T Level Technical Qualification in Digital Business Services

Core knowledge and understanding

Paper B

Mark scheme

NCFE

This mark scheme has been written by the assessment writer and refined, alongside the relevant questions, by a panel of subject experts through the external assessment writing process and at standardisation meetings.

The purpose of this mark scheme is to give you:

- examples and criteria of the types of response expected from a student
- information on how individual marks are to be awarded
- the allocated assessment objective(s) and total mark for each question.

Marking guidelines

General guidelines

You must apply the following marking guidelines to all marking undertaken throughout the marking period. This is to ensure fairness to all students, who must receive the same treatment. You must mark the first student in exactly the same way as you mark the last.

- The mark scheme must be referred to throughout the marking period and applied consistently. Do not change your approach to marking once you have been standardised.
- Reward students positively giving credit for what they have shown, rather than what they might have omitted.
- Utilise the whole mark range and always award full marks when the response merits them.
- Be prepared to award zero marks if the student's response has no creditworthy material.
- Do not credit irrelevant material that does not answer the question, no matter how impressive the response might be.
- When allocating marks across assessment objectives (AOs) within an individual response, these should logically link and should not be from disparate points of indicative content provided in the mark scheme.
- The marks awarded for each response should be clearly and legibly recorded in the grid on the front of the question paper.
- If you are in any doubt about the application of the mark scheme, you must consult with your team leader or the chief examiner.

Guidelines for using extended response marking grids

Extended response mark grids have been designed to assess students' work holistically. They consist of band-based descriptors and indicative content.

Band-based descriptors: each band is made up of several descriptors for across the AO range; AO1-AO3, which when combined provide the quality of response that a student needs to demonstrate. Each band-based descriptor is worth varying marks.

The grids are broken down into bands, with each band having an associated descriptor indicating the performance at that band. You should determine the band before determining the mark. Indicative content reflects content-related points that a student may make but is not an exhaustive list. Nor is it a model answer. Students may make all, some or none of the points included in the indicative content as its purpose is as a guide for the relevance and expectation of the responses. Students must be credited for any other appropriate response.
Application of extended response marking grids

When determining a band, you should use a bottomup approach. If the response meets all the descriptors in the lowest band, you should move to the next one, and so on, until the response matches the band descriptor. Remember to look at the overall quality of the response and reward students positively, rather than focussing on small omissions. If the response covers aspects at different bands, you should use a best-fit approach at this stage and use the available marks within the band to credit the response appropriately.

When determining a mark, your decision should be based on the quality of the response in relation to the descriptors. You must also consider the relative weightings of the assessment objectives, so as not to over/under credit a response. Standardisation materials, marked by the Chief Examiner, will help you with determining a mark. You will be able to use exemplar student responses to compare to live responses, to decide if it is the same, better, or worse.

You are reminded that the indicative content provided under the marking grid is there as a guide, and therefore you must credit other suitable responses a student may produce. It is not a requirement either that students must cover all the indicative content to be awarded full marks.

Assessment objectives

This assessment requires students to:

AO1: Demonstrate knowledge and understanding of the digital business services sector
AO2: Apply knowledge and understanding of the digital business services sector to different situations and contexts
AO3: Analyse and evaluate information and issues related to the digital business services sector

The weightings of each assessment objective can be found in the qualification specification.

Section A: Tools and testing　　　　　　　　　　**Total for this section: 23 marks**

1	Define the term 'concept testing'.
	[1 mark]

AO1 = 1 mark

Award **one** (AO1) mark for a definition of concept testing:

- asking customers questions about an idea for a new service to find their views (1)
- having an idea evaluated by its target market before it is developed (1).

Accept any other suitable response.

2	Give one **possible use of budget sheets.**
	[1 mark]

AO1 = 1 mark

Award **one** (AO1) mark for a possible use of budget sheets:

- controlling spending (1)
- providing targets for managers / staff (1)
- informing resource planning (1)
- forecasting (1)
- expense tracking (1).

Accept any other suitable response.

3	Elle Sar is a fashion brand that produces custom clothes based on designs created on a website. The business is launching a new version of its website, but it is currently going through a process of black box testing.
	A range of users are inputting designs with different parameters into the site. This is being done from a range of devices and web browsers. The number of users logged in at the same time is being steadily increased. This has put a lot of strain on the server hosting the site.
	a) Describe what black box testing is.
	[1 mark]
	b) Explain one **way Elle Sar might use black box testing.**
	[2 marks]

AO1 = 1 mark
AO2 = 2 marks

a) Award **one** (AO1) mark for a description of what black box testing is:

- black box testing tests inputs and outputs against expected results (1)
- black box testing measures the functional requirements of a system (1)
- black box testing is used to examine the functionality of an application or website (1 AO1).

b) Award **one** (AO2) mark for each explanation point of a way that Elle Sar might use black box testing, up to a maximum of **two** marks.

- Elle Sar staff can identify edge cases that might affect the operation of the site and the quality of the output (1) by inputting the simplest designs and the most complex designs to ensure that the output is as expected (1).
- Elle Sar could use this type of testing to check the level of functionality across different web browsers and devices (1) to ensure that the user experience remains consistent even though the increased customer use has put strain on the server (1).

Accept any other suitable response.

4	**Coronado Cross is a popular tourist attraction. The IT manager has recently discovered that the online booking system for the business is not working correctly.**
	Upon closer inspection alongside a developer, they have noticed that queries to the database containing existing bookings are not showing on the customer-facing web portal, making it appear that dates and times are available when they are already booked.
	a) Identify two **processes of root cause analysis that could be used by Coronado Cross.**
	[2 marks]
	b) Explain how one **of the identified processes could be used to solve the problems with the booking system.**
	[2 marks]

AO1 = 2 marks
AO2 = 2 marks

a) Award **one** (AO1) mark for each identified stage in the root cause analysis process, up to a maximum of **two** marks:

- define the problem (1)
- collect data relating to the problem (1)
- identify what caused the problem (1)
- prioritise the causes (1)
- identify solutions to the underlying problem (1)
- implement the change (1)

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- monitor and sustain (1).

b) Award **one** (AO2) mark for each explanation point of how the stage of the root cause analysis process identified could be used to solve the problems with the booking system, up to a maximum of **two** marks.

