it is unlikely that the same set of responses will be appropriate for two different questions, even if they relate to the same general area of IT. Secondly, without the accompanying discussion, evaluation, description, etc. responses are unlikely to be sufficient in themselves to be awarded credit.

## **General comments**

For the tick box questions, some candidates did not put down the required number of ticks. Candidates should answer all of the questions as fully as they can.

In general, candidates need to be more confident using technical terms in answering questions. Some responses were too vague or lacked sufficient detail to gain credit.

Candidates are advised to plan answers out before writing their full responses. Candidates could, for example, list their thoughts in rough before choosing, and elaborating on, items from their list that would be appropriate for their response to a question.

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

Topics that candidates found particularly challenging included mental models, the impact of video conferencing when applied to a specific scenario and types of chaining in expert systems. It was expected that candidates would demonstrate detailed knowledge of these.

The use of past paper mark scheme answers was particularly noticeable when candidates answered Questions **6(a)**, **6(b)** and **9**.

### **Comments on specific questions**

#### **Question 1**

Candidates did well on this question, with many candidates gaining at least partial credit. There was no clear pattern to the incorrect answers, although many candidates thought that a much larger sample size is possible using direct, rather than indirect, data sources.

#### **Question 2**

As in **Question 1**, candidates did well on this question. There was no clear pattern to the incorrect answers.

#### **Question 3**

Candidates performed well on this question, with all performing better on part **(a)** than they did on part **(b)**.

- (a)** Virtually all candidates managed to define the term 'hardware' well.
- (b)** The meaning of utility software was well understood, but the examples given were not well described. Although only brief descriptions were required, simply naming utilities such as 'defragmentation software' or 'anti-virus software' was not enough.

#### **Question 4**

Most candidates did well on this question, gaining at least partial credit. Strong responses described the changing nature of dynamic data and explained it in the context of a news website. Some answers gave incomplete descriptions. It is always a good idea for candidates to read back over their answers to check they make sense.

#### **Question 5**

This question was answered quite well, and most candidates did better in part **(a)** than part **(b)**.

- (a)** This part of the question was well-answered, with most responses demonstrating a good level of understanding. Common errors included writing IF instead of IIF, not including appropriate quotes and not closing the second pair of brackets.
- (b)** There were some very strong responses to this question, although many candidates found this part more challenging than part **(a)**. A common error was to concentrate on how the formula from part **(a)** would be entered, but not detail the steps needed before and after doing this.

#### **Question 6**

Candidates found this question challenging, with part **(a)** proving more challenging than part **(b)**.

- (a)** Few responses were seen that demonstrated an understanding of mental models. Many responses were better suited to a previous year's question on the importance of a mental model when designing a user interface but did not describe what a mental model is, as required by the question.
- (b)** Many responses identified features of a user interface but did not include full descriptions. For example, 'large fonts', 'icons', 'buttons', etc. were listed without explanation. Some candidates described different kinds of interface, rather than describing their features.

#### **Question 7**

Candidates found this question challenging. This topic is covered in greater depth on the A Level than the IGCSE syllabus. Many candidates gained credit for the standard advantages of holding video conferences such as saving time and reducing travel expenses. However, few candidates related their answers to the given scenario of senior doctors in a hospital being in touch with other doctors working away from the hospital. This question used the command word “Evaluate” so some description of advantages and disadvantages was required.

### Question 8

This question asked for an explanation of the differences between flat file and relational databases. Many responses listed features of one or the other type of database but did not explain the differences. Candidates should ensure they use correct terms for the elements of databases, such as tables and fields. Candidates also need to be confident using technical terms such as atomic data, redundancy and normalisation.

### Question 9

This question was well answered, with many responses describing the features of peer-to-peer networks. However, some responses compared peer-to-peer with client-server networks, a question from a previous year’s paper.

### Question 10

Candidates found this question to be one of the most challenging on the paper, with many candidates omitting the question. Many brief responses were seen and these often demonstrated insufficient knowledge of the topic. Some responses referred to the IF...THEN construct but did not elaborate on its use.

### Question 11

Candidates found this question challenging, with parts (a) and (c) proving more challenging than parts (b) and (d).

- (a) Many candidates attempted to use an IF construct, VLOOKUP or a combination of both. These methods did not lead to complete solutions. A common error for candidate who did use the COUNTIFS function was incorrect placement of the \$ symbol for the absolute referencing, or omitting the \$ symbol altogether.
- (b) Few candidates wrote a correct formula to calculate the speed of the swimmer. Many candidates did not take account of the instruction to calculate the speed, instead reading the word “average” and using an Average function. Many candidates left out the parts of the formula that would have separated the letter ‘m’ from the data in column I to create a numerical value to be used in the division.
- (c) Candidates found this question challenging. Most candidates realised that validation of some sort was necessary but seemed unable to explain how they would achieve it.
- (d) Candidates did better on this part than part (c). However, many candidates did not identify the range of cells that was to be sorted. Descriptions of the sort were sometimes ambiguous or confusing, such as ‘ascending to descending’.

### Question 12

Candidates found this question challenging, with most candidates gaining little credit. Evaluation requires comparisons to be made. What was required here was a description of the advantages of one type of software over the other and vice versa within the given scenario. Many candidates provided lists of features of databases and spreadsheets, but did not evaluate how appropriate the applications would be for recording student details.

# INFORMATION TECHNOLOGY

---

<p><b>Paper 9626/12</b> <b>Theory</b></p>
---

## **Key messages**

There appeared to have been a further improvement in candidates' preparation for this assessment compared with previous years, with candidates showing a greater level of understanding. However, there were still some areas of the syllabus where many candidates appeared to lack detailed knowledge.

Some candidates gave brief answers when, on much of the paper, some expansion and detail is required.

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

Discuss questions require candidates to give the important arguments for and against, and often require a conclusion. This cannot be achieved by simply writing bullet points, which are not regarded as providing the basis for a discussion. In future assessments it is likely that the absence of a coherent discussion, involving arguments for and against, will attract very low marks.

Questions which required a recall response were handled well by most candidates, particularly questions which required short answers, though there were few on this paper. Questions which required candidates to apply their knowledge and understanding were found to be more challenging by many candidates, with responses being seen which were not sufficiently accurate or detailed.

This paper involves a lot of handwriting. It is very important that the handwriting is not rushed and can be easily read. Rushed scripts and poor handwriting make it very difficult for an examiner to understand what the candidate has written down. This can lead to the candidate not being awarded a mark when what they have written down cannot be understood.

Questions which require higher order thinking skills and the ability to evaluate resulted in better responses this session than in previous sessions, though there were still some weak answers. Teachers are advised to further develop the skills of their learners beyond recalling points of information to enable them to gain better results at this examination level.

It was apparent that many candidates were relying heavily on past paper mark schemes in formulating their answers. Mark schemes are intended to be a guide to teachers as to how to assess a script. They are not intended to be model answers. Examiners saw a number of scripts where candidates listed sets of bullet points that appeared to have been learnt directly from previous mark schemes. This is not likely to be a successful strategy for two main reasons. Firstly, it is unlikely that the same set of responses will be appropriate for two different questions, even if they relate to the same general area of IT. Secondly, without the accompanying discussion, evaluation, description, etc. responses are unlikely to be sufficient in themselves to be awarded credit.

## **General comments**

For the tick box questions, some candidates are not putting down the required number of ticks. Candidates need to be encouraged to answer all the questions as fully as they can.

In general, candidates need to be more confident using technical terms in answering questions. Some responses were too vague or lacked sufficient detail to gain credit.

Candidates are advised to plan answers out before writing their full responses. Candidates could, for example, list their thoughts in rough before choosing, and elaborating on, items from their list that would be appropriate to their response to a question.

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

Topics that caused particular difficulties for candidates included MIS and HTTPS. It is expected that candidates will demonstrate detailed knowledge of these.

