

# Markscheme

**May 2022**

## **Information technology in a global society**

**Higher level**

**Paper 1**

23 pages

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### **Critical Thinking – explanation, analysis and evaluation**

These trigger words often signal critical thinking. The bold words are the key terms in the various criteria.

**Explanation** – *Because, as a result of, due to, therefore, consequently, for example*

**Analysis** – *Furthermore, additionally, however, but, conversely, likewise, in addition, on the other hand, whereas*

**Evaluation** – *My opinion, overall, although, despite, on balance, weighing up*

Examiners should be aware that in some cases, candidates may take a different approach, which if appropriate should be rewarded. If in doubt, check with your team leader.

In the case of an “identify” question read all answers and mark positively up to the maximum marks. Disregard incorrect answers. In all other cases where a question asks for a certain number of facts eg “describe two kinds”, mark the **first two** correct answers. This could include two descriptions, one description and one identification, or two identifications.

It should be recognized that, given time constraints, answers for part (c) questions are likely to include a much narrower range of issues and concepts than identified in the markband. There is no “correct” answer. Examiners must be prepared to award full marks to answers which synthesize and evaluate even if they do not examine all the stimulus material.

## Section A

### 1. Medical data shared in online apps

*Note to examiners:*

- All part (a) and (b) questions are marked using ticks and annotations where appropriate.
- Part (c) is marked using a markband. Use annotations and text comments to provide a rationale behind the marks you awarded. **Do not use ticks.**

(a) (i) Define the term *privacy*. [2]

Answers may include:

- knowing who somebody is...
- ... but not knowing what activities they are carrying out.
  
- having control over one's personal information
- ... such as the ability of individuals/groups to determine when, how and to what extent their personal information is shared with others (Guide p.21).

*Award [1] for identifying privacy and [1] for an additional comment.*

(ii) Identify **two** ways the smartwatch and cellphone (mobile phone) could use to communicate with each other. [2]

Answers may include:

- Bluetooth.
- WiFi
- Near field communication (NFC).

*Award [1] for identifying each way that the smart watch and the mobile phone could use to communicate with each other up to [2].*

(iii) State the domain name. [1]

yourhealthwatch.com

*Note to examiners: accept www.yourhealthwatch.com*

(iv) State the protocol used in the URL. [1]

https / hypertext transfer protocol secure

- (b) (i) The team developing the smartwatch app followed the project development life cycle (PDLC).

Explain why end-users should be involved in the development of products such as the smartwatch app.

[3]

Answers may include:

- End-users are able to provide an insight into how a product may function
- ... which may not be possible to obtain from in-house testing (alpha testing)
- ... as this may not expose the product to the range of situations it may be expected to function in
- ... and could be considered to be beta testing
- ... will make end-product more marketable / desirable to the end-user.
  
- End-user testing can take place in the customer's environment.
- ... allowing them to use the program under normal conditions
- ... which may allow them to find 'bugs' / features which need improving / discover new features and suggest these to the developers
- ... which may lead to making the end-users more likely to use the finished product as they are involved in its development.

*Award [1] for identifying a reason why end-users should be involved in the development of products such as the smartwatch app and [1] for each subsequent development of that reason up to [3].*

*Note to examiners: the development of one idea with two additional points that develop it.*

- (ii) Explain why a feasibility study would be used in the development of products such as the smartwatch app.

[3]

Answers may include:

- Feasibility studies can provide the parameters for the development of a product.
- This may provide / set constraints that the developers can work within.
- ... and may prevent the development going in directions that may prove to be unsustainable.
- Determine the technical viability.
- Determine the economic viability.
- Determine how much time the project may take.

*Award [1] for identifying a reason why a feasibility study would be used in the development of products such as the smartwatch app and [1] for each subsequent development of that reason up to [3].*

*Note to examiners: the development of one idea with two additional points that develop it.*

- (c) Many people use smartwatches to monitor their vital signs and manage their health.

To what extent should an individual use a smartwatch to manage their health?