- The IT manager could define the problem by explaining the issues around the existing bookings not appearing correctly (1) in order for the developer to understand what needs to be done to solve the problem with the booking system (1).
- The IT manager could identify the cause of the problem by analysing the flow of data from the database to the web portal (1) in order to identify appropriate solutions that will fix the link between the database and the website (1).

Accept any other suitable response.

5	T.A.W. is a logistics company that operates in the furniture market. The company has expanded from working nationally in the UK to working with manufacturers and retailers in 40 countries. The expansion means that new evaluation tools are needed to measure the success of the business. The business has a website which provides information to customers from around the world. T.A.W. has a database of market intelligence, which holds over 50 million records and a large amount of unstructured data. The business has a management information system which contains financial data relating to different business activities. **a) Identify** two **evaluation tools.** [2 marks] **b) Explain how** one **of the identified evaluation tools would be appropriate for the needs of T.A.W.** [2 marks]

AO1 = 2 marks
AO2 = 2 marks

a) Award **one** (AO1) mark for each evaluation tool identified, up to a maximum of **two** marks:

- marketing analytics tools / search analytics / social media analytics (1)
- financial analytics tools (1)
- reporting tools (1)
- data mining (1).

b) Award **one** (AO2) mark for each explanation point of how an identified evaluation tool would be appropriate for the needs of TAW, up to a maximum of **two** marks.

- Data mining will allow the business to analyse the 50 million records (1) which will enable the business to gain insights into business performance (1).

- Managers could use financial analytic tools to visualise monetary data and drill down into key indicators (1), allowing them to explore the financial performance of different parts of the business to ensure that profitability targets are met (1).

Accept any other suitable response.

6	**C Doktor is a business that offers customers an online app that provides health services.**
	The business currently has a high wage bill. Many staff complain that meetings are unnecessary and repetitive. Currently, only around 25% of server capacity is needed from day to day.
	Explain two **ways that the lean project management framework could be used by managers of C Doktor to improve the business.**
	[4 marks]

AO2 = 4 marks

Award **one** (AO2) mark for each explanation point of a relevant aspect of how lean project management could be used by the managers of C Doktor, up to a maximum of **four** marks.

- Examples of wastage such as the limited use of server capacity, could be identified (1), leading to a reorganisation of the server or an expansion of demand to ensure that this resource is not wasted (1).
- Processes could be improved, such as the hiring of staff to ensure the business gets good value from its large wage bill (1) leading to the business only hiring the most effective and productive workers into key roles such as software developers (1).
- Wasted staff activity could be identified (1) this will reduce the amount of time that staff spend in unnecessary meetings meaning that less time is wasted, and staff are more productive as a result (1).

Accept any other suitable response.

7	**W.Donovan is an antiques business, selling rare objects online. The business is planning to launch a new app which will help people find out the value of items that they are thinking about selling.**
	Assess ways that W. Donovan could utilise usability testing to identify and resolve issues before the app is launched.
	[3 marks]

AO3 = 3 marks

Award **one** (AO3) mark per assessment point relating to the ways that usability testing could be used to identify and resolve issues before the app is launched, up to a maximum of **three** marks.

- Usability testing may identify a lack of responsiveness which would mean that the developers would need to return to the base code and address any bugs which would make the software lag when users try to access the antique marketplace (1). Usability testing may identify that the interface is hard to use which would mean that UI designers would need to take the feedback from the testing and redesign the antique selling app, so that users can have a more intuitive experience that will allow them to sell their antiques more easily (1). Usability testing may identify that the app does not have the expected functionality, indicating that there would be a need for the developers to undertake a process of root cause analysis to find and address the problem (1).

Accept any other suitable response.

8	**Sparden Comms is a community group that has recently opened a community space which offers a café, space for meetings and rooms for community groups. Sparden Comms has a very community-focused approach to running the space and they want to ensure that as many local residents as possible are able to contribute their opinions on how the space is being used. Sparden Comms are considering using discussion threads to enable them to collect the opinions of the local residents.**
	Discuss to what extent discussion threads will be the best collaborative tool for Sparden Comms to use in collecting local opinions.
	• Your response must include reasoned judgements.
	[3 marks]

AO3 = 3 marks

Award **one** (AO3) mark for each discussion point about the extent to which discussion threads would be the best collaborative tool, up to a maximum of **three** marks.

- Discussion threads may allow non-local residents to contribute their opinions, which Sparden Comms would then need to filter out if they can (1) and it would also rely on the local residents knowing about the discussion thread and having the digital access to be able to use it, otherwise the opinions gathered would be biased (1). Discussion threads would be a good way for Sparden Comms to collect the opinions of the local residents as they can set up the thread and allow people to respond when they want and they can get detailed feedback as it will use open questioning (1).
- The discussion thread would also allow local people to give their opinions anonymously as they can choose a username so they can give honest opinions (1), however, the threads will need the business to do a lot of initial marketing to raise awareness of them and they may need to hire someone to moderate the threads to make sure there is no poor behaviour on there (1). Discussion threads would be good for collecting opinions as Sparden Comms could set up a different thread for each issue they want opinions on, so it would be easy and cheap to get local opinions compared to doing a survey (1).

Accept any other suitable response.