The use of past paper mark scheme answers was particularly noticeable when candidates answered **Questions 4, 7(b), 10 and 12.**

### **Comments on specific questions**

#### **Question 1**

Candidates were asked to provide four ticks. Therefore, it was expected that only four ticks would appear in each question. There was a range of ticks and crosses seen, and in some instances more than the required number of ticks were evident. However, candidates did well on this question. Many candidates incorrectly ticked the top box, indicating that they thought it would be necessary to buy more data loggers. A number of candidates confused indirect with direct data sources. Occasionally candidates ticked fewer than the four answers requested and missed the opportunity to gain credit.

#### **Question 2**

Candidates did equally well on this question, with many gaining at least partial credit. A common error was choosing 'A hard disk drive uses flash memory to store data'. Candidates often confused RAM with ROM and consequently incorrectly ticked the 6th or 8th statements. Again, a small minority of candidates ticked fewer than the four answers requested and missed the opportunity to gain credit.

#### **Question 3**

This question was reasonably well answered, with most candidates gaining at least partial credit for each part.

- (a) Many candidates made at least one good point. Answers about custom written software taking a long time to develop and it being more expensive to write code specifically for one user were the most common answers that gained credit. However, a number of candidates did not expand their answers to include why it was expensive or took more time, so were not awarded full credit.
- (b) Correct answers included the system being made to exactly fit the hockey club requirements and it not having unwanted features. Some answers were too vague to be awarded credit.

#### **Question 4**

Candidates found this question challenging. Many candidates missed or misunderstood the instruction not to describe the components of an expert system. Some candidates appeared to have learnt past mark schemes off by heart. They gave answers describing the components of an expert system using these past paper mark scheme points but did not explain how the system works. Many candidates were able to describe the doctor keying in the symptoms and the expert system asking questions based on the inputs made by the doctor. Very few candidates were able to gain credit by describing the process of logical reasoning carried out by the system. Nor were many candidates able to write that the system would produce a list of possible diagnoses for the doctor to choose from. Some candidates seemed to think that an expert system was some kind of robotic doctor. Candidates often seemed to be under the impression that the expert system provided the diagnosis and the doctor's role was just to accept this and act upon it. A small minority of candidates thought an expert system was a monitoring system.

#### **Question 5**

This question was well answered. **Part (a)** was much better answered than **part (b)**, although candidates also did reasonably well on this part.

- (a) Most candidates answered this question well and gained at least partial credit. A common error was placing the \$ for absolute referencing incorrectly or leaving it out altogether. A small number of candidates attempted a nested if but did not add the necessary absolute references in the correct places. When trying to produce a nested if of more than 4–5 ifs, it is important to realise that this is not the most efficient approach to solving the problem.
- (b) Most candidates gained at least partial credit for this question, and some very good answers were seen. Some confusion was evident with the use of Sort and filter then custom sort. Where this had been stated, it usually stated the use of filter only. However, some candidates gave very good answers that clearly showed that they had understood the question well and were familiar with the functions and steps needed to carry out the task. Where candidates did not gain credit, it was usually because of vague descriptions. Candidates should clearly state how to do something as if they were writing instructions for someone else to undertake. A significant number of candidates did not mention K3. The majority of candidates tried to use the AVERAGE function in the formula. A significant number of responses were too vague about replication. Very few candidates selected F3:K20. Most candidates gained credit for “descending”. However, a number of candidates described the order of the sort as ‘descending to ascending’ so did not gain credit.

### Question 6

Most candidates gained at least partial credit on this question. However, many answers contained insufficient examples of intranets or extranets. Most candidates were able to state that an intranet was a private computer network based in an organisation. Stronger responses went on to mention that an intranet uses internet technologies, tends to be a LAN, and that it provides greater security. A lot of the descriptions about an extranet were unable to gain credit, with many of the examples given not being well expressed. Some candidates misinterpreted the question as requiring a description of the differences between a LAN and a WAN. A number of candidates realised that a VPN could be used for an extranet.

### Question 7

Overall, the question was well answered but some candidates struggled with part (a). This question required only recall of information and should have been one of the most straightforward questions on the paper.

- (a) Although many correct responses were seen, other responses did not demonstrate adequate knowledge of the topic. Quite a few candidates gave answers such as utility software and operating software. Compiler was occasionally incorrectly classified as application software.
- (b) Most candidates were able to gain at least partial credit by explaining that a compiler translates a higher-level language into machine code. However, candidates demonstrated a lack of detailed knowledge of this topic. Many candidates compared a compiler with an interpreter, which has been on a previous exam paper but was not required here.

### Question 8

Many candidates provided good answers for this question. Candidates seemed to perform better on **parts (a), (c)(i) and (c)(iii)**.

- (a) Most candidates gained at least partial credit, with a few gaining full credit. The most common error was partial completion of the format column. Most candidates only put in one or two items instead of completing it fully, and an incorrect format for currency was commonly seen. Some candidates used the ‘Customer’ table rather than the ‘Invoices’ table, as instructed in the question, and were only able to gain partial credit. It is important that candidates read the questions carefully. Many candidates were unable to correctly identify the foreign key. A small minority of candidates did not gain the attribute mark as they did not copy them accurately.
- (b) This part of the question was fairly well answered with most candidates gaining at least partial credit, though few managed to get the calculated field formula completely correct. The most common error related to the placement of the square brackets, with some candidates omitting the colon after the field name.
- (c) (i) Many candidates gained full credit by correctly identifying a length check and saying what was allowable, though some of the descriptions of what was allowable were vague.



- (ii) Candidates found this question challenging, with format check sometimes being given as an answer. Many candidates gained partial credit for correctly identifying range check. However, some candidates who had done this did not go on to state both ends of the range, and some answers did not state one end. The question stated that all values shown were typical, and some candidates did not use this information.
- (iii) Most candidates gained at least partial credit. The majority of candidates correctly identified format check and some also stated what the correct format should be. However, some candidates did not precisely describe the correct format that would be permitted and so were unable to gain full credit.
- (iv) Few candidates gained full credit on this question part. Check digit was only occasionally correctly given, and few candidates were able to say how it would have prevented this error or what was allowable.

### Question 9

Most responses detailed what HTTPS is and how it works but did not give advantages or disadvantages. Most responses that gained credit referred to the security and encryption aspects of HTTPS. Few attempts at evaluation were made and as a result the marks were generally low for this answer.

### Question 10

This question proved to be challenging, and few responses gained more than minimal credit. Little evidence was seen of understanding of the term MIS. Some candidates repeated answers from previous mark schemes which asked about how an MIS helps the managers within a company, whereas this question required candidates to describe what an MIS consists of. Candidates most commonly gained credit for identifying data resources such as databases. Some candidates confused MIS with an operating system or a database management system. Few good examples of the role of an MIS manager were seen.

### Question 11

This question also proved to be challenging, with little knowledge of dot matrix printers seen. Candidates were, however, able to identify more disadvantages than advantages.

- (a) The most common answer to this question was based on the ink ribbon lasting longer or the ribbon being cheaper to buy than an inkjet cartridge. Candidates who did not recognise that this was a comparison question between a dot matrix printer and an inkjet printer were unable to gain full credit. Answers often did not contain sufficient detail. For example, 'A dot matrix printer is cheap' was not enough as the response did not detail whether the printer was cheap to buy or cheap to run. It might be an incorrect answer as, generally, a dot-matrix printer would be far more expensive to buy than an inkjet printer. This answer is also not comparative as 'cheap' is too general a term - what is cheap to one person may be expensive to another. Some candidates did not read the question carefully enough and compared the dot-matrix printer to a laser printer instead of an ink-jet printer.
- (b) This part produced some good answers, with many candidates giving the issue of noise. However, some candidates did not then compare the dot matrix printer against the inkjet printer or did not describe the disadvantages in enough detail. Simply stating that it is slower than an inkjet printer is not accurate enough. Responses needed to state that the speed of output is slower or use a similar phrase. Again, the use of phrases such as 'dot matrix printers are more expensive' is not enough as it is not clear whether it is the purchase or the running of the dot matrix printer that is more expensive. Similarly, statements such as a dot-matrix printer is slow, fast or poor quality were not enough unless expanded and compared.