[8]

Answers may include:

**Advantages:**

- Patients will be able to keep abreast of their vital signs / medical condition 24/7.
- This can lead to them having less need to go to the doctors or to use valuable health resources if the condition is not serious.
- All the historical data may be captured.
- The data will be more comprehensive than if it is only collected in a consultation with a doctor.
- Which may mean it is easier to spot trends / abnormalities.
- Might allow users to better manage illnesses which can be controlled, like diabetes and high blood pressure.
- Allows users to maintain a healthy lifestyle as their vital signs can show the benefits of healthy activity e.g., exercise, good sleep, eating well etc.

**Disadvantages:**

- The app might suggest treatments which are not appropriate if the user's symptoms do not match the 'average' symptoms for a particular condition.
- Users of the smartwatch may become fixated by it, which could have negative effects (white coat syndrome).
- May be unreliable - may be lost or damaged or experience software bugs which make them unreliable.
- Technology in a smart watch may not provide accurate enough readings for medical use.
- The user may not want to use the watch because they are worried about what might happen to the data which the watch generates i.e. could be sold to or shared with third parties / used against them by insurance companies or potential employers etc.

*In part (c) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.*

*Please see generic markband on page 23.*

## 2. Investigation of ocean disasters

*Note to examiners:*

- All part (a) questions and part (b)(i) are marked using ticks and annotations where appropriate.
- Part (b)(ii) and the part (c) questions are marked using a markband. Use annotations and text comments to provide a rationale behind the marks you awarded. **Do not use ticks.**

(a) The voyage data recorder (VDR) records weather conditions during a voyage.

- (i) Identify **two** sensors that may be used to detect data about the weather conditions. [2]

Answers may include:

- (Atmospheric) pressure
- Temperature
- Wind (speed/direction)
- Humidity
- Rain / precipitation / water level (BOD)
- Sunlight

*Award [1] for identifying each sensor that may be used to detect data about weather conditions up to a maximum of [2].*

- (ii) State the primary key in the Ship table in **Figure 3**. [1]

Ship\_ID

- (iii) State the relationship between the Ship table and Accident table in **Figure 3**. [1]

One – many

- (iv) Outline **one** advantage of using a relational database rather than a flat-file database. [2]

Answers may include:

- Any item of data is only entered once.
- ... which eliminates redundant data.
  
- Removing redundant data
- ... reduces the amount of storage space needed for the database.
- ... reduces the chance of an error occurring.
  
- Normalization
- ... reduces the chance of anomalies (eg update / deletion / insertion).
  
- Improves security of the data
- ... as different permissions can be added to different tables.

*Award [1] for identifying an advantage of a relational database rather than a flat-file database and [1] for a development of that reason up to [2].*

(b) (i) Distinguish between data validation **and** data verification. **[2]**

Answers may include:

- Data validation is the process of ensuring the data entered is valid (clean, correct and useful) using computer based rules (e.g. presence check, length check, type check, range check etc).
- Data verification is the process of checking what has been entered is correct compared to the original (integrity) or by entering the data twice and comparing the instances of the data entry.

*Award [1] for a definition of data validation.*

*Award [1] for a definition of data verification.*

(ii) The MADAS system uses data visualization.

Explain why data visualization is used by the MADAS system. **[4]**

Answers may include:

- Visualization is story telling with images, graphs and charts.
- It uses mathematical operations to model events.
- This enables complex data to be presented in a way that can be easily understood.
- This allows the easy identification of trends
- ... to make connections between operations and results
- ... to identify future problems which may arise / predict accidents.

Marks	Level descriptor
0	No knowledge or understanding of ITGS issues and concepts. No use of appropriate ITGS terminology.
1–2	A limited response that indicates very little understanding of why data visualization is used by the MADAS system. Uses little or no appropriate ITGS terminology. No reference is made to the scenario.
3–4	An explanation of why data visualization is used by the MADAS system. There is appropriate ITGS terminology throughout the response. Explicit and relevant references are made to the scenario.



- (c) To what extent can the use of simulations like the MADAS system help prevent future accidents?

