

T Level Technical Qualification in Digital Business Services

Core knowledge and understanding Paper B

Mark scheme

v1.4: Specimen assessment materials
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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 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 levels-based descriptors and indicative content.

Levels-based descriptors: Each level 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 level-based descriptor is worth varying marks.

The grids are broken down into levels, with each level having an associated descriptor indicating the performance at that level. You should determine the level 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 level, you should use a bottom up approach. If the response meets all the descriptors in the lowest level, you should move to the next one, and so on, until the response matches the level 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 levels, you should use a best-fit approach at this stage and use the available marks within the level 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 Wendy runs a small business, designing and making personalised jewellery, which she sells through her website and advertises through a popular social network. She would like to increase her sales, but feels she needs to know more about which demographics are her main target audience.

Name one marketing analytic tool and describe how it could be used to help Wendy's business.

[2 marks]

AO1 = 1 mark

AO2 = 1 mark

Award **one** (AO1) mark for correctly naming a marketing analytic tool. Award **one** further (AO2) mark for correctly describing how this tool could be used to help Wendy's business, for example:

- using search analytics (AO1) Wendy may be able to identify which of her products are more popular by analysing the bounce rate of specific product pages (AO2)
- using social media analytics (AO1) Wendy could view specific demographic information about her audience and how they engage with her business. Wendy could use this information to target a specific audience that may be more likely to buy her jewellery (AO2).

Accept any other suitable response.

2 Describe three steps in the process of applying root cause analysis.

[3 marks]

AO1 = 3 marks

Award **one** mark for each correctly described step within the process of applying root cause analysis, up to a maximum of **three** marks, for example:

- it is important to define the problem needing to be addressed. Understanding the problem will allow for a better analysis of the root cause (AO1)
- collecting data relating to the problem will better inform possible causes. This will lead to a higher probability of predicting the actual root cause (AO1)
- prioritising the possible causes will ensure that the most likely root cause is addressed first by an appropriate solution. This could lead to the problem being resolved with fewer steps. (AO1)

Accept any other suitable response.

3 A team of software developers has been asked to develop a new system for a college to record student details. The developers have a range of skills and experiences and are looking for advice on how they can adopt project management methodologies to improve their working practice. They also accept that they have problems with effective organisation amongst the team.

Name two project management methodologies and explain how each could benefit the team.

[4 marks]

AO1 = 2 marks

AO2 = 2 marks

Award **one** (AO1) mark for each project management methodology named, up to a maximum of **two** marks, for example:

- Agile
- Waterfall
- Spiral
- rapid application development (RAD). Abbreviation or full name is awardable.

Award **one** mark for each explanation of how the project management methodology could benefit the team (AO2), up to a maximum of **two** marks, for example:

- Agile management would benefit the college team because they have a range of skills and experiences. These can then be brought together and used in the most effective way through specific task allocation to make the most of the staff's skills and experience (AO2)
- as they have problems with organisation, a Waterfall management method would be useful because this would break down the college record project into specific phases which then flow from one to the other. This would aid clarity and organisation for the team and assist with the project's overall completion (AO2).

Accept any other suitable response.

4 A large organisation uses a content management system (CMS) to support various departments. There is due to be a release of a major update to this system that will need to be rolled out across the organisation. Once the update is live an additional three departments will be using the system due to the new functionality.

The organisation is planning to use the following testing methods:

- **usability or audience testing**
- **stress testing.**

Discuss how each of the testing methods could be used before releasing the update to the content management system (CMS).

[4 marks]

AO3 = 4 marks

Award **one** mark for each relevant discussion point about a testing method, up to a maximum of **two** marks for each testing method, up to a maximum of **four** marks.

Usability or audience testing:

- usability or audience testing could be applied to ensure that the new update to the CMS still meets the requirements of the marketing, stakeholder and finance departments (1)
- usability or audience testing could be applied to facilitate user adoption of the changes and ensure a smooth roll out of the changes as end users will have felt engaged in the change process and understand the impact of the changes in advance of them being launched (1)

Stress testing:

- due to the increased number of departments that will be using the system, stress testing should be applied to ensure that the system can facilitate the additional load of users (1)
- stress testing can be used to help the developers understand how the system performs when under strain so they can recognise these signs and act on them rapidly once it has been launched, this will help them to manage future issues effectively (1)

Accept any other suitable response.