### Question 12

Many candidates started their answers to this question well. However, some then relied heavily on the mark scheme answers to a past paper question comparing peer to peer networks with client-server networks. The question was about networking computers and asked candidates to refrain from referring to the internet. Some candidates gave answers based on having access to the internet. There was also a need to describe the advantages and disadvantages of networking compared with leaving the computers as standalone computers. Candidates who did not make a comparison were therefore unable to gain full credit. More candidates gained credit from describing the disadvantages than from describing the advantages.

# INFORMATION TECHNOLOGY

---

<p><b>Paper 9626/13</b> <b>Theory</b></p>
---

## **Key messages**

In order to be fully prepared for this examination, candidates must make sure they cover all areas of the syllabus in sufficient depth.

Some candidates gave brief answers when, on much of the paper, some expansion and detail was required.

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

Questions which required a recall response were handled well by most candidates, particularly questions which required short answers, though there were few on this paper. Questions which required candidates to apply their knowledge and understanding were found to be more challenging by many candidates, with responses being seen which were not sufficiently accurate or detailed.

This paper involves a lot of handwriting. It is very important that the handwriting is not rushed and can be easily read. Rushed scripts and poor handwriting make it very difficult for an examiner to understand what the candidate has written down. This can lead to the candidate not being awarded a mark when what they have written down cannot be understood.

Candidates found questions which required higher order thinking skills, and the ability to evaluate, challenging. Teachers are advised to further develop the skills of their learners beyond recalling points of information to enable them to gain better results at this examination level.

It was apparent that many candidates were relying heavily on past paper mark schemes in formulating their answers. Mark schemes are intended to be a guide to teachers as to how to assess a script. They are not intended to be model answers. Examiners saw many scripts where candidates listed sets of bullet points that appeared to have been learnt directly from previous mark schemes. This is not likely to be a successful strategy for two main reasons. Firstly, it is unlikely that the same set of responses will be appropriate for two different questions, even if they relate to the same general area of IT. Secondly, without the accompanying discussion, evaluation, description, etc. responses are unlikely to be sufficient in themselves to be awarded credit.

## **General comments**

For the tick box questions, some candidates did not put down the required number of ticks. Candidates should answer all of the questions as fully as they can.

In general, candidates need to be more confident using technical terms in answering questions. Some responses were too vague or lacked sufficient detail to gain credit.

Candidates are advised to plan answers out before writing their full responses. Candidates could, for example, list their thoughts in rough before choosing, and elaborating on, items from their list that would be appropriate for their response to a question.

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



Topics that candidates found particularly challenging included mental models, the impact of video conferencing when applied to a specific scenario and types of chaining in expert systems. It was expected that candidates would demonstrate detailed knowledge of these.

The use of past paper mark scheme answers was particularly noticeable when candidates answered Questions **6(a)**, **6(b)** and **9**.

### **Comments on specific questions**

#### **Question 1**

Candidates did well on this question, with many candidates gaining at least partial credit. There was no clear pattern to the incorrect answers, although many candidates thought that a much larger sample size is possible using direct, rather than indirect, data sources.

#### **Question 2**

As in **Question 1**, candidates did well on this question. There was no clear pattern to the incorrect answers.

#### **Question 3**

Candidates performed well on this question, with all performing better on part **(a)** than they did on part **(b)**.

- (a)** Virtually all candidates managed to define the term 'hardware' well.
- (b)** The meaning of utility software was well understood, but the examples given were not well described. Although only brief descriptions were required, simply naming utilities such as 'defragmentation software' or 'anti-virus software' was not enough.

#### **Question 4**

Most candidates did well on this question, gaining at least partial credit. Strong responses described the changing nature of dynamic data and explained it in the context of a news website. Some answers gave incomplete descriptions. It is always a good idea for candidates to read back over their answers to check they make sense.

#### **Question 5**

This question was answered quite well, and most candidates did better in part **(a)** than part **(b)**.

- (a)** This part of the question was well-answered, with most responses demonstrating a good level of understanding. Common errors included writing IF instead of IIF, not including appropriate quotes and not closing the second pair of brackets.
- (b)** There were some very strong responses to this question, although many candidates found this part more challenging than part **(a)**. A common error was to concentrate on how the formula from part **(a)** would be entered, but not detail the steps needed before and after doing this.

#### **Question 6**

Candidates found this question challenging, with part **(a)** proving more challenging than part **(b)**.

- (a)** Few responses were seen that demonstrated an understanding of mental models. Many responses were better suited to a previous year's question on the importance of a mental model when designing a user interface but did not describe what a mental model is, as required by the question.
- (b)** Many responses identified features of a user interface but did not include full descriptions. For example, 'large fonts', 'icons', 'buttons', etc. were listed without explanation. Some candidates described different kinds of interface, rather than describing their features.

#### **Question 7**

Candidates found this question challenging. This topic is covered in greater depth on the A Level than the IGCSE syllabus. Many candidates gained credit for the standard advantages of holding video conferences such as saving time and reducing travel expenses. However, few candidates related their answers to the given scenario of senior doctors in a hospital being in touch with other doctors working away from the hospital. This question used the command word “Evaluate” so some description of advantages and disadvantages was required.

### Question 8

This question asked for an explanation of the differences between flat file and relational databases. Many responses listed features of one or the other type of database but did not explain the differences. Candidates should ensure they use correct terms for the elements of databases, such as tables and fields. Candidates also need to be confident using technical terms such as atomic data, redundancy and normalisation.

### Question 9

This question was well answered, with many responses describing the features of peer-to-peer networks. However, some responses compared peer-to-peer with client-server networks, a question from a previous year’s paper.

### Question 10

Candidates found this question to be one of the most challenging on the paper, with many candidates omitting the question. Many brief responses were seen and these often demonstrated insufficient knowledge of the topic. Some responses referred to the IF...THEN construct but did not elaborate on its use.

### Question 11

Candidates found this question challenging, with parts (a) and (c) proving more challenging than parts (b) and (d).

- (a) Many candidates attempted to use an IF construct, VLOOKUP or a combination of both. These methods did not lead to complete solutions. A common error for candidate who did use the COUNTIFS function was incorrect placement of the \$ symbol for the absolute referencing, or omitting the \$ symbol altogether.
- (b) Few candidates wrote a correct formula to calculate the speed of the swimmer. Many candidates did not take account of the instruction to calculate the speed, instead reading the word “average” and using an Average function. Many candidates left out the parts of the formula that would have separated the letter ‘m’ from the data in column I to create a numerical value to be used in the division.
- (c) Candidates found this question challenging. Most candidates realised that validation of some sort was necessary but seemed unable to explain how they would achieve it.
- (d) Candidates did better on this part than part (c). However, many candidates did not identify the range of cells that was to be sorted. Descriptions of the sort were sometimes ambiguous or confusing, such as ‘ascending to descending’.

### Question 12

Candidates found this question challenging, with most candidates gaining little credit. Evaluation requires comparisons to be made. What was required here was a description of the advantages of one type of software over the other and vice versa within the given scenario. Many candidates provided lists of features of databases and spreadsheets, but did not evaluate how appropriate the applications would be for recording student details.