[8]

Answers may include:

Advantages:

- There is a lot of data and if this is put together usefully then the causes of the accident can be better understood.
- Understanding the accident will mean that mitigation strategies can be developed.
- If the simulation was part of a training program then the simulations could be used to teach future boat pilots how to avoid the same kind of accidents.
- Cheaper to run a situation through a simulation to see what will happen than to wait for it to happen in real life.
- The information from the model and simulation may allow the authorities to make changes to the regulations.
- “What if” simulation can be easily run to observe the effects of changes in behaviour or conditions.

Disadvantages:

- Simulations are only as accurate as the data which is given to them. GIGO.
- Simulations might be biased because they have been created by a particular organisation / company.
- Simulations are not the real thing so even if a person has trained on a simulation, there is no guarantee that this will mean they will know what to do if facing a possible accident.
- Too many variables to account for and it is unclear which of these might have made the accident worse or better.

*In part (c) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.*

*Please see generic markband on page 23.*

**3. Schools told not to use cloud computing software applications**

*Note to examiners:*

- All part (a) and (b) questions are marked using ticks and annotations where appropriate.
- Part (c) is marked using a markband. Use annotations and text comments to provide a rationale behind the marks you awarded. **Do not use ticks.**

- (a) (i) Identify **two** types of cloud computing software applications that students might use at school. [2]

Answers may include:

- Word processor: Google Docs / Microsoft Word.
- Spreadsheet: Google Sheets / Microsoft Excel.
- Email: Gmail / MS Outlook.
- Presentation: Google Slides / MS PowerPoint.
- Web site design: Google Sites.
- Calendars: Google Calendar.
- Online forms: Google Forms / MS Forms.
- Collaboration tools: Microsoft Teams / Google Classroom.
- Storage apps: Microsoft OneDrive / Google Drive
- Video Communication: Zoom, Skype, Teams, Meet etc.
- Learning Management Systems: Blackboard/ Moodle / Powerschool / Canvas / Schoology etc.

*Award [1] for identifying each application up to [2].*

*Note to examiners:*

*DO NOT accept Microsoft Office / Office 365 / Google Workspace / Gsuite as these are mentioned in the stimulus materials on the question paper.*

- (ii) If the schools in Hesse can no longer use cloud computing software applications, they will need to store their data on a local file server and access it through a local area network (LAN).

Identify **two** ways in which data could be secured if the school stored it locally. [2]

Answers may include:

- Different levels of access
- Login (username and password / biometrics)
- Firewalls, proxy server
- Encryption
- Audit trails
- Anti-virus / anti-malware software
- Physical security of the servers

*Award [1] for identifying each way the data can be stored securely up to [2].*

- (iii) The change from cloud computing software applications may require the school to change the type of licence they need to purchase.

Identify **two** types of licence that the school could purchase to allow them to install and run software applications on their local area network (LAN).

**[2]**

Answers may include:

- Site / school
- Concurrent
- Multi user
- Single user
- Educational licence
- Volume Licence

*Award **[1]** for identifying each licence type up to **[2]**.*

- (b) The European Union's (EU) General Data Protection Regulation (GDPR) governs data protection and privacy in the EU. Its regulations give users certain rights in terms of their data.

Explain **three** principles that should be included in data protection regulations such as GDPR.

**[6]**

Answers may include:

- The right to know who has access to my data
- ... and for the purposes it is being used for.
  
- The level of security used to protect the data
- ... so only appropriate users of the data have access.
  
- The purpose that the data will be used for
- ... will it be shared with third parties.
  
- Data will not be processed without informed consent from the owner
- ... unless there is a legal requirement to process the data
  
- Requires that the holder of the data controller provides information to the data subject
- ... in a concise, transparent, intelligible and easily accessible form, using clear and plain language.
  
- The data subject has the right to be forgotten
- ... so data can be deleted after it has served its required purpose.
  
- Data should be stored on a server within the same country or within a country with similar data protection legislation in place.
- ... so that the owner of the data is sure that its security remains protected.