Section B: Legislation and security　　　　　**Total for this section: 37 marks plus 3 marks for QWC**

9	**Identify** two **technical threats to a business.**
	[2 marks]

AO1 = 2 marks

Award **one** (AO1) mark for each stated technical threat to a business, up to a maximum of **two** marks:

- botnets (1)
- denial-of-service (DoS) (1)
- distributed denial-of-service (DDoS) (1)
- hacking (1)
- malware (1)
- malicious spam (1)
- buffer overflow (1).

Accept any other suitable response.

10	**Henry Jones and Partners is a law firm. The business has had a number of complaints from staff about violations of their rights under the Human Rights Act 1998. Managers at the business often ask unnecessary questions about the personal lives of staff. Staff who work from home must have their webcams on as they work and be visible to managers at all times.**
	a) Identify two **key features of the Human Rights Act (1998).**
	[2 marks]
	b) Explain how one **of these key features protects the staff of Henry Jones and Partners.**
	[2 marks]

AO1 = 2 marks
AO2 = 2 marks

a) Award **one** (AO1) mark for each identified feature of the Human Rights Act (1998), up a maximum of **two** marks:

- governs an individual's right to privacy (1)
- governs surveillance (1).

b) Award **one** (AO2) mark for explaining how each key feature protects the staff of the business, up to a maximum of **two** marks.

- An individual's right to privacy means that managers at Henry Jones and Partners would need to respect the staff's right to privacy by not asking personal questions (1), or that staff would be protected if they chose not to answer / to report the incident (1).
- Under the governance of surveillance, managers would not be allowed to insist that staff leave their webcams on at all times (1), so staff who work from home should have the option of turning their webcam off (1).

Accept any other suitable response.

11	**Vinnick is a consultancy firm that specialises in advising small firms on data visualisation and processing. The company accepts payments via a web portal. They work with companies in the telecoms industry and with electrical engineers. The company works within several relevant industry standards.** **a) State** two **industry standards.** [2 marks] **b) Explain how** one **identified industry standard might affect the operations of Vinnick.** [2 marks]

AO1 = 2 marks
AO2 = 2 marks

a) Award **one** (AO1) mark for each industry standard given up to a maximum of **two** marks:

- IETF (Internet Engineering Task Force) (1)
- RFC (Request for Comments) (1)
- EIA / TIA (Electronic Industries Alliance / Telecommunications Industry Association) (1)
- IEEE (Institute of Electrical and Electronics Engineers) (1)
- PCISSC (Payment Card Industry Security Standards Council) (1)
- International Organization for Standardization (ISO) (1)
- British Standard (BS).

N.B. accept abbreviations

a) Award **one** (AO2) mark for each explanation point of how the identified industry standard might affect the operations of Vinnick, up to a maximum of **two** marks. For example:

- PCISSC rules govern the way that payments will be taken through the web-portal operated by Vinnick (1) meaning that Vinnick will have to meet high standards of security for accepting payments (1)
- IEEE / IETF will have standards that are specific to the telecoms companies that Vinnick provides consultancy for (1) meaning that the advice they provide to these firms will be appropriate for their industry (1).

Accept any other suitable response.

12	D-Moss Marketing produces marketing campaigns for cosmetics companies. An apprentice at the company broke a confidentiality agreement by sharing details of a new product range on their personal social media account. This has led to competitors gaining an advantage in the market and has reduced the impact of a planned promotional campaign. **Explain** one **reputational consequence for D-Moss Marketing of breaking a confidentiality agreement.** [2 marks]

AO2 = 2 marks

Award **one** (AO2) mark for each explanation point of a reputational consequence of breaking a confidentiality agreement, up to a maximum of **two** marks.

- New clients may be unwilling to use the services / existing clients may stop using the services provided by D-Moss Marketing (1) as they do not want to take the risk that their trade secrets will be shared online in this way as it may lead to rivals gaining access to trade secrets and selling them (1).
- The brand of D-Moss Marketing may be damaged as a result of the negative publicity caused by the actions of the apprentice (1) as this may lead to adverse publicity which will impact on the perception of people within a range of industries who might otherwise have used the company for marketing services (1).

Accept any other suitable response.

13	Star Nights is a manufacturing business that produces telescopes. The telescopes are sold online through an e-commerce website. The company has a strict no refund policy. If customers are not happy with their order, they must pay to return goods to the business for a replacement. Products are generally high quality but can be expensive. There is currently a lack of competition in the market. The company has been advised to work within the codes of conduct for e-commerce companies in the UK. **Explain** two **ways that customers will be protected by Star Nights operating within a code of conduct.** [4 marks]

AO2 = 4 marks

Award **one** (AO2) mark for each explanation point of a way that customers will be protected by Star Nights operating within a code of conduct, up to a maximum of **four** marks.

- The business will be compliant with the rules which will mean that the rights of customers are more likely to be upheld (1) leading to less chance that they will be supplied with inadequate products that they will then have to pay to return (1).
- As the products are expensive and there is a no refund policy, customers want to be sure that their purchases are protected (1). By operating within a code of conduct, Star Nights

should provide customers with a detailed description of the product / warranty / guarantee for their purchase (1).
- The code of conduct should provide security protection for customers in terms of customer reviews and online payment security (1) this would enable the customer to make purchases with confidence in the product and in the e-commerce website (1).

Accept any other suitable response.

14	SantMac is an accounting firm that works with clients in the oil industry. The business provides a range of services to its clients, including storage of data and completion of reports. Staff regularly handle commercially sensitive data on behalf of their clients. This is stored on secure online servers.
	Assess the potential risks to SantMac of using commercially sensitive information.
	[3 marks]

AO3 = 3 marks

Award **one** (AO3) mark for each assessment point of the impact on SantMac of using commercially sensitive information, up to a maximum of **three** marks.