# INFORMATION TECHNOLOGY

---

<p><b>Paper 9626/02</b> <b>Practical</b></p>
--

## Key messages

- Candidates needed a better understanding of the types of relationship that occur between tables in a relational database.
- Candidates needed a greater theoretical understanding of:
  - normalisation
  - dynamic parameter queries.
- Candidates needed to be more familiar with applying their theoretical knowledge to practical tasks including:
  - creating a relational database normalised to 3NF
  - considering **appropriate** data structures (including table names and field names)
  - considering the target audience when creating software solutions.
- Candidates needed to ensure that if they submitted more than one copy of an answer (particularly for the database queries and reports), it was clear to the examiner which version was the correct one. As these were frequently stored within the software, it was not always possible to identify which version the candidate deemed their finished version.
- Candidates needed more practice and experience in setting the timing on video creation.
- Candidates needed to take greater care with the accuracy of data entry.

## General comments

A significant number of candidates did not submit one or more of the required files for assessment, or submitted the files in the wrong file format, (for example: video files were frequently submitted as .wmp project files rather than exported into .mp4 format).

## Comments on specific questions

### Question 1

Most candidates who attempted the video and provided evidence in a correct file format completed this well. However, not all candidates set all elements of their video to have a 16:9 image ratio, especially the initial background images. A number of candidates did not place the image Ski1.png down both sides of a white background and some cropped or pixelated the images whilst other candidates placed a single image centrally in the frames. The text was often added correctly, but some candidates did not follow the instructions for a red, 60 point font (almost all added a sans-serif font). A number of candidates included this text in the background so did not add an appropriate effect to place the text.

### Question 2

Many candidates trimmed the clip to 8 seconds (some retained the last 8 seconds rather than the first) and most candidates removed the soundtrack from the clip.

### Question 3

Many candidates trimmed the clip to 13 seconds (again some retained the last 13 seconds rather than the first 13 seconds) and most candidates removed the soundtrack from the clip. The transition between the clips was placed by many candidates but not all set this to a 3-second transition which had to be altered and should have differed in length from the pre-defined transition lengths in most packages. Some candidates incorrectly set transition effects between all sections of the video.

### Question 4

A significant number of candidates did not use the last frame of the second video for their snapshot, although usually the snapshot that was placed was displayed for the required 14 seconds. Captions were frequently added as specified but some candidates quoted the bulleted text from this question as their caption and others just copied the introductory text. Stronger candidates used this information and tried to advertise the ski school. Credits rarely included all the information from the brief, with few candidates stating that the original clips were filmed by TMBvideo or that the location was Ellmau, Austria. Occasionally the text did not contrast with the background therefore readability was lost and a few candidates scrolled the text at a speed that made it impossible to read the content.

### Question 5

Most submissions were in .mp4 format with the correct filename but there were some typographical errors. Some candidates did not export the video and their folder only contained their working project files (like .wlm) which could not be accessed.

### Question 6

Many candidates found this question challenging but gained some credit for identifying that a normalised database does not contain redundant data. The most common error was to state that normalised databases do not contain duplicated data. They can contain duplicated data (and frequently do) but if set to 3NF cannot contain duplicated records. Several candidates identified that normalised databases contain atomic data.

### Question 7

This question was also challenging for many candidates. Few responded that it was a dynamic parameter query, or analysed the fields that were dynamic or static. Where candidates did identify the dynamic query, they sometimes went on to discuss the benefits and drawbacks of these compared to a static parameter query, but not all candidates related their answers to the cars query in the question. A number of candidates described the query structure, such as which fields would show and that no sort order was selected, rather than evaluating the use of a dynamic query.

### Question 8

This question proved challenging for a significant number of candidates. Few candidates followed the instruction to examine the data in the file, resulting in errors when normalising the data. Most candidates successfully created the database, but not all of them were relational databases, with a significant number only using a single table to 1NF taken from the original data. Few candidates created this to 3NF by breaking down the data into Employees and Place (of employment), but some stronger candidates also included the Job data as a separate table linked to the Employees table. Table names were often selected well, but field names were often lengthy, contained spaces or contained inconsistent structure or case, despite clear instructions that 'all field names must be short, meaningful and consistent in style'. A significant number of candidates submitted databases with multiple tables containing the same fields (and data). A small number of candidates considered the fields and created tables but these contained no data. A small number of candidates did not import the data but created linked tables which did not work when submitted for assessment. Some candidates created two or more tables but did not link them.

### Question 9

This question was attempted by most candidates. The layout of the report and the instruction 'so that it is grouped and formatted' indicated that grouping the data was required. Few candidates were successful in this, although many candidates formatted their report to look similar to the one shown in the question paper. The underlying query required selections from the 'date of birth' and 'date that the employment started' fields

but few candidates correctly identified these fields and the required dates to fulfil the requirements of the question.

### Question 10

Most candidates who attempted this question created a wildcard search for all the 'Trainee' employees and this could be evidenced in the database queries. The subsequent crosstab query was not as successfully created by as many candidates. The completed crosstab was frequently exported into portable document format, but data was often truncated. Gridlines were rarely seen, even in the submissions from stronger candidates.

# INFORMATION TECHNOLOGY

---

<p><b>Paper 9626/31</b> <b>Advanced Theory</b></p>
--

## **Key messages**

Some good technical descriptions were seen and some candidates appeared to have good subject knowledge. However, there were also candidates who seemed to lack sufficient knowledge of the syllabus topics to answer the questions fully. At A Level, answers are expected to be in detail and candidates are required to apply their knowledge to given contexts. It is imperative that candidates read the short scenarios and the information given in these scenarios very carefully so that they can apply their knowledge when answering the subsequent questions.

Candidates should also make sure that they are answering the questions as set in order to access the higher mark range. It is not sufficient to look for 'key words' in the questions, and write answers based on these key words.

## **General comments**

When asked to 'explain', 'describe', 'evaluate', 'analyse' or 'discuss' a topic, candidates should write in continuous prose to be able to expand and elaborate their discussions. Answers consisting of bullet points rarely produce explanations, descriptions or comparisons. These answers do not generally gain marks in the higher mark range.

Page 30 of the syllabus contains a list of 'command words' that appear in the questions and explains what each word requires of candidates. It is very important that, when answering questions, candidates read the rubric and answer the question in the appropriate manner.

Fewer candidates omitted questions than in previous series. Candidates should always be encouraged to attempt all of the questions. Good practice was seen by candidates who had used the spare pages or additional pages. These candidates cross-referenced their answers, making it clear to the examiners where questions had been answered so that the appropriate credit could be awarded.

## **Comments on specific questions**

### **Question 1**

- (a) Many candidates accurately described the purpose of the cart as accumulating goods ready for purchase. Few went on to mention the calculation of the total cost of purchases prior to purchase.
- (b) Candidates found this question challenging despite there being a large number of possible answers. Good answers could have referred to the web server software required to host the store, the databases that would be used to store information about items being sold and to store the customer account details, a search engine to enable customers to search for items, software for the creation of customer accounts and security checks, firewalls for security, backup software and the software needed to administer the online shop (products, prices, discounts, etc.). Credit was also given for describing sections of the website, e.g. FAQs, which may well be separate modules.

### **Question 2**

- (a) This question was quite well answered by some candidates who showed a good understanding of the protocols. Credit was not given for lists of protocols; as always, candidates were required to describe, rather than simply name, the protocols. A good answer could have included, for example, FTP and HTTP. For example, FTP/file transfer protocol which is used for uploading files to a server





and HTTP/hypertext transfer protocol which is used for accessing web pages. Credit was given for a wide range of appropriate protocols.

- (b) This question required candidates to describe how data is transmitted between a device and a wireless access point. Credit was available for the more technical details such as the use of radio waves in several bands, e.g. 2.4 GHz/5 GHz frequency ranges/(900 MHz and 3.6/60 GHz frequency bands), modulating data frames onto carrier waves, the use of spread spectrum technology, and details of WiFi connections. As this question asked candidates about the transmission of data, more detailed descriptions were required to gain full credit. Some candidates wrote about wireless access points and cabled connections, which did not answer the question.
- (c) This question required candidates to make comparisons between Bluetooth and WiFi for data transfer. The command words compare and contrast, as detailed in the syllabus, specifically require candidates to identify similarities and differences. To gain full credit, candidates had to give a number of both and were required to give more than simple statements. Both similarities and differences were required, and good answers could have referred to both being communication systems, both using wireless technology, and both having a limited bandwidth compared to cabled networks. Contrasts could have included Bluetooth having a shorter range and lower bandwidth than WiFi and Bluetooth being restricted by objects while WiFi can penetrate most objects.