*Award [1] for identifying a principle that should be included in data regulation principles such as GDPR and [1] for a development up to [2].*

*Mark as [2] + [2] + [2].*

- (c) A new school has opened in Switzerland and its IT Manager is considering two options:
- **Option 1:** Using a local client–server network.
  - **Option 2:** Using a cloud-based service.

Evaluate the implications of these two options for the IT Manager.

[8]

Answers may include:

**Option 1:**

**Advantages**

- The management of the client-server network can be carried out in-house which will mean the way in which the network is set up can be tailored to the school's needs.
- There will be fewer costs to external agencies for the upkeep of the network i.e. there is no monthly fee / subscription fees etc. Which will need to be managed by the IT Manager.
- The IT Manager will have complete knowledge about where their data is held.
- A client-server network allows in-house control of backup and security (this could be argued from both sides depending on the competency of the IT staff).

**Disadvantages**

- The hardware costs for network infrastructure as well as software licencing costs will need to be paid by the school and managed by the IT manager.
- IT manager will need to employ staff who can manage the network and maintain the hardware or arrange for this to be outsourced.

**Option 2:**

**Advantages**

- The management of the client-server network can be carried out remotely by the cloud service provider which will mean that IT Manager will not have to carry out a number of tasks linked to the maintenance of the network.
- The cloud-based provider will provide backing up facilities as part of the service so the IT Manager will not have to address this issue.
- The cloud-based provider will be able to provide up to date versions of software and services more efficiently than the IT Manager who may have to buy them in after carrying out due diligence.

**Disadvantages**

- Increasing the storage capacity of the network would be easily done by requesting this from the cloud service provider. No addition hardware or infrastructure will be required.
- There will still be a need to have some hardware and software on site (for example print servers) which will need to be purchased and maintained by the IT manager.

*In part (c) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.*

*Please see generic markband on page 23.*

## Section B

### 4. Cameras in school

*Note to examiners:*

- All part (a) questions are marked using ticks and annotations where appropriate.
- Part (b) and Part (c) questions are marked using a markband. Use annotations and text comments to provide a rationale behind the marks you awarded. **Do not use ticks.**

- (a) (i) Identify the steps used by the facial recognition software to identify an individual student.

[4]

Answers may include:

- The image of the student is captured, i.e., with a camera.
- The system transforms analog information into a set of digital information based on the person's facial features.
- The image is stored in a database.
- In the classroom, the facial recognition software scans its range of vision until it detects a face.
- During the lesson, the software measures key features of the face (distance between the eyes, width of the nose, *etc.*).
- 3D facial recognition can use features of the face, such as curves of the nose and chin.
- The software matches the student's face with the one stored in the database.

*Award [1] for each step used by the facial recognition software to identify an individual student identified up to [4] max.*

- (ii) A data flow diagram was used in the development of the facial recognition software.

Identify **two** characteristics of a data flow diagram.

[2]

Answers may include:

- Graphic representation of the flow of data through a system.
- That includes inputs and outputs.
- States the processes used in the system.
- Uses specific symbols to represent inputs, processes, outputs *etc.*
- Can be used to analyse a system or create a model for a new system.

*Award [1] for each characteristic of a data flow diagram identified up to [2] max.*

(b) The school’s IT manager has received a report of several IT-related incidents that occurred in the last week.

- Incident 1: Students installed and played a video game during a history lesson.
- Incident 2: The facial recognition software detected that students appeared to be talking a lot in a French class.
- Incident 3: There was an unreliable internet connection during the streaming of a video as part of a biology lesson.
- Incident 4: Internet connection was lost just as final-year geography students were about to begin online examinations.

Explain how the IT manager could determine the order of priority for these four incidents.

[6]

Answers may include:

- The extent to which the incident affects student learning, the more students affected will mean the incident would be assigned a higher priority.
- Any incident that is a potential threat to the security of the school network would be assigned a higher priority
- If the incident could have a negative effect on the image/reputation of the school, it would be assigned a higher priority
- If the incident is frequent, it may be assigned a higher priority unless it does not have a direct impact on student learning.
- If the incident is intermittent, its effects on student learning will need to be assessed. Depending on this, it may be assigned a high priority.
- Priority may be assigned based on who is affected,
  - loss of internet access in a year 1 class would be a lower priority than in a year 12 class
  - loss of internet access during lunchtime computer club would be a lower priority than loss of access during an online exam.