- SantMac may use commercially sensitive data such as sales revenue or profit margins whilst storing / producing accounts / reports that are accurate and tailored to each individual client request (1), but the handling of this data may cause a risk to SantMac because a breach would violate the confidentiality of clients and could lead to costly legal action / damage to reputation (1); however, the benefits that the information would bring in allowing SantMac to produce accurate accounts should outweigh the concerns, especially as SantMac should have clear guidance for staff to follow when handling sensitive data (1).
- The oil companies will not want their competitors to know what they are paying their employees for example, as competitors may use this data to poach their employees by offering better wages and conditions (1) which could leave their clients short of employees and unable to run their oil rigs (1), and this would lead to the oil company finding a new accounting firm as they no longer trust SantMac which would cost them money and reputational damage (1).

Accept any other suitable response.

| 15 | Apree-Cat is a sportswear manufacturer that focuses on clothing for professional tennis players. Many clients are famous, which puts Apree-Cat at greater risk of cyber attacks. Client data needs to be protected carefully from both internal and external users who might want to use the information for inappropriate purposes. A number of staff members recently discovered that their passwords had been compromised as a result of a malware attack.

Assess how useful multi-factor authentication would be to prevent unauthorised access to Apree-Cat's client data.

[3 marks] |
| --- | --- |

AO3 = 3 marks

Award **one** (AO3) mark for each assessment point of how useful multi-factor authentication would be to prevent unauthorised access to Apree-Cat's client data, up to a maximum of **three** marks.

- Multi-factor authentication would be effective as this means that even if a staff member's password is compromised, further confirmation of their identity, such as a code sent to a mobile phone or email address, would be needed in order to access sensitive client data, making it more secure (1). Without access to this extra level of security, it will not be possible for malicious individuals to log into the accounts even if they do manage to compromise a password as they will have no way to gain access to the relevant authentication code (1), however, if connectivity is limited or a confirmation email is intercepted, this can prevent users from accessing the security code and restricts them from accessing their account (1).
- Using multi-factor authentication would reduce the chance of a malware attack as a hacker would not only need to know the employees log in data but they would also have to have access to the code (1). This would reduce the chances of a malware attack happening as they would not be able to get past the initial authentication process as they would not have the code (1), and the business would be notified that there has been multiple failed attempts at authentication which would allow them to be aware that a malware attack is being attempted and they could prevent it (1).

Accept any other suitable response.

16	Safia has recently started a new job as the IT director for a large legal services company. Part of Safia's role is to ensure that client information is kept securely and that data breaches are kept to a minimum. Safia has found a number of vulnerabilities in the system:
	• out-of-date encryption and software
	• no authentication and authorisation for accessing data in place
	• employees having poor cyber hygiene.
	Safia is deciding which threat to work on first.
	Assess which of the vulnerabilities presents the biggest threat to the client data. [3 marks]

AO3 = 3 marks

Award **one** (AO3) mark for each assessment point up to a maximum of **three** marks.

- The biggest threat that Safia faces is the lack of authentication and authorisation of data. This will allow any employees within the business or hackers from outside the business access to all client files, even if they aren't working on their case (1) which makes the likelihood of a data breach significantly higher, and it risks the business suffering reputational damage (1). Safia should ensure that she fixes this immediately to reduce the number of people able to access each client file, which will reduce the chances of a data breach happening (1).
- Safia needs to address the poor cyber hygiene first by deleting all accounts for staff no longer working at the business (1). Leaving old employee accounts on the system means that staff who have left the business are still able to access files and hackers could use this to gain access to the system (1). This is her main priority as there is also no authorisation or authentication so once the hacker gets access via a dormant staff account they have access to the entire system (1).

Accept any other suitable response.

17	CPMatrix is a security company that provides services to nightclubs and events.
	Their staff are thoroughly background checked to ensure that they are suitable to work in the industry.
	The data is stored on a server in the head office. There have been several cyber attacks on the office computer aimed at accessing staff background checks and stealing client data.
	Computers at the company have been found to be running a 10-year-old version of an operating system. Maintenance of systems is carried out on an ad hoc basis and there is no overall planning or auditing of system support. Services often fail during events, making it hard to confirm if appropriate staff have been allocated to work.
	Discuss the ways software and system maintenance can be used as a means of risk mitigation for CPMatrix.
	Your answer must include:
	• Factors that influence software and system maintenance • Risk mitigation and management.
	Your response must include reasoned judgements.
	[12 marks plus 3 for QWC]

AO1 = 4 marks
AO2 = 4 marks
AO3 = 4 marks

Band	Mark	Descriptor
4	10–12	**AO3 –** Discussion of the ways in which software and system maintenance will aid CPMatrix in risk mitigation is **comprehensive, effective, relevant,** and shows **detailed understanding** and **logical** and **coherent** chains of reasoning throughout and is **fully** supported with **rational** and **balanced** judgements.
		AO2 – Applied all **relevant** knowledge of the ways in which software and system maintenance will aid CPMatrix in risk mitigation and shows a **detailed** functional understanding of risk mitigation controls to prevent threats to digital systems.
		AO1 – A **wide range** of **relevant** knowledge and understanding of the ways in which software and system maintenance will aid CPMatrix in risk mitigation which is **accurate** and **detailed**. A **wide range** of appropriate technical terms are used.
		The answer demonstrates **comprehensive** breadth **and / or** depth of understanding.
3	7–9	**AO3 –** Discussion of the ways in which software and system maintenance will aid CPMatrix in risk mitigation is in **most parts effective and mostly**