### Question 3

Most candidates could describe alpha and beta testing and credit was given for this, but the higher marks were for analysing the differences. The syllabus list of command words explains analyse as *'explain the main points or effectiveness in detail, identify their characteristics, examine closely'* which means that candidates are required to give more detailed explanations than stating what, for example, alpha testing, is. A good answer could have explained that alpha testing will result in a more technical analysis of the faults of the system as it is carried out by the developers themselves, and that beta testing audiences will give a more objective view than the developers who carry out alpha testing. This is more detailed than 'alpha testing is carried out by the developers' which is merely a statement of fact instead of an analysis.

### Question 4

In this question, candidates were required to evaluate, by weighing up the advantages and disadvantages of, the use of questionnaires for collecting data when compared to interviews and observation. The mark scheme provides some points of discussion, but other references were given credit provided candidates weighed up the advantages and disadvantages. Responses needed to discuss the relative importance of any advantages or disadvantages. Good answers could have included references to: the larger amounts of information that can be gathered from many responders in a shorter time than when interviewing or observing so increasing the quantity of data for analysis; data gathered using interviews potentially containing, unlike questionnaires, answers which the interviewees think the interviewer wants to hear which affects the validity of the data; questionnaires being used by any number of researchers with little effect on the reliability and validity of the data; data gathered using questionnaires being easier to analyse quantitatively than interviews; and the researcher not seeing the process as a whole as is possible with observation so the data not referring to the whole process. Such responses are not simply statements of facts about questionnaires. A Level requires skills beyond factual recall and candidates are expected to be able to discuss and evaluate topics using their knowledge and understanding.

### Question 5

- (a) Most candidates answered this question well. Good charts were produced with accurate and correct details.
- (b) Most candidates answered this question well. Most candidates could identify the activities and calculate the length of the path correctly. A common error, however, was to correctly determine the activities but produce an incorrect length for the path.

### Question 6

This question required candidates to discuss the benefits and drawbacks of the use of copper ethernet cables within a computer network. The command word 'Discuss' requires candidates to *'give important arguments for and against. Often requires a conclusion.'* Therefore, this question required more than statements of facts about copper cabling for ethernet, and some candidates attempted this. However, most

candidates did not provide responses that could be awarded the higher marks. Both benefits and drawbacks were required, with comments about how these are important. Some good answers were seen with references to, for example, copper cables being flexible so they can be installed almost everywhere but also being subject to electrical interference which can affect the rate of data transfer, copper cables being more of a safety hazard than WiFi as people are more likely to trip over poorly installed cabling. Poorer answers referred to 'cheaper' or 'easier to install' with no further expansion.

### Question 7

This question divided the benefits and drawbacks into two parts in an attempt to get candidates to focus on each. Most candidates could do this and some good answers were seen.

- (a) This question was quite well answered but many candidates only gave brief answers and did not gain full credit. Most candidates referred to the loss of data due to malware and the retrieval of unaffected files but references to the protection of files against, for example, a power loss affecting the main system and then the rapid access to missing files could also have been mentioned.
- (b) Again, this question was quite well answered but many candidates only gave brief answers and did not gain full credit. Descriptions were required so brief statements, e.g. 'backups can be hacked' did not gain credit. Many candidates referred to hacking when data is backed up to the cloud but did not provide any further explanation of why this might possibly be a drawback. For example, backups can be stolen in their entirety if they not encrypted so all of the data can be accessed. Good answers should have given more detail and referred to such drawbacks as backups restoring data to a time before a malware infection but the latest data is lost, and backups potentially not storing up to date data if they are run during office hours.

### Question 8

Candidates found this question very challenging. It was expected that the role of a proxy server (Section 13.1 in the syllabus refers to servers and a proxy server is a well-known server) would be well understood by candidates. However, most answers were brief and superficial. Answers could have referred to a proxy server being the gateway between an organisation's (in this case a school's) network and the internet, providing a cache of frequently used web sites/pages so that access appeared to users to be faster, or the provision of control over access by the school's networked computers to the internet. Details were required so vague answers such as 'receives electronic requests from users and goes and searches the internet for requested data' would not gain credit. While extremely detailed technical knowledge is not expected, candidates need sufficient knowledge to answer questions such as these to A Level standard.

### Question 9

- (a) This question required candidates to examine a simple network diagram and describe what hardware and software was likely to be found at various points. Most candidates could deduce that the hardware would probably be a router but few could adequately explain its role and the role of the software that could be employed at that point. Explanations require reasons so it was expected that candidates would identify the hardware and software and explain why these would be used. Good answers could have referred to the router and its role, the use of anti-malware, firewalls and encryption, with explanations and reasons why their role was important. As the question specifically asked for hardware and software, full credit could only be gained by referring to both. Candidates must read questions carefully and answer appropriately, e.g. where two topics are mentioned, candidates must refer to both.
- (b) This question required candidates to provide an explanation for staff being discouraged from using unsecured internet connections. Many candidates could provide responses that pointed out that there was no firewall present and that the company data, if not encrypted, could be at risk. The higher marks were scored by detailing the risks to the data that could arise from the lack of security.

### Question 10

This question was answered quite well, with many candidates describing the steps that would have to be taken in order to extract the image of the person from one photograph and place it into another.

### Question 11

This question was about the collection of input data, its manipulation and the display of the results using JavaScript. Some good explanations of the functioning of the code were seen, with candidates mentioning the declaration of necessary variables, the collection of the dimensions in displayed message areas, the calculation with *calc.area* and the use of *document.write()* to display the messages on screen about the area of the rectangle. Good answers ‘stepped through’ the code, explaining each stage from the declaration of the variables to the display of the result on screen.

# INFORMATION TECHNOLOGY

---

<p><b>Paper 9626/32</b> <b>Paper 3</b></p>
--

## **Key messages**

Some good technical descriptions were seen and some candidates appeared to have good subject knowledge but there were also many candidates who seemed to lack sufficient knowledge of the syllabus topics to answer the questions fully. At A Level, answers are expected to be in detail and candidates are required to apply their knowledge to given contexts. It is imperative that candidates read the short scenarios and the information given in these scenarios very carefully so that they can apply their knowledge when answering the subsequent questions.

Candidates should also make sure that they are answering the questions as set in order to access the higher mark range. It is not sufficient to look for 'key words' in the questions, and write answers based on these key words.

## **General comments**

Where candidates are asked to 'explain', 'describe', 'evaluate', 'analyse' or 'discuss' a topic, candidates should write in continuous prose to be able to expand and elaborate their discussions. Answers consisting of bullet points rarely produce little more than simple points or short statements with no explanations, descriptions or comparisons. These answers do not generally gain marks in the higher mark range.

Page 30 of the syllabus contains a list of 'command words' that appear in the questions and explains what each word requires of candidates. It is very important that, when answering questions, candidates read the rubric and answer the question in the appropriate manner.

Fewer candidates omitted questions than in previous series. Candidates should always be encouraged to attempt all of the questions. Good practice was seen by candidates who had used the spare pages or additional pages. These candidates cross-referenced their answers, making it clear to the examiners where questions had been answered so that the appropriate credit could be awarded.