Marks	Level descriptor
0	No knowledge or understanding of ITGS issues and concepts. No use of appropriate ITGS terminology.
1–2	A limited response that indicates very little understanding of the topic or the reason is not clear. Uses little or no appropriate ITGS terminology. No reference is made to the scenario in the stimulus material. The response is theoretical
3–4	A description of the possible criteria that could be used to assign the priority level of an incident. There is some use of appropriate ITGS terminology in the response.
5–6	An explanation of the possible criteria that could be used to assign the priority level of an incident. Explicit and relevant references are made to the scenario in the stimulus material. There is appropriate ITGS terminology throughout the response.

- (c) Discuss whether Flynn School should introduce a facial recognition system that uses machine learning to analyse each student’s behaviour and give them a score that is automatically emailed to their parents.

[8]

Answers may include:

**Advantages** of implementing the facial recognition system:

- May provide reassurance to students and parents about their safety while at school.
- May provide useful information to the school that could be used to feedback into possible teaching and learning strategies
- May provide additional supporting evidence if there is a difference of opinions
- May reduce the need for teachers to have to register students at the start of lessons or the beginning/end of each day, ie freeing up staff time
- May be able to create attendance/lateness reports if necessary.
- May motivate students to work harder, participate frequently.

**Disadvantages** of implementing the facial recognition system:

- May be seen as intrusive by students and teachers.
- May be used as part of the management of teachers
- May not pick up the nuances in student and teacher interaction, for example, the context of the behaviour may be important, and this will not be picked up by the facial recognition system
- Will teachers and students “game” the system, so the teaching and learning experience may be geared to satisfy the algorithms used in the facial recognition software.
- Cost of implementation – hardware, software.

*In part (c) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.*

*Please see generic markband on page 23.*



## 5. Robotic Surgery

*Note to examiners:*

- All part (a) and (b) questions are marked using ticks and annotations where appropriate.
- Part (c) is marked using a markband. Use annotations and text comments to provide a rationale behind the marks you awarded. **Do not use ticks.**

(a) (i) System developers use prototypes as part of the development process.

Identify **two** characteristics of a prototype.

[2]

Answers may include:

- Early working model of a system or subsystem.
- Used to test the system (*eg* interface, functioning).
- Used to demonstrate how the system will work.
- Used to check whether the systems will meet the target user's requirements.

*Award [1] for each characteristic of a prototype identified up to [2].*

(ii) Identify **two** characteristics of alpha testing.

[2]

Answers may include:

- First testing of new software but done toward the end of the development process.
- Main goal is to refine the quality of the product by fixing bugs/problems before they affect the final product.
- Generally done in house, *ie* not by users who don't work for the company.
- Usually done by a group that is not part of the design team.
- Determines if the software is ready for beta testing.

*Award [1] for identifying each characteristic of alpha testing up to [2].*

(iii) Identify **two** characteristics of beta testing.

[2]

Answers may include:

- Last test of new hardware or software prior to release.
- Main goal is to refine the product by fixing bugs/problems not found in alpha testing.
- Carried out by external stakeholders rather than in house.

*Award [1] for identifying each characteristic of beta testing up to [2].*

- (b) (i) The surgical robot uses machine learning software that utilizes neural networks.

Explain why neural networks are utilized in the machine learning process.

**[3]**

Answers may include:

- Neural networks are adept at analysing images so the movements in multiple surgical procedures can be analysed.
- Neural networks can rearrange the connections between “neurons”, so they can change and learn.
- Neural networks require training before they become useful; the data collected during the surgery can be used.
- Neural networks learn by trial and error, so it can respond to new situations and therefore improve practice over time.
- Machine learning requires the software to learn from experience.