| |
|---|
| <p>5 A gaming retailer plans to offer purchasable game downloads, and to develop hardware for gamers.</p> <p>Describe the following methods of testing, and for each give an example of how it could be used in this situation.</p> <ul style="list-style-type: none">• concept testing• penetration testing. <p style="text-align: right;">[4 marks]</p> |
|---|

AO1 = 2 marks

AO2 = 2 marks

Award **one** mark for each description of the method (concept and penetration) (AO1) and **one** mark for each related example of how it could be used (AO2), up to a maximum of **four** marks, for example:

- concept testing - scoping and validating requirements (1 AO1) informing decisions before committing time and resources to development of a new piece of gaming hardware which may not be viable due to current competing products in the market (1 AO2)
- penetration testing - to determine vulnerabilities in a controlled environment (AO1) through an authorised attack on systems to assess where there are weaknesses in the business's download purchasing system (1 AO2).

Accept any other suitable response.

6 An energy organisation has staff in the UK, Europe and working offshore on oil rigs. It is important that all staff can communicate effectively daily. They have access to technology at the offices both onshore and on the offshore oil rigs.

Explain three challenges the business is likely to experience in maintaining effective daily communication.

For each challenge, explain how a collaborative communication tool could benefit the organisation.

[6 marks]

AO2 = 3 marks

AO3 = 3 marks

Award **one** (AO2) mark for an explanation of each challenge to the business, up to a maximum of three marks, for example:

- efficient distribution of information may be a challenge to the business as their staff are located across the world and may not always have access to centrally stored files (1 AO2)
- due to the nature of the business, required expertise could be currently based on a rig and therefore unavailable by traditional methods or in different time zones to their colleagues (1 AO2)
- as the business has many team members across different locations, face-to-face communication is not always possible (1 AO2)

Award **one** (AO3) mark for each valid explanation of how a collaborative communication tool could be used to overcome the corresponding explained challenge, up to a maximum of **three** marks, for example:

- introducing a cloud-based system which all staff could access regardless of location would provide efficient storage and distribution of information regardless of whether it is onshore or offshore (1 AO3)
- instant messenger functionality will allow staff to communicate rapidly and informally with each other at all times and can be used on a smart phone for staff who may not have access to laptops or computers when working on an oil rig (1 AO3) video conferencing can be a useful tool to ensure effective communication is supported across the business where problems can be discussed with colleagues regardless of where they are situated (1 AO3).

Section B: Legislation and security

**Total for this section: 36 marks,
plus 3 marks for QWC**

7 Describe two types of malware that could be a threat to a digital system.

[2 marks]

AO1 = 2 marks

Award **one** mark for each accurate description of a type of malware up to a maximum of **two** marks, for example:

- a key logger is a program that can record the keystrokes of a user without their knowledge (1)
- ransomware is malware that can restrict the user from accessing their data or system unless the attacker's demands are met (1)
- a trojan is a virus or piece of malware that can disguise itself as non harmful (1)
- spyware is malware that tracks and records personal data about a user without their knowledge (1).

Accept any other suitable response.

8 State two possible impacts to a company's digital systems if they do not carry out regular maintenance on those systems.

[2 marks]

AO1 = 2 marks

Award **one** mark for any of the following, up to a maximum of **two** marks:

- data loss (1)
- security breach (1)
- hardware failure (1)
- increased equipment downtime (1)
- reduced asset lifespan and efficiency (1)

Accept any other suitable response.

9 A digital contractor working for a security company lost a USB stick containing unencrypted personal data on all the business's staff and operational information on customers that they provide security for.

Explain two consequences to data security as a result of this loss.

[4 marks]

AO2 = 4 marks

Award **two** marks for each consequence explained in context, up to a maximum of **four** marks, for example:

- loss of this sensitive information could be used by others to discover the security protection of the business's customers (1). This could result in their protection being compromised and open to criminal activity (1)
- as the memory stick contained sensitive personal information which would include name, address and date of birth of staff (1), these people are in danger of having their identification stolen (1).

Accept any other suitable responses.

10 A software company has recently had a series of negative online reviews. To address these and to improve their reputation and working practices, the owner is considering gaining accreditation from the International Organisation for Standardisation (ISO).

(a) State two roles of industry standards and professional codes of conduct.

(b) Explain two benefits to the company of gaining ISO accreditation.[4 marks]

AO1 = 2 marks

AO2 = 2 marks

Award **one** (AO1) mark for each role stated, up to a maximum of **two** marks, for example:

- compliance
- facilitating competition within the industry
- promoting innovation
- providing interoperability between new and existing systems
- ensuring security
- ensuring transparency of sectors.