## Comments on specific questions

### Question 1

- (a) This question required a description of 'nodes' as used in a vector image. While some candidates could describe these as 'points' that show the start and end points of lines, the majority of responses lacked the technical detail required at A Level. Nodes are the control points for lines and paths in a vector image and determine the direction of the line or path. A significant number of responses included uses, which was not required. Candidates are reminded to read the questions carefully.
- (b) The use of node editing in the creation of vector images is a requirement of Section 16.1 of the syllabus. Responses should have included reference to, for example, joining nodes, moving nodes to change the shape/path direction, adding new nodes or deleting nodes to change the overall shape or add a new path, and/or adjusting the length of each control arm without changing the direction of lines or paths.

### Question 2

This question asked candidates to choose and justify the type of project management software that could be used by various personnel employed by a building company. Most candidates could identify and describe the types of PMS required but the reasons given were often repetitive and vague. Some candidates did not answer the question but described the types of office software that could be used by the personnel. To gain full credit, responses needed to select a type of PMS for each person and justify each choice. For example, desktop PMS would be appropriate for the Director and Managing Director because of a requirement for high quality graphics. Project managers could use desktop or web-based PMS as they are based in offices so will probably be using a desktop computer with access to the internet. Project supervisors would use web-based PMS as they require remote use, while some supervisors may need to use mobile devices with internet access so would need to use web-based software. Mentions of the need for collaborative features would also have gained credit.

### Question 3

The reason that no output is produced is because no error message is generated by the syntax error in line 7. "Peter" is enclosed in quotes that are the same as the quotes for the string which is not allowed. Some candidates managed to locate this error but many pointed to other lines and noted 'errors' that were not errors.

### Question 4

- (a) Most candidates answered this question well and in some detail, although some answers were vague and lacked technical knowledge. Good answers should have referred to the embedding of the code in HTML so that the results could be displayed, the declaration of each of the variables and their purpose, and the production of the list along with how each item is displayed on a new line.
- (b) This question was well answered. There were a number of ways to accomplish the amendment including typing the amendment directly into the array or adding the line `crops.unshift("beans");` to any line between `var crops` and `while()`.

### Question 5

This question was well answered. Impacts discussed ranged from the positive impacts of always having access to information and being in constant contact with others to the negatives such as inappropriate use (e.g. cheating in exams, cyberbullying) or the effects on students' mental wellbeing.

### Question 6

A full response to this question would refer to the use of lasers to transmit data over long distances along thin fibre optic cables and the carrying of vast amounts of data (or high bandwidths), the use of lasers in free space (i.e. no transmission medium or in just air), the immunity to electromagnetic interference and the increased security. However, candidate responses demonstrated some confusion between the laser beams and the fibre optic cables e.g. 'lasers can bend around corners'. Candidates need to be clear about the technical terms and the details of optical transmission methods and media as referenced in section 13.1 of the syllabus.

### Question 7

This question required candidates to evaluate, by weighing up the advantages and disadvantages of, the use of robotics in the delivery of goods. Responses could have referred to the use of robotics at any point in the delivery process from the initial packing of goods to the final delivery stages. However, credit was only gained by discussion of the relative importance of any advantages and disadvantages of using robotics. The mark scheme provides some points of discussions but other references were given credit provided candidates weighed up the advantages and disadvantages. While many candidates could describe uses of robotics, few provided an evaluation of these uses. A Level requires skills beyond factual recall and candidates are expected to be able to discuss and evaluate topics using their knowledge and understanding.

### Question 8

- (a) Most candidates referred to the use of a user ID with a password or PIN known only to user. While some responses made vague references to biometrics, such as 'using fingerprints' they did not describe the need to scan and analyse or cross-reference these. Good answers could have referred to, for example, the requesting of a random selection of three of the digits of a PIN, a transaction authentication number (TAN) sent to customers via text message or the questioning of different devices being used to log in.
- (b) This question asked for a description of the protocols used by a VPN. While many candidates could identify some of the protocols, few responses described their use in the VPN. A significant number of responses described protocols that were not relevant such as HTTPS. Candidates must ensure that they target the scenario in the question. Good answers would have referred to the specific protocols used in VPNs such as IP security (IPSec) which encrypts the data in the packets, Secure Socket Layer/SSL that creates the handshake system in conjunction with Transport Layer Security/TLS and the Point-to-Point Tunnelling Protocol to create a tunnel and encapsulate the data packet.

### Question 9

This question required candidates to make comparisons between Massive Open Online Courses and online tutorials. The command words compare and contrast, as detailed in the syllabus, require candidates to identify similarities and differences. To gain the higher marks, candidates had to give a number of both and were required to give more than simple statements. Most candidates could point out that both MOOCs and online tutorials use the World Wide Web and that both MOOCs and online tutorials are interactive with multimedia. Some responses correctly explained that MOOCs provide interactive user forums whereas online tutorials do not provide these. Good answers could have included, for example, MOOCs covering more content than online tutorial because tutorials are usually focused on limited topics and MOOCs are more easily scalable to encompass more content than online tutorials.

### Question 10

Many vague answers such as 'better' or 'poor' quality were seen. At A Level, more precise descriptions are required e.g. low bit rates produce video that lacks detail or is pixelated or shows motion in jerky steps. Credit was given for an accurate definition of bit rate (e.g. bit rate represents the amount of data that is stored per unit time in the streamed video) and for accurate references to the fact that the bandwidth of available connections determines the bit rate that can be used for the video stream. Good answers could have referred to this and to the fact that if the transmission medium does not have sufficient bandwidth to carry the required bit rate, the video will show constant buffering which, in turn, will reduce the viewer's enjoyment of the video. Candidates should be reminded that answers need to contain sufficient detail.



### Question 11

Most responses demonstrated a good understanding of how editing tools can be used in graphics manipulation. Changes to the image included the removal of the barrier, the addition of a new, second, lamp post, and the addition of a title. There were many tools that could have been described e.g. selection, cut, colour pickers, text writing, copy/paste tools, layer tools. To gain credit, candidates were required to describe how the tools could be used, so statements that merely identified them were not sufficient. Good answers should have given a detailed description of the use of a tool e.g. for the addition of a new lamp post, a freehand select tool could be used to draw around the existing lamp post and copy/paste tools used to copy it to the clipboard while leaving the existing post in place (the use of 'cut' is not correct), a new layer should be created for the additional lamp post to be pasted and positioned. Similar detail was required for any other tools that were described. A final merge (down) of the layers to 'flatten' the image was also given credit but was rarely seen.

### Question 12

Many candidates answered this question very well.

### Question 13

In this question candidates were expected to describe how a design had been created, displayed in 3D and then rotated. The tools available in CAD packages should be known to candidates as the syllabus, section, 14.8, requires this knowledge. Good answers could have included the use of editing tools to enter the required dimensions of the room into a 2D plan, locating fixtures such as positioning windows and doors, positioning objects such as tables and chairs from an image/item library and then colouring the objects. The 3D image can be created using push/pull/3D imaging tool and dragged around to show different views.

### Question 14

This question required candidates to evaluate, by weighing up the positive and negative impacts of, holographic imaging on medicine. Some good answers detailing the positive and negative impacts were seen. Good answers could have referred to, for example, the ability to see inside a patient without the need for surgery, and to training being more realistic. Negatives could have included the initial cost being high and the need for highly trained technicians.



# INFORMATION TECHNOLOGY

---

<p><b>Paper 9626/33</b> <b>Advanced Theory</b></p>
--

## **Key messages**

Some good technical descriptions were seen and some candidates appeared to have good subject knowledge. However, there were also candidates who seemed to lack sufficient knowledge of the syllabus topics to answer the questions fully. At A Level, answers are expected to be in detail and candidates are required to apply their knowledge to given contexts. It is imperative that candidates read the short scenarios and the information given in these scenarios very carefully so that they can apply their knowledge when answering the subsequent questions.

Candidates should also make sure that they are answering the questions as set in order to access the higher mark range. It is not sufficient to look for 'key words' in the questions, and write answers based on these key words.

## **General comments**

When asked to 'explain', 'describe', 'evaluate', 'analyse' or 'discuss' a topic, candidates should write in continuous prose to be able to expand and elaborate their discussions. Answers consisting of bullet points rarely produce explanations, descriptions or comparisons. These answers do not generally gain marks in the higher mark range.