		relevant, showing **mostly logical** and **coherent** chains of reasoning, and judgements that consider **most** of the relevant arguments. **AO2 –** Applied **mostly relevant** knowledge of the ways in which software and system maintenance will aid CPMatrix in risk mitigation, showing **some** functional understanding of risk mitigation controls to prevent threats to digital systems. **AO1 –** Knowledge and understanding of the ways in which software and system maintenance will aid CPMatrix in risk mitigation is in **most parts clear** and **mostly accurate**, although on occasion **may lose** focus. The answer demonstrates **reasonable** breadth **and / or** depth of understanding, with **occasional** inaccuracies and / or omissions.
2	**4–6**	**AO3 –** Discussion of the ways in which software and system maintenance will aid CPMatrix in risk mitigation is in **some parts effective** and of **some relevance**, with some understanding and reasoning taking the form of **generic statements** with some development. Given judgements consider only the most **basic** arguments. **AO2 –** Applied some, but **limited** knowledge of the ways in which software and system maintenance will aid CPMatrix in risk mitigation and may show a **lack** of functional understanding of risk mitigation controls to prevent threats to digital systems. **AO1 –** Knowledge and understanding of the ways in which software and system maintenance will aid CPMatrix in risk mitigation shows **some but limited** accuracy, focus and relevance. The answer is **basic** and shows **limited** breadth **and / or** depth of understanding, with inaccuracies and omissions.
1	**1–3**	**AO3 –** Discussion of the ways in which software and system maintenance will aid CPMatrix in risk mitigation can be maintained is **minimal** and **very limited** in effectiveness and relevance. Given judgements are **unsupported** and show **little relevance** to the question aims. **AO2 –** Applied **general** knowledge and / or **general** assertions about the ways in which software and system maintenance will aid CPMatrix in risk mitigation, with **little relevance** to the context. **AO1 –** Knowledge and understanding of the ways in which software and system maintenance will aid CPMatrix in risk mitigation shows **very minimal** accuracy, focus and relevance. The answer has **isolated** points, showing **very minimal** breath **and / or** depth of understanding, with **significant** inaccuracies and omissions.
	0	No creditworthy material.

Quality of written communication (QWC) = 3 marks

Mark	Descriptor
3	The answer is clearly expressed and well structured. The rules of grammar are used with effective control of meaning overall. A wide range of appropriate technical terms is used effectively.
2	The answer is generally clearly expressed and sufficiently structured. The rules of grammar are used with general control of meaning overall. A good range of appropriate technical terms is used effectively.
1	The answer lacks some clarity and is generally poorly structured. The rules of grammar are used with some control of meaning and any errors do not significantly hinder the overall meaning. A limited range of appropriate technical terms is used effectively.
0	There is no answer written or none of the material presented is creditworthy. **OR** The answer does not reach the threshold performance level. The answer is fragmented and unstructured. The errors in grammar severely hinder the overall meaning.

Indicative content

Examiners are reminded that the indicative content reflects content-related points that a student may make but it is not an exhaustive list, nor is it a model answer. Students may make all, some, or none of the points included in the indicative content as its purpose is as a guide for the relevance and expectations of the responses. Students must be credited for any other appropriate responses.

AO1 – Knowledge and understanding of factors which influence software and system maintenance

- Software updates involve replacing or patching older versions of the programs installed on individual computers or networks.
- Software updates need to be scheduled at appropriate times to avoid creating problems with user experience.
- Scheduled maintenance involves making changes such as hardware and software updates / upgrades systematically. This often involves phased changes so that disruption is minimised, often by spreading tasks over a period of time and doing tasks that involve shutting down systems late at night or during holidays to minimise disruption to work.
- Interruption to service is when systems are shut down or unavailable. This might be as a result of maintenance or due to errors occurring, such as hardware or software failure.

AO2 – Applied software and maintenance knowledge of risk mitigation to be utilised by CPMatrix

- The company has 10-year-old operating systems. These are more likely to have bugs and are less likely to be supported with regular security updates by the manufacturer. This means it is likely that there will be more known exploits that can be used by attackers.
- The business will need to identify suitable times, such as when events are finished, before scheduling software updates, to minimise the risk of creating unhappy customers.
- System maintenance is done on an ad hoc basis, meaning that action is taken when problems occur or in an unplanned way. This means there is more risk of disruption as there is no proactive or preventative work on the network.

- Interruptions to service often occur during events, this is a business-critical failure which might lead to harm to clients' interests.

AO3 – Discussion of the ways software and maintenance addresses risk mitigation

- Software updates are often free and so if they are scheduled appropriately – for example, at night – the business can minimise the impact on customers / staff – but it must shoulder the cost of updated software if it wants to be able to update software – this is especially important given that the company is regularly attacked by cyber criminals.
- Failing to deal with the updating of software in a timely fashion can lead to problems. If the process is delayed accommodating events, it may lead to features not working correctly leading to staff being unable to do their jobs properly from day to day.
- System maintenance should be completed regularly and if it is only done when there are identified problems then this may leave vulnerabilities in systems that can be exploited. Given that the business is already regularly a target of hackers this is a big risk and the company should take a more proactive approach to maintenance.
- Service interruption should be balanced against the need to keep systems up to date. Having a lack of access to systems at busy times will risk reputational damage and so the company will potentially lose customers so it should ensure that outages are during periods of time when it will not affect customers.

Accept any other suitable response

Section C: Digital analysis and data   **Total for this section: 40 marks plus 3 marks for QWC**

18	What does ABAC stand for as a type of data access management?

      A **Application-based access control**
      B **Attribute-based access control**
      C **Authentication-based access control**
      D **Automation-based access control**

[1 mark]

AO1 = 1 mark

Award **one** mark for the correct answer:

B – attribute-based access control.

19	Define the term 'finiteness'.

[1 mark]

AO1 = 1 mark

Award **one** AO1 mark for the correct answer:

- where there is a definite limit to the number of steps that can be taken in an algorithm.