*Award [1] for each statement that explains why neural networks are used in the machine learning process up to [3].*

- (ii) Explain why an agile project management methodology would be used in the development of the software for a surgical robot.

**[3]**

Answers may include:

- Changes in software development in this field occur very rapidly.
- This means that the nature / scope/ direction of the project may change quickly.
  
- The project management methodology used must be sufficiently adaptable to be able to cope with the changes.
- So the Waterfall project management methodology will not be appropriate as there is not allowance.
  
- The project is broken down into small tasks
- This allows teams to work independently and deliver the product faster.

*Award [1] for each statement that explains why an agile project management methodology would be used in the development of the software for a surgical robot up to [3].*

- (c) In 2020, a patient died while undergoing a surgical procedure in which a surgical robot was used. A court case followed to determine who was accountable.

Discuss whether the surgeon, the manufacturer of the surgical robot, or the hospital manager should be held accountable.

[8]

Answers may include:

The **surgeon** is accountable if:

- it can be proved that they did not use the robotic tools appropriately
- they conducted the operation without having completed the required training courses
- they didn't have enough experience with the robotic equipment.

The **manufacturer of the surgical robot** is accountable if:

- it can be proved that the robot has failed (*ie*, been unable to complete the task that the manufacturer has claimed it is able to do)
- the robot has been sold to the hospital with claims that it is able to carry out tasks it cannot perform
- parts in the robot have not functioned properly
- there are errors in the software that created the problem
- a component of the robot was deemed defective but was not recalled
- the robot itself has caused an injury, *eg* unintended cauterizing burns from the robot's cauterizing tool.

The **hospital manager** is accountable if:

- the surgeon has not been given sufficient training to be able to competently use the robot
- the robot has been purchased and used in the hospital without due diligence
- the system has not been properly maintained
- something that was critical to the system was not in the patient's medical record at the hospital.

*In part (c) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.*

*Please see generic markband on page 23.*

## 6. Marlowe sees the vet

*Note to examiners:*

- All part (a) questions and part (b)(i) are marked using ticks and annotations where appropriate.
- Part (b)(ii) and the part (c) questions are marked using a markband. Use annotations and text comments to provide a rationale behind the marks you awarded. **Do not use ticks.**

- (a) (i) Identify **two** components of an expert system. [2]

Answers may include:

- Inference engine
- Knowledge base
- User interface

*Award [1] for each component of an expert system up to [2].*

- (ii) Identify **two** reasons why a prototype of the *East Side Vets* expert system would have been developed before its release. [2]

Answers may include:

- Allows the developers to see potential strengths and weaknesses.
- Allows the developers to make changes based on real user interactions.
- Allows the developers see failures before it is released.

*Award [1] for each reason why a prototype was developed up to [2].*

- (iii) The vets have found that many pets have multiple conditions, and they are considering upgrading the expert system to one that uses fuzzy logic.

Identify **two** reasons why the *East Side Vets* expert system should use fuzzy logic. [2]

Answers may include:

- Pet's symptoms are often rather vague and cannot be described as true or false.
- Fuzzy logic measures the degree to which a PET OWNERS statement can be correct.
- Fuzzy logic can deal with uncertainty.
- Mimics how a person would make a decision.

*Award [1] for each reason why should be used up to [2].*

- (b) (i) Explain why forward chaining is used in the *East Side Vets* expert system. [2]

Answers may include:

- Forward chaining starts with the data and uses inference rules to arrive at a goal.
- The final goal has not been determined.
- This is typical of a pet owner trying to determine whether the pet needs to visit the vet.

*Award [1] for each distinct part of an explanation of why forward chaining would be used in the expert system up to [2].*

- (ii) When the *East Side Vets* expert system was introduced, a direct changeover methodology was used rather than a phased changeover.

Explain why a direct changeover methodology was used to introduce the new system.

[4]

Answers may include:

- Direct changeover is cheaper than using a phased changeover.
- The time for the direct changeover is quicker than using a phased changeover.
- The new system may be completely different to the previous system, so using both may confuse staff at the vets; for example, the previous system may not be computerized or it may not be possible to transfer information from the old system to the new one.
- Having two systems in operation may not be cost effective / ineffective use of staff time.