Page 30 of the syllabus contains a list of 'command words' that appear in the questions and explains what each word requires of candidates. It is very important that, when answering questions, candidates read the rubric and answer the question in the appropriate manner.

Fewer candidates omitted questions than in previous series. Candidates should always be encouraged to attempt all of the questions. Good practice was seen by candidates who had used the spare pages or additional pages. These candidates cross-referenced their answers, making it clear to the examiners where questions had been answered so that the appropriate credit could be awarded.

## **Comments on specific questions**

### **Question 1**

- (a) Many candidates accurately described the purpose of the cart as accumulating goods ready for purchase. Few went on to mention the calculation of the total cost of purchases prior to purchase.
- (b) Candidates found this question challenging despite there being a large number of possible answers. Good answers could have referred to the web server software required to host the store, the databases that would be used to store information about items being sold and to store the customer account details, a search engine to enable customers to search for items, software for the creation of customer accounts and security checks, firewalls for security, backup software and the software needed to administer the online shop (products, prices, discounts, etc.). Credit was also given for describing sections of the website, e.g. FAQs, which may well be separate modules.

### **Question 2**

- (a) This question was quite well answered by some candidates who showed a good understanding of the protocols. Credit was not given for lists of protocols; as always, candidates were required to describe, rather than simply name, the protocols. A good answer could have included, for example, FTP and HTTP. For example, FTP/file transfer protocol which is used for uploading files to a server



and HTTP/hypertext transfer protocol which is used for accessing web pages. Credit was given for a wide range of appropriate protocols.

- (b) This question required candidates to describe how data is transmitted between a device and a wireless access point. Credit was available for the more technical details such as the use of radio waves in several bands, e.g. 2.4 GHz/5 GHz frequency ranges/(900 MHz and 3.6/60 GHz frequency bands), modulating data frames onto carrier waves, the use of spread spectrum technology, and details of WiFi connections. As this question asked candidates about the transmission of data, more detailed descriptions were required to gain full credit. Some candidates wrote about wireless access points and cabled connections, which did not answer the question.
- (c) This question required candidates to make comparisons between Bluetooth and WiFi for data transfer. The command words compare and contrast, as detailed in the syllabus, specifically require candidates to identify similarities and differences. To gain full credit, candidates had to give a number of both and were required to give more than simple statements. Both similarities and differences were required, and good answers could have referred to both being communication systems, both using wireless technology, and both having a limited bandwidth compared to cabled networks. Contrasts could have included Bluetooth having a shorter range and lower bandwidth than WiFi and Bluetooth being restricted by objects while WiFi can penetrate most objects.

### Question 3

Most candidates could describe alpha and beta testing and credit was given for this, but the higher marks were for analysing the differences. The syllabus list of command words explains analyse as *'explain the main points or effectiveness in detail, identify their characteristics, examine closely'* which means that candidates are required to give more detailed explanations than stating what, for example, alpha testing, is. A good answer could have explained that alpha testing will result in a more technical analysis of the faults of the system as it is carried out by the developers themselves, and that beta testing audiences will give a more objective view than the developers who carry out alpha testing. This is more detailed than 'alpha testing is carried out by the developers' which is merely a statement of fact instead of an analysis.

### Question 4

In this question, candidates were required to evaluate, by weighing up the advantages and disadvantages of, the use of questionnaires for collecting data when compared to interviews and observation. The mark scheme provides some points of discussion, but other references were given credit provided candidates weighed up the advantages and disadvantages. Responses needed to discuss the relative importance of any advantages or disadvantages. Good answers could have included references to: the larger amounts of information that can be gathered from many responders in a shorter time than when interviewing or observing so increasing the quantity of data for analysis; data gathered using interviews potentially containing, unlike questionnaires, answers which the interviewees think the interviewer wants to hear which affects the validity of the data; questionnaires being used by any number of researchers with little effect on the reliability and validity of the data; data gathered using questionnaires being easier to analyse quantitatively than interviews; and the researcher not seeing the process as a whole as is possible with observation so the data not referring to the whole process. Such responses are not simply statements of facts about questionnaires. A Level requires skills beyond factual recall and candidates are expected to be able to discuss and evaluate topics using their knowledge and understanding.

### Question 5

- (a) Most candidates answered this question well. Good charts were produced with accurate and correct details.
- (b) Most candidates answered this question well. Most candidates could identify the activities and calculate the length of the path correctly. A common error, however, was to correctly determine the activities but produce an incorrect length for the path.

### Question 6

This question required candidates to discuss the benefits and drawbacks of the use of copper ethernet cables within a computer network. The command word 'Discuss' requires candidates to *'give important arguments for and against. Often requires a conclusion.'* Therefore, this question required more than statements of facts about copper cabling for ethernet, and some candidates attempted this. However, most

candidates did not provide responses that could be awarded the higher marks. Both benefits and drawbacks were required, with comments about how these are important. Some good answers were seen with references to, for example, copper cables being flexible so they can be installed almost everywhere but also being subject to electrical interference which can affect the rate of data transfer, copper cables being more of a safety hazard than WiFi as people are more likely to trip over poorly installed cabling. Poorer answers referred to 'cheaper' or 'easier to install' with no further expansion.

### Question 7

This question divided the benefits and drawbacks into two parts in an attempt to get candidates to focus on each. Most candidates could do this and some good answers were seen.

- (a) This question was quite well answered but many candidates only gave brief answers and did not gain full credit. Most candidates referred to the loss of data due to malware and the retrieval of unaffected files but references to the protection of files against, for example, a power loss affecting the main system and then the rapid access to missing files could also have been mentioned.
- (b) Again, this question was quite well answered but many candidates only gave brief answers and did not gain full credit. Descriptions were required so brief statements, e.g. 'backups can be hacked' did not gain credit. Many candidates referred to hacking when data is backed up to the cloud but did not provide any further explanation of why this might possibly be a drawback. For example, backups can be stolen in their entirety if they not encrypted so all of the data can be accessed. Good answers should have given more detail and referred to such drawbacks as backups restoring data to a time before a malware infection but the latest data is lost, and backups potentially not storing up to date data if they are run during office hours.

### Question 8

Candidates found this question very challenging. It was expected that the role of a proxy server (Section 13.1 in the syllabus refers to servers and a proxy server is a well-known server) would be well understood by candidates. However, most answers were brief and superficial. Answers could have referred to a proxy server being the gateway between an organisation's (in this case a school's) network and the internet, providing a cache of frequently used web sites/pages so that access appeared to users to be faster, or the provision of control over access by the school's networked computers to the internet. Details were required so vague answers such as 'receives electronic requests from users and goes and searches the internet for requested data' would not gain credit. While extremely detailed technical knowledge is not expected, candidates need sufficient knowledge to answer questions such as these to A Level standard.

### Question 9

- (a) This question required candidates to examine a simple network diagram and describe what hardware and software was likely to be found at various points. Most candidates could deduce that the hardware would probably be a router but few could adequately explain its role and the role of the software that could be employed at that point. Explanations require reasons so it was expected that candidates would identify the hardware and software and explain why these would be used. Good answers could have referred to the router and its role, the use of anti-malware, firewalls and encryption, with explanations and reasons why their role was important. As the question specifically asked for hardware and software, full credit could only be gained by referring to both. Candidates must read questions carefully and answer appropriately, e.g. where two topics are mentioned, candidates must refer to both.
- (b) This question required candidates to provide an explanation for staff being discouraged from using unsecured internet connections. Many candidates could provide responses that pointed out that there was no firewall present and that the company data, if not encrypted, could be at risk. The higher marks were scored by detailing the risks to the data that could arise from the lack of security.

### Question 10

This question was answered quite well, with many candidates describing the steps that would have to be taken in order to extract the image of the person from one photograph and place it into another.