Accept any other suitable response

20	Identify one source of external data.

[1 mark]

AO1 = 1 mark

Award **one** AO1 mark for the correct answer:

- public (1)
- government (1)
- suppliers (1)
- competitors (1)
- sector / industry (1).

Accept any other suitable response.

21	A college is carrying out research to understand the flow of traffic outside its gates. They are monitoring traffic at all times and will use the data to inform any traffic-calming actions they may need to take.
	Explain one **way that the college could use pattern recognition to inform their actions.**
	[2 marks]

AO2 = 2 marks

Award **one** (AO2) mark for an explanation of the use of pattern recognition, up to a maximum of **two** marks.

- Pattern recognition could identify the frequency and times that specific vehicles pass a specific point outside of the college (1), which will confirm the busiest times so that the college can put effective traffic-calming measures in place (1).
- Pattern recognition could be used to log stationary vehicles immediately outside the college gates / entering the college car park (1), this would enable the college to see if drivers were parking irresponsibly and to implement measures to prevent this if necessary (1).

Accept any other suitable response.

22	Seaborn Transit is a company that transports raw materials on ships. Currently, around a third of the space on each ship is empty. Some competitors have much less empty space on each voyage. The company has asked its operations team to develop an algorithm to help plan the loading of ships. The aim is to use space efficiently to maximise profits. The new algorithm is being developed using pseudo code. It will be presented to the board of directors, who are a largely non-technical audience.
	Explain one **advantage of using pseudo code in the presentation to the board of directors.**
	[2 marks]

AO2 = 2 marks

Award **one** (AO2) mark for each explanation point of an advantage of using pseudo code in the presentation to the board of directors, up to a maximum of **two** marks.

- Pseudo code is relatively close to normal language which makes it easier for a non-technical audience, such as the board of directors to understand it (1), this will speed up the development process as the directors are more likely to approve the new algorithm if they can follow the logic (1).
- Pseudo code is like actual code which means that it can be quickly converted into an actual executable program in one or several languages (1) which means that once the algorithm is approved it can be turned into working code and deployed relatively quickly (1).

Accept any other suitable response.

23	HoneyH is a software development agency. They use flowcharts as a design tool. They have recently taken on a new apprentice who has very limited experience of designing algorithms.
	a) Identify two **features of a flowchart.**
	[2 marks]
	b) Explain one **reason why a flowchart would be a suitable tool for helping the apprentice to learn how to design algorithms.**
	[2 marks]

AO1 = 2 marks
AO2 = 2 marks

a) Award **one** (AO1) mark for each identified feature of flow charts, up to a maximum of **two** marks. For example:

- terminator / start and end points (1)
- flow line / process arrow (1)
- symbols / process / decision (1).

Accept any other suitable response.

b) Award **one** (AO2) mark for each explanation point of why a flowchart would be a suitable tool to help the apprentice learn how to design algorithms, up to a maximum of **two** marks.

- A flowchart is a visual tool which would allow the apprentice to see how data flows through an algorithm (1), helping them to visualise the flow of data through constructs such as iteration / selection, making these constructs less abstract (1).
- A flowchart is based on a small number of simple symbols which are easy to learn (1) and can be converted into code, step by step, aiding the apprentice to move from planning to design to execution (1).

Accept any other suitable response.

24	A school is introducing a new timetabling package that uses databases based on the entity relationship model. The school currently has a number of office staff who are relatively inexperienced in the use of databases. The office staff will attend training on how to set up the back-end system.
	a) Identify two **components of an entity relationship model.** [2 marks]
	b) Explain two **ways that the school could use the entity relationship model to benefit its timetabling process.** [4 marks]

AO1 = 2 marks
AO2 = 4 marks

a) Award **one** (AO1) mark for each component of an entity relationship model identified, up to a maximum of **two** marks:

- entities / table name (1)
- attributes / field names (1)
- relationships (1).

Accept any other suitable response.

b) Award **one** (AO2) mark for each explanation point of how the school could use the entity relationship model to benefit its timetabling process, up to a maximum of **four** marks.

- As it is a very visual model, office staff can be confident that all elements are included before they start adding any specific data (1), this would benefit the timetabling process because it would reduce the risk of duplication or omission of data, leading to a timetable that isn't fit for purpose (1).
- The entity relationship model would support the office staff to see the relationships between the entities and how these relate to courses / student / staff data (1), the timetable could then be created based on the selection of different entities and attributes to create individual timetables for classes without duplicating information (1).
- The entity model would allow any attributes to be identified in normal form to remove the need for duplication (1) and utilise the relationships created between the tables to create input / output forms to display the timetables (1).

Accept any other suitable response.

25	AL Analytics is a data analysis business that collects and analyses data on behalf of clients. The specialism of the business is handling large data sets, but they currently take a long time to process the complex information contained in these. The business makes little profit. In order to automate certain tasks, managers are planning to train a machine learning algorithm to autonomously complete tasks such as gathering data from the internet and cleaning data. The business currently wants to gain a unique selling point (USP) for complex analysis. Assess the impact of machine learning algorithms supporting data analysis tasks carried out by AL Analytics. [3 marks]

AO3 = 3 marks

Award **one** (AO3) mark for each assessment point of the impact of machine learning algorithms supporting data analysis tasks, up to a maximum of **three** marks.

- Machine learning algorithms can process large amounts of data, making more complex decisions than a human is capable of, resulting in better service for clients, which will in turn lead to an increase in customer satisfaction (1). Machine learning will reduce the risk of human bias as it will make accurate decisions that are purely based on data rather than the analyst's perception of the data, which would ensure that AL Analytics clients would receive clean / relevant / unbiased data (1). It can also be optimised to focus on specific tasks to mine large quantities of data, gaining unique insights that will contribute to the USP of the business and significantly improve the efficiency, making AL Analytics much more competitive and therefore more profitable (1).
- Machine learning will improve the chances of AL Analytics making a profit as they will be able to use the algorithm to analyse and automate a lot of tasks that they currently have to pay staff to do, which will save money (1). As the algorithm will start to spot patterns in the data they will be able to complete these tasks much faster and it will give them the ability to take on more clients (1) as they are able to do each task quicker, thereby increasing their revenue and potential profits (1).