Award **one** (AO2) mark for each explained benefit to the company for gaining ISO accreditation, up to a maximum of **two** marks, for example:

- ISO accreditation increases customer confidence in the quality of the company's processes and practices (1).
- ISO accreditation may help address the bad reputation the company has gained through negative reviews (1).
- ISO accreditation may attract more customers and increase retention of current customers, leading to more business (1).
- ISO accreditation may increase credibility and recognition within their sector (1).
- Increased sector credibility may lead to new business partnership opportunities (1).

Accept any other suitable response.

- 11 A long-established luxury car manufacturer in the UK wants to sell its cars online directly to international customers. Some within the company fear that plans to launch the new service do not allow enough time to check compliance with all relevant legislation. Directors feel that the intellectual property is protected because the company has been in business for a long time and it has applied for ISO 9001 certification but there are concerns that other relevant legislation might have been overlooked.**
- Give one advantage and one disadvantage to the business if they go ahead with their plan.**
- For each advantage and disadvantage, discuss two potential impacts on the business.**
- [6 marks]

AO2 = 2 marks

AO3 = 4 marks

Award **one** (AO2) mark for **one** advantage and **one** (AO2) mark for **one** disadvantage given for the business to go ahead with the plan, up to a maximum of **two** marks.

Award **one** (AO3) mark for each valid and relevant discussion point relevant to the stated advantage and disadvantage, up to a maximum of **four** marks, for example.

Example advantages:

- adopting the plan would be worth the risk because they have applied for ISO 9001 certification which will show up weaknesses in their procedures and allow them to address this (1 AO2)
- adopting ISO 900 will ensure that before selling to international customers they are complying with their high expectations (1 AO3)
- ISO 900 will enable them to address these weaknesses and ensure that their plan is adopted in such a way that customers will receive a good quality service (1 AO3).
- they are a well-known luxury brand and this is an opportunity to expand their brand and reach new markets and countries where they can increase their revenue (1 AO2)
- selling online will potentially reduce the cost to serve these new markets and mean they can increase their profit on sales to the new markets (1 AO3)
- expansion to new markets will improve income for the brand and could strengthen the business in the long-term by opening up new market opportunities (1 AO3)

Example disadvantages:

- it appears that the business has not paid much attention to data privacy and therefore they could put themselves at risk of a breach without proper checks (1 AO2)
- before they go ahead with this plan, they should embed ISO 9001 into their business, to ensure that data security is appropriately managed (1 AO3)
- this is especially important due to the high cost of the cars as they could be liable to a cyber attack (1 AO3).
- the company could breach legislation they are unaware of in other countries if they have not taken the time to understand which legislation applies
- if the company does breach legislation in other countries unknowingly, they may lose customer confidence as people will expect a well-known luxury brand to operate effectively (1 AO3)
- the company risks significant fines if they breach legislation which could cause financial problems and put the business at risk (1 AO3)

Accept any other suitable response.

12 A bank is transferring all its paper records about customers' accounts into a new cloud-based digital system. Each member of staff accesses the system with their name and a generic password before copy typing all of the data. Passwords are changed every six months. Last year the bank caught cleaners attempting to install malware. It is not the bank's policy to security check or train cleaning staff.

Describe two weaknesses in this computer security system.

Explain what the impact of these weaknesses could be on the bank's operations.

[6 marks]

AO2 = 2 marks

AO3 = 4 marks

Award up to **one** (AO2) mark for **each** weakness described, up to a maximum of **two** marks.

Award **two** marks for each explanation of the impact of weaknesses on operations, up to a maximum of **four** marks, for example:

- using a name and a generic login, as this bank's employees do to login, is very unsecure and could be guessed by those wanting to access the system (1 AO2). By not using secure login details the bank is in danger of having their systems attacked by ransom hackers (1 AO3). This is because they could hack into the system and install a ransomware virus that threatens to wipe all data should money not be paid (1 AO3)
- not checking or training members of staff who have access to the bank leaves them liable to physical interference of hardware as staff will be unaware of the dangers of this (1 AO2). This leaves the bank open to physical interference with their hardware, either intentionally by physically installing malware such as keystroke logger to record login details which could then be used maliciously (1 AO3). Or, due to the lack of training it could be unintentional action by staff, for example turning off a server to carry out cleaning (1 AO3).

Accept any other suitable response.

13 **An online business provides money saving advice to customers on a range of services.**

Customers complete a questionnaire which includes personal and sensitive information before recommendations are made.