### Question 11

This question was about the collection of input data, its manipulation and the display of the results using JavaScript. Some good explanations of the functioning of the code were seen, with candidates mentioning the declaration of necessary variables, the collection of the dimensions in displayed message areas, the calculation with *calc.area* and the use of *document.write()* to display the messages on screen about the area of the rectangle. Good answers ‘stepped through’ the code, explaining each stage from the declaration of the variables to the display of the result on screen.

# INFORMATION TECHNOLOGY

---

<p><b>Paper 9626/04</b> <b>Advanced Practical</b></p>
---

## General comments

Many candidates needed more experience in developing accuracy in the image editing tasks and almost all would benefit from centres prioritising coverage of database normalisation.

## Comments on specific tasks

### **Tasks 1 and 2 – image editing tasks**

In **Task 1**, candidates were required to edit an image to replace objects with what could be determined as the background and complete formerly obscured areas. This involved repairing a path, extending parts of the sea and copying the shape and design of the base of a lamp post to make it symmetrical.

The 'before' and 'after' examples in the question paper indicate that candidates needed to be aware that the accuracy of the editing was of prime importance. Candidates would benefit from more practice in using image editing tools and techniques. Tasks such as these can be well covered using very basic and open source image editing applications. These provide all the necessary tools to clone regions and to cut, flip and stitch areas with precision. Simple image editing applications are less likely to confuse beginners with the myriad of tool options and settings that are available in other packages.

In **Task 2**, candidates had to prepare an image of a pearl for use in the animation task. The background needed to be removed so that areas outside the pearl were transparent. Many candidates found this difficult and only cropped the image to the horizontal and vertical limits of the pearl. This meant the pearl showed on a white square when it appeared in the animation. However, candidates were still able to gain full credit in the animation task having made this error in task 2.

Cutting objects from backgrounds is a common requirement in image editing. Centres should provide candidates with enough experience with the necessary tools and perhaps the use of layers.

### **Task 3 – an animation task**

To complete this task successfully, candidates needed to use 'masks' to ensure the animation of the text and the pearl appeared in the required areas only. Many candidates did not have experience in masking techniques but some used quite clever alternative methods involving layers and copies of areas of the background. If the layering was sufficiently accurate, full credit could be gained. Such techniques are far more time consuming, however, and candidates would benefit from being familiar with the nature and use of masks in an animation.

Once again, accuracy was important in this task. The images shown in the question paper showed the final positions and sizes of the animated object and text. Candidates needed to be careful to match these properties with as much precision as possible. In particular, many candidates needed to pay more attention to the final position of the red text in relation to the lighthouse.



#### Task 4 – a JavaScript task

Candidates were provided with a 'scroller' that displayed a series of images when they clicked 'Next' or 'Previous' buttons. The scroller should have displayed an alert when the series of images reached the limits scrolling both forwards and back. The code had an error that meant that, on clicking 'Next' after the last image, a blank image was shown before the alert was displayed. Candidates had to realise that this was because the images were listed in an array and arrays are numbered from Zero. This meant that, although there were seven images, the last image was recognised as number six.

**Part (b)** of the task required candidates to remove the alerts and amend the code so that the scroller cycled through the images continually. This involved adding code to reset a counter when the first and last images were reached.

For **part (c)** of the task, the code had to be further amended to display corresponding text for each image. The most efficient method for this part of the task was to create another array to hold the text for each image. There was a single mark for efficiency if this method was used, but other successful solutions were acceptable.

Many candidate files indicated that candidates would benefit from greater coverage of JavaScript coding. It may be that although candidates have enough experience to carry out practice tasks, they need more opportunities to develop the problem solving and 'debugging' skills that are necessary to feel confident in tackling tasks such as these.

The last part of **Task 4** required candidates to 'evaluate the effectiveness' of the completed scroller as shown in the question paper and to list two suggestions about how it could be improved. **Evaluate** is listed as a *command word* in the syllabus glossary and so candidates should have been aware that in evaluating the scroller they needed to: 'discuss the importance of, weigh up the advantages and disadvantages, judge the overall effectiveness, weigh up your opinions.'

Whilst almost all candidates made sensible suggestions, many did not cover the functionality and ease of use of the scroller and wrote too extensively on the nature or requirements of the intended audience.

Centres could support candidates by covering or reinforcing the importance of adhering to the requirements of command words as described in the syllabus.

#### Task 5 – a database theory task

Candidates were presented with a table showing details of holiday villas and their costs.

They were tasked with proposing tables that would display the data in normalised forms and detailing their reasoning.

The original data had two villas listed in each **Villa\_Class**. Notes explained that **Service(per day)** charges were levied at 5 per cent of the **Cost(per day)** of each villa.

Candidates had to recognise and state that the data was unnormalised and no Primary Key could be set because there were multiple entries in the **Villa\_Name** field.

Whilst many candidates had heard of, and used the term 'Atomic data', very few seemed to really understand how to proceed in reconfiguring the data into 1NF.

The intended solution was to set a compound key using the **Villa\_Class** and each **Villa\_Name** fields.

An alternative solution using the creation of a new **Villa\_id** field was less efficient but could be used to satisfy the requirements of configuring the data to First Normal Form.

When required to explain why the data in this table was not in 2NF, a minority of candidates were able to explain clearly that the data in the new table was not in 2NF because the **Cost(per day)** and the **Service(per day)** fields depend on the **Villa\_Class** but not the **Villa\_Name** – i.e. are not dependent on the whole key.

Configuring the data to 2NF required candidates to create a second table comprising the **Villa\_Class**, **Cost(per day)** and **Service(per day)** fields and setting **Villa\_Class** as the primary key.

Very few candidates were able to explain that the data was not in Third Normal Form because the **Service(per day)** depends upon the **Cost(per day)** but not the **Villa\_Class** – i.e. the field is not dependent upon the primary key.

Setting the data to 3NF required candidates to create a third table using the **Cost(per day)** and **Service(per day)** fields with **Cost(per day)** as the primary key.

In general, candidates needed to demonstrate that they understood that for tables to be in 3NF:

- No non-key field depends upon another non-key field
- All non-key fields depend only on the (whole) primary key.

Full solutions to this task were seen very rarely and candidates would benefit from covering this area more extensively. The concepts involved in normalisation are important but quite difficult and candidates will need to attempt many examples before they can be confident in tackling tasks such as this one.

### Task 6 – a database task

The first part of this task was very straightforward and almost all candidates succeeded in creating the required tables and setting the relationships. However, very few candidates followed the instruction to, 'Make sure that all data types are appropriate', by considering the nature of the **TelephoneNumber** and the **CCNumber** fields. Both fields were alphanumeric in nature and should have been set as text.

The two reports required candidates to do some problem solving and, since no queries were specified, candidates had to determine what tables, fields and criteria would be needed to create the reports.

The first report required was a list of customers who had booked a villa in all three years. The second report was required to display a list of the villas that had not been booked in 2017.

Very few candidates managed to successfully create both reports. It seemed that, although candidates had enough skill to create and work with databases, not all were able to pursue the logic required to formulate correct solutions.

A number of candidates were unable to gain marks because they did not adhere to the requirements of the reports and did not present or format the data as shown in the question paper.

### In conclusion

For this session, the main issues for centres to bear in mind seem to be the need for:

- the development of image editing skills such as:
  - cloning areas
  - cutting objects by colour or shape
  - the removal of backgrounds
  - the use of layers and transparency
  - accuracy in all of the above.
- the provision of more experience for candidates in using masks in an animation
- further opportunities for candidates to develop problem solving and 'debugging' skills in JavaScript
- reinforcement of the importance of adhering to the requirements of command words as described in the syllabus
- extensive coverage of the principles of Normalisation and a wide variety of example tasks
- emphasis of the importance of determining and satisfying all requirements detailed or shown in the question paper.