Accept any other suitable response.

26	Count-Base offers accountancy and other business services to small businesses. Part of this service is providing data entry and digitising records for small businesses. Count-Base have recently expanded the services they offer to include creating algorithm solutions to help the small businesses to automate their financial transactions. Assess how the algorithm solutions that Count-Base offer could affect their clients. [3 marks]

AO3 = 3 marks

Award **one** (AO3) mark for each assessment point for how bespoke algorithms could affect Count-Base's clients, up to a maximum of **three** marks.

- The new algorithms to automate their financial transactions will be beneficial to the clients as it will reduce the amount of time (1) that employees at the small business will need to spend on preparing customer invoices as the algorithms will do the financial calculations for them (1), which could mean that the business is also able to save money as they will need less staff (1).
- The new algorithms could improve the efficiency of the business as they are able to send out invoices to their customers faster (1) as the algorithms will be able to produce the invoices faster than the employees (1), which could mean that the business may receive the payments from their customers faster as they receive their invoices earlier than they used to (1).

Accept any other suitable response.

27	G-Tex Consulting stores a large amount of financial client data. A recent security audit revealed that a weakness in their systems is a lack of user permissions on the shared computer network. Staff can frequently access data that is not related to their day-to-day work and can access files created by other staff members. Staff often collaborate with each other and sometimes need to share files. Some projects require access to very sensitive data that should only be available to managers.
	a) Explain one **type of user permissions that could be set by the system administrator at G-Tex Consulting.**
	[2 marks]
	b) Discuss to what extent setting user permissions would support G-Tex Consulting to make the client data more secure.
	• **Your response must include reasoned judgements.**
	[3 marks]

AO2 = 2 marks
AO3 = 3 marks

a) Award **one** (AO2) mark for a relevant explanation point of a user permission that could be set by the system administrator at G-Tex Consulting, up to a maximum of **two** marks.

- Role-based access control / RBAC – to allow staff in particular roles access to the data that is only relevant to their day-to-day work (1), this would ensure that access to the sensitive client data is restricted to only those staff who needed to see / use it (1).
- Discretionary access control / DAC – set permissions to allow file sharing for the staff based on which tasks / activities they need to work on at a certain time (1) this would allow staff to collaborate on projects / work and permissions can be removed by the resource owner when necessary / when appropriate (1).

Accept any other suitable response.

b) Award **one** (AO3) mark for each discussion point of why setting user permissions would support G-Tex Consulting to make the client data more secure, up to a maximum of **three** marks.

- By setting user permissions in response to the findings of the security audit, G-Tex Consulting would have oversight of all staff members' access and would know who has viewed / amended data, enabling the company to have greater data security (1). Setting user permissions on an individual staff member basis would allow G-Tex Consulting to restrict access to the sensitive client data to the relevant staff roles as and when appropriate (1). If the company did not have these permissions in place, then there is a greater risk of accidental / intentional breach of the sensitive client data due to the increased number of staff who could otherwise amend it / delete it / share it (1).
- Having user permissions will be beneficial to G-Tex as they will be able to limit who is able to access data within the business (1), which means that G-Tex can ensure that individual employees are only receiving access to information they need, so if there is a malicious employee in the business they will not be able to access any data that they are not directly working on (1) which will prevent them being able to steal sensitive company information and providing it to others (1).

Accept any other suitable response.

28	A supermarket has introduced a customer loyalty scheme whereby customers are rewarded for every purchase they make. To be part of this loyalty scheme, customers sign up for a loyalty card by providing their personal details, such as where they live, who lives in their household and the household income.
	Points are collected when the loyalty card is scanned at the check-out and loyalty points can be spent in store to get discounts off their shopping. The loyalty card data is stored within the supermarket's customer database.
	The supermarket would like to run a marketing campaign to promote a new range of healthy baby meals using the data collected via the loyalty card.
	Evaluate how effective the loyalty card data will be in helping the supermarket to promote the new range of baby meals.
	[12 marks plus 3 for QWC]

AO1 = 4 marks
AO2 = 4 marks
AO3 = 4 marks

Band	Mark	Descriptor
4	10–12	**AO3** – Evaluation of the effectiveness of the supermarket using loyalty card data to support marketing techniques is **comprehensive, effective, relevant**, and shows **detailed** understanding and **logical** and **coherent** chains of reasoning throughout. Given conclusions are informed and are **fully** supported with **rational** and **balanced** judgements. **AO2** – Applied all **relevant** knowledge of how the supermarket can use loyalty card data to support the selection of marketing techniques, showing