Evaluate the security risks that the business will need to be aware of before personal data is collected online.

You should consider the following:

- **the processing of personal data**
- **the importance of maintaining privacy and confidentiality**
- **technical and non-technical threats and vulnerabilities**
- **the implications these threats and vulnerabilities may have on the company**
- **risk mitigation techniques to prevent threats to the system.**

[12 marks plus 3 for QWC]

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

| Band | Mark | Descriptor |
|-------------|-------------|---|
| 4 | 10–12 | <p>AO3 Evaluation of the security risks, threats, vulnerabilities, implications and risk mitigations is comprehensive, effective, and relevant, showing detailed understanding and logical and coherent chains of reasoning throughout. Given conclusions are informed and are fully supported with rational and balanced judgements.</p> <p>AO2 Applied all relevant knowledge of security risks to the context and shows a detailed functional understanding of threats, vulnerabilities and mitigations.</p> <p>AO1 A wide range of relevant knowledge and understanding of the security risks, threats, implications and risk mitigations, which is accurate and detailed.</p> <p>The answer demonstrates comprehensive breadth and/or depth of understanding.</p> |
| 3 | 7–9 | <p>AO3 Evaluation of the security risks, threats, vulnerabilities, implications and risk mitigations is in most parts effective and mostly relevant, showing mostly logical and coherent chains of reasoning. Given conclusions supported by judgements that consider most of the relevant arguments.</p> <p>AO2 Applied mostly relevant knowledge of security risks to the context, showing some functional understanding of threats, vulnerabilities and mitigations.</p> <p>AO1 Knowledge and understanding of the security risks, threats, implications</p> |

| | | |
|---|-----|---|
| | | <p>and risk mitigations, is in most parts clear and mostly accurate, although on occasion may lose focus.</p> <p>The answer demonstrates reasonable breadth and/or depth of understanding, with occasional inaccuracies and/or omissions.</p> |
| 2 | 4–6 | <p>AO3 Evaluation of the security risks, threats, vulnerabilities, implications and risk mitigations is in some parts effective and of some relevance, with some understanding and reasoning taking the form of generic statements with some development. Given brief conclusions supported by judgements that consider only the most basic arguments.</p> <p>AO2 Applied some but limited knowledge of security risks to the context and may show a lack of functional understanding of digital security risks, threats, implications and risk mitigations.</p> <p>AO1 Knowledge and understanding of the security risks, threats, implications and risk mitigations show some but limited accuracy, focus and relevance.</p> <p>The answer is basic and shows limited breadth and/or depth of understanding, with inaccuracies and omissions.</p> |
| 1 | 1–3 | <p>AO3 Evaluation of the security risks, threats, vulnerabilities, implications and risk mitigations is minimal and very limited in effectiveness and relevance. Given tenuous conclusions that are unsupported and show little relevance to the question aims.</p> <p>AO2 Applied general knowledge and/or general assertions about security risks with little relevance to the context.</p> <p>AO1 Knowledge and understanding of the factors which influence security risks, threats, implications and risk mitigations shows very minimal accuracy, focus and relevance.</p> <p>The answer has isolated points, showing very minimal breath and/or depth of understanding, with significant inaccuracies and omissions.</p> |
| | 0 | No creditable evidence |

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

AO1 The processing of personal data.

- All measures are taken to process personal data in line with relevant laws such as GDPR, this prevents the risk of data breaches and legal action or fines.
- Customers understand how their data will be processed and give their consent, this mitigates the risk of complaints or potential data breaches caused by customers not providing consent.

AO1 The importance of maintaining privacy and confidentiality.

- Maintains compliance, maintains trust with internal and external stakeholders, promotes positive image, avoids security risks and unauthorised access.
- Legislation relating to personal data such as GDPR, Computer Misuse Act 1990 and The Public Sector Bodies (Websites and Mobile Applications) Accessibility Regulations 2018.

AO2 The consequences of not maintaining privacy and confidentiality.

- Security – the business has access to very sensitive and personal information, such as income and addresses. Therefore, it is vital that this information is kept confidential as they could be the target of cyber attacks due to the value of the data they hold (AO2).
- Reputational – the business may lose customers as well as valuable advertising revenue if other businesses who offer money saving deals through their service believe they are unreliable. (AO2)

AO3 The consequences of not maintaining privacy and confidentiality.