Marks	Level descriptor
0	No knowledge or understanding of ITGS issues and concepts. No use of appropriate ITGS terminology.
1–2	An outline of why a direct changeover methodology was used. There is some use of appropriate ITGS terminology in the response.
3–4	An explanation of why a direct changeover methodology was used. Explicit and relevant references are made to the scenario in the stimulus material. There is appropriate ITGS terminology throughout the response.

- (c) To what extent does the use of the expert system by *East Side Vets* provide benefits for both the vets **and** their customers?

[8]

Answers may include:

**Advantages for the vet:**

- The range of animals seen at the vets is small, so the expert system should save staff wasting time by answering the same questions.
- Reduces the number of appointments that may need to be made, so saving time that will allow office staff to deal with other issues.
- Provides initial information so vet can prepare for the visit.
- Allows the vet to prioritize treatment of animals based on the information provided by the expert system.

**Disadvantages for the vet:**

- Buying the software may be an unnecessary expense, especially if the vet practice is small.
- May need to invest in training for staff and troubleshooting if the expert system provides inaccurate information.
- Is the expert system necessary?
- May be seen by pet owners as having a less human approach.

**Advantages for the customer:**

- Provides an instant response.
- Saves time and money if the pet does not need to see the vet.
- If the pet needs treatment, it should get it faster, as the expert system will have already prioritized the case.

**Disadvantages for the customer:**

- May not trust the expert system, or may still want to see the vet after the output suggests otherwise.
- Removes the option of asking questions of the vet or the assistant.
- If the system is incorrect, their pet could suffer.

*In part (c) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.*

*Please see generic markband on page 23.*

**SL and HL paper 1 part (c) and HL paper 3 question 3 markband**

Marks	Level descriptor
<p><b>No marks</b></p>	<ul style="list-style-type: none"> <li>• A response with no knowledge or understanding of the relevant ITGS issues and concepts.</li> <li>• A response that includes no appropriate ITGS terminology.</li> </ul>
<p><b>Basic 1–2 marks</b></p>	<ul style="list-style-type: none"> <li>• A response with minimal knowledge and understanding of the relevant ITGS issues and concepts.</li> <li>• A response that includes minimal use of appropriate ITGS terminology.</li> <li>• A response that has no evidence of judgments and/or conclusions.</li> <li>• No reference is made to the scenario in the stimulus material in the response.</li> <li>• The response may be no more than a list.</li> </ul>
<p><b>Adequate 3–4 marks</b></p>	<ul style="list-style-type: none"> <li>• A descriptive response with limited knowledge and/or understanding of the relevant ITGS issues and/or concepts.</li> <li>• A response that includes limited use of appropriate ITGS terminology.</li> <li>• A response that has evidence of conclusions and/or judgments that are no more than unsubstantiated statements. The analysis underpinning them may also be partial or unbalanced.</li> <li>• Implicit references are made to the scenario in the stimulus material in the response.</li> </ul>
<p><b>Competent 5–6 marks</b></p>	<ul style="list-style-type: none"> <li>• A response with knowledge and understanding of the relevant ITGS issues and/or concepts.</li> <li>• A response that uses ITGS terminology appropriately in places.</li> <li>• A response that includes conclusions and/or judgments that have limited support and are underpinned by a balanced analysis.</li> <li>• Explicit references to the scenario in the stimulus material are made at places in the response.</li> </ul>
<p><b>Proficient 7–8 marks</b></p>	<ul style="list-style-type: none"> <li>• A response with a detailed knowledge and understanding of the relevant ITGS issues and/or concepts.</li> <li>• A response that uses ITGS terminology appropriately throughout.</li> <li>• A response that includes conclusions and/or judgments that are well supported and underpinned by a balanced analysis.</li> <li>• Explicit references are made appropriately to the scenario in the stimulus material throughout the response.</li> </ul>