		a **detailed** functional understanding of how the supermarket can use marketing data to promote the new range of baby meals. **AO1** – A **wide range** of relevant knowledge and understanding of the factors which influence how the supermarket can use loyalty card data, which is **accurate** and **detailed**. A **wide range** of appropriate technical terms are used. The answer demonstrates **comprehensive** breadth **and / or** depth of understanding.
3	7–9	**AO3** – Evaluation of the effectiveness of the supermarket using loyalty card data is in **most parts effective** and **mostly relevant**, showing **mostly logical** and **coherent** chains of reasoning. Given conclusions are supported by judgements that consider **most** of the relevant arguments. **AO2** – Applied **mostly relevant** knowledge of how the supermarket can use loyalty card data to support the selection of marketing techniques, showing **some** functional understanding of how the supermarket can use marketing data to promote the new range of baby meals. **AO1** – Knowledge and understanding of the factors which influence how the supermarket can use loyalty card data to support marketing techniques is in **most parts clear** and **mostly accurate**, although on occasion **may lose** focus. The answer demonstrates **reasonable** breadth **and / or** depth of understanding, with **occasional** inaccuracies and / or omissions.
2	4–6	**AO3** – Evaluation of the effectiveness of the supermarket using loyalty card data to support marketing techniques is in **some parts effective** and of **some relevance**, with some understanding and reasoning taking the form of **generic** statements, with **some** development. Given conclusions are **brief** and supported by judgements that consider only the most **basic** arguments. **AO2** – Applied **some, but limited** knowledge of how the supermarket can use loyalty card data to support the selection of marketing techniques, showing **limited** functional understanding of how the supermarket can use marketing data to promote the new range of baby meals. **AO1** – Knowledge and understanding of the factors which influence how the supermarket can use loyalty card data to support marketing techniques shows **some but limited** accuracy, focus and relevance. The answer is **basic** and shows **limited** breadth **and / or** depth of understanding, with inaccuracies and omissions.
1	1–3	**AO3** – Evaluation of the effectiveness of the supermarket using loyalty card data to support marketing techniques is **minimal** and **very limited** in **effectiveness** and **relevance**. Given tenuous conclusions that are **unsupported** and show **little relevance** to the question aims.

		AO2 – Applied **general** knowledge and / or **general** assertions about how the supermarket can use loyalty card data with **little relevance** to the context. **AO1** – Knowledge and understanding of the factors which influence how the supermarket can use loyalty card data to support marketing techniques shows **very minimal** accuracy, focus and relevance. The answer has **isolated** points, showing **very minimal** breath **and / or** depth of understanding, with **significant** inaccuracies and omissions.
	0	No creditworthy material.

Quality of written communication (QWC) = 3 marks

Mark	Descriptor
3	The answer is clearly expressed and well structured. The rules of grammar are used with effective control of meaning overall. A wide range of appropriate technical terms is used effectively.
2	The answer is generally clearly expressed and sufficiently structured. The rules of grammar are used with general control of meaning overall. A good range of appropriate technical terms is used effectively.
1	The answer lacks some clarity and is generally poorly structured. The rules of grammar are used with some control of meaning and any errors do not significantly hinder the overall meaning. A limited range of appropriate technical terms is used effectively.
0	There is no answer written or none of the material presented is creditworthy. **OR** The answer does not reach the threshold performance level. The answer is fragmented and unstructured. The errors in grammar severely hinder the overall meaning.

Indicative content

Examiners are reminded that the indicative content reflects content-related points that a student may make but it is not an exhaustive list, nor is it a model answer. Students may make all, some, or none of the points included in the indicative content as its purpose is as a guide for the relevance and expectations of the responses. Students must be credited for any other appropriate responses.

AO1 – Definitions of relevant marketing data

- Marketing – data related to the profitable identification and satisfaction of customer needs.
- Customer profiles – data related to the characteristics and behaviours of specific groups of customers.
- Targeting customers – data related to selling goods or services to specific individuals or groups.
- Direct promotion – data related to sending promotional material to specific customers or groups of customers, such as physical or email addresses.

AO2 – How the supermarket can use data to support selection of marketing techniques

- Customer profiles can help target individuals and groups that are particularly receptive to the message and more likely to be interested in it or take it seriously.

- Targeting customers based on specific marketing information so that they are given the version of the campaign that is most relevant to their needs and interests.
- Direct promotion can be carried out based on a mailing list of people who are most likely to be influenced by the message that is being delivered or everyone in a specific demographic group that the campaign is trying to influence.
- Marketing data can be used to identify the needs of specific groups of consumers, allowing messages to be constructed by the supermarket which appeal to those customer groups by linking the political messages being promoted to the specific needs of those individuals.

AO3 – Evaluation of how effective the loyalty-card data will be in supporting marketing techniques

- Customer profiles mean that resources are targeted efficiently, and the campaign is likely to be more cost effective because the messages will be sent to those who are most likely to be receptive to it, leading to a reduction in the sending of costly promotional material to people on whom it will have no effect.
- Targeting customers means that the messages are more likely to have an impact because the data analytics can be used to select recipients who are likely to be a good target for the campaign messages, meaning that they will receive the information that is most likely to persuade them to agree with the views of the politicians.
- Direct marketing is narrowcasting a message that is tailored and customised to a given viewpoint making the likelihood of success greater as a tailored message delivered to the right person is more likely to be impactful than a general message broadcast to many people – the communication can be personalised making it more likely to be relevant to the individual.
- Marketing data can allow efficient targeting of resources because the needs of individuals can be used to target appropriate messages, meaning that the resources of the supermarket can be used to share marketing communication activity with the right people, meaning that money is not wasted in sharing communications that will not reach the correct audience, leading to avoidable wastage which would reduce the profit margins earned by the supermarket – marketing data may not always be accurate as some customers may complete purchasing for others and so some targeted advertising / offers may not be appropriate to every customer who has purchased similar products in the past.

Accept any other suitable response

Assessment objective grid

Question	AO1	AO2	AO3	QWC	Total
Section A					
1	1				1
2	1				1
3	1	2			3
4	2	2			4
5	2	2			4
6		4			4
7			3		3
8			3		3
Section B					
9	2				2
10	2	2			4
11	2	2			4
12		2			2
13		4			4
14			3		3
15			3		3
16			3		3
17	4	4	4	3	15
Section C					
18	1				1
19	1				1
20	1				1
21		2			2
22		2			2
23	2	2			4
24	2	4			6
25			3		3
26			3		3
27		2	3		5
28	4	4	4	3	15
Total	**28**	**40**	**32**	**6**	**106**

Document information