- If they fail to do this fines could be imposed, leading to loss of earnings which could impact on the business's ability to undertake future growth as money allocated to a specific project would have to be used to pay the fine (AO3).
- Legal - such as lawsuits or termination of contract. This will damage the business's reputation and customers will therefore be more likely to transfer their business to competitors. This would negatively affect the business's revenue and profit (AO3).
- Reputational - through loss of clients and damage to brand which would impact the business's competitiveness, as customers would be more likely to trust and therefore use a business with a better reputation (AO3).

AO1 The technical and non-technical threats.

- Technical - lack of encryption, out-of-date software/hardware, fail-open electronic locks, weak passwords, missing authentication and authorisation, use of broken algorithms.
- Technical - botnets, hacking, malware, malicious spam.

- Non-technical - employees not following policies and procedures, competency and training of staff, recruitment screening, poor cyber hygiene, inadequate physical access controls, social engineering.
- Non-technical - human error, disguised criminals.

AO2 The implications these threats and vulnerabilities may have on an organisation.

- Loss of sensitive information through the unauthorised access to the system or service is a potentially serious threat to the business. Should the business fail to encrypt sensitive customer information then this is potentially open to disclosure should any accidental release of data happen. Due to the nature of data held by the business customers would expect this to be encrypted and therefore unreadable if it is lost (AO2).

AO3 The implications these threats and vulnerabilities may have on an organisation.

- This would not only damage the reputation of the business but may open it up to legal action. This would be costly in both reputational damage and financial fines. Either of these could impact the ability to continue to operate or grow in the future (AO3).
- Corruption of a system/data or damage to system operations could stop the business from undertaking its core functions as systems would not be operable. This would likely mean that the business would be unable to process customer information in order to make recommendations and therefore customers would be lost to competitors (AO3).
- Unauthorised access to a restricted physical environment could lead to malware being physically installed through the insertion of a USB memory stick. This could record keystrokes which would provide the offender with passwords to enable them to access company records and systems. This could then be used to fraudulently gain money from the business or take identity of customers or staff members (AO3).

AO1 Risk mitigation techniques to prevent threats to digital systems.

The risk mitigation technique provided should be linked to the threats presented in the answer. These mitigation techniques could include the following:

- anti-virus and anti-malware software
- firewalls, software and hardware
- intrusion detection systems
- encryption, purpose, process and protocols
- user access, policies and procedures
- staff training and CPD
- back-ups
- software and system maintenance.

AO2 Possible mitigation techniques to prevent threats to a digital system.

- The business should ensure that all back-ups are in a different location to the original data, as this ensures that any incident that happens to the main site will not impact back-up data

as a business which relies on access to customer data and customer trust it is vital that they have significant controls in place(AO2).

- The business can use their access to customers to promote security and to highlight risks and signs of a breach to ensure all relevant people are vigilant and aware of prevention techniques (AO2)

AO3 Possible mitigation techniques to prevent threats to a digital system.

- Corruption of a system or its data could be mitigated by ensuring that the business has appropriate back-up strategies in place and that these are regularly tested to ensure they are providing appropriate protection (AO3).
Various security features can be implemented such as access control, encryption of data and restricted access to buildings and devices, these will all need to be tested regularly to ensure they're offering the required protection. This could include the use of ethical hackers, penetration testing or audits. These techniques will allow the business to identify and resolve any weak spots in their controls.

SAMPLE

Section C Digital analysis and data

Total for this section: 41marks,
plus 3 marks for QWC

**14 Identify whether each of the following are internal or external sources of data:
[see question paper for table]**

[1 mark]

AO1 = 1 mark

Award **one** (AO1) mark for categorising all data sources correctly (as shown below).

| Data | Internal or External? |
|---|-----------------------|
| Statement of annual profit and loss | Internal |
| Number of people employed in retail | External |
| Breakdown of employees by gender | Internal |
| Customer responses to TV advertising campaign | Internal |

All four sources of data to be correct in order to award.

15 State the purpose of an algorithm.

[1 mark]

AO1 = 1 mark

Award **one** (AO1) mark for any of the following, to a maximum of **one** mark:

- to automate calculations
- to process computational actions
- to support problem solving.

Accept any other suitable response.

16 A local further education college has joined with a smaller college. All student and staff data from both colleges needs to be joined to form one dataset.

Explain why the integration of data is so important to the college.

[2 marks]

AO2 = 2 marks

Award **one** (AO2) mark for each explanatory point that outlines why the integration of data is so important to the college, up to a maximum of **two** marks.

Application of data:

- to create/store and retain data records of staff and students for future use (1). For example, where a staff or students' personal details need to be accessible in the case of an emergency (1)
- to integrate different sets of information together on the team the joined staff are in (1). For example, curriculum subject delivery resources which need to be integrated rather than lost (1).

Accept any other suitable response.

17 **The manager of a mobile phone store wants to use sales data to make decisions about staffing and development.**

The manager has decided to adopt an operational management approach to monitor key performance indicators (KPI) of the sales team.

| Staff | Role | Full / Part time | Sales target | Actual sales | Training completed |
|----------------|-------------------|------------------|--------------|--------------|--------------------------------------|
| John Grey | Sales assistant | FT | 100 | 90 | Sales techniques Customer service |
| Steve Jenson | Sales manager | FT | 100 | 99 | Sales techniques Customer service |
| Sami Singh | Sales assistant | FT | 90 | 115 | |
| Lisa Alexander | Sales team leader | FT | 95 | 85 | Sales techniques |
| Julie Keeth | Trainee | PT | 25 | 17 | |
| Debra Lyle | Sales assistant | PT | 35 | 12 | |
| Peter Smith | Sales assistant | PT | 50 | 41 | Customer service |

Recommend to the manager two actions that could be taken to improve sales.

Justify your answer.

[4 marks]

AO2 = 2 marks

AO3 = 2 marks

Award **one** mark for each relevant action recommended, up to a maximum of **two** marks. (AO2).

Award **one** mark for each valid justification for these recommended actions, up to a maximum of **two** marks (AO3).

- using trends and patterns for example, to identify performance links between training completed and contracted hours full-time or part-time (1 AO2) ensure underperforming staff members go through both training programmes offered by the business which would provide additional skills to enable them to achieve higher levels of success (1 AO3)
- forecasting predicted actual sales achieved by a particular member of staff by using time series analysis of past activity (1 AO2). Use highly performing staff members (Sami Singh) to train other staff which would give staff members the opportunity to learn how to succeed from someone who has specific experience of the role (1 AO3).

Accept any other suitable response.

18 Amy works as a data technician and has been contracted to develop an algorithm to classify living organisms as mammals, reptiles, or birds. This algorithm would need to assess characteristics of organisms such as if they are warm or cold blooded, their method of reproduction or what type of skin cover they have, in order to classify them.

She has the following information to refer to:

| | Warm/Cold blooded | Reproduction | Skin covering |
|-----------------|--------------------------|---------------------|----------------------|
| Mammals | Warm | Live birth | Skin/Fur |
| Birds | Warm | Eggs | Feathers |
| Reptiles | Cold | Eggs | Scales |

Describe the decomposition and abstraction stages of the computational thinking process, and for each explain how they could be applied to create the classification algorithm.

[4 marks]

AO1 = 2 marks

AO2 = 2 marks

Award **one** mark for describing each stage of computation thinking, up to a maximum of **two** marks, and a further **one** mark for how each explained stage could be applied to support the design of the algorithm, up to a maximum of **two** marks, for example:

- decomposition would help clarify the stages required to develop the algorithm, by breaking down the problem into manageable components (1 AO1). As Amy needs to classify organisms as mammal, bird or reptile, she would need to decompose what the identifying characteristics of each of these organisms are (1 AO2)
- abstraction would be used to filter and remove irrelevant organism characteristics that did not support the classification processes (1 AO1). This could be characteristics such as colour or size, that may not indicate whether they were bird, reptile or mammal. (1 AO2)

Award any other suitable response.

19 A car insurance firm currently decides policy prices for its customers manually, which has resulted in some customers receiving inaccurate policy prices. To increase accuracy, they would like to move to an automated system using an algorithm. To determine policy price a user is required to input age, gender, car model and number of claims into a digital system. This information is then analysed, and a price decided. Once a policy price is determined this information would need to be sent to the policy holder.

(a) Describe two characteristics of an algorithm.

(b) Analyse whether the application of an algorithm would support the accuracy of the pricing process and allow opportunities for automation.

[5 marks]

AO1 = 2 marks

AO3 = 3 marks

- Award **one** mark (AO1) for each correct description of a characteristic of an algorithm, up to a maximum of **two** marks, for example: finiteness - this means that an algorithm has to have a finite or defined number of steps and cannot be continuous (1 AO1)
- iteration - this means that an algorithm can have repetition of steps until a certain criterion is met or desired result achieved (1 AO1)
- selection - selection allows an algorithm to receive input from a user or system to decide on an appropriate next step (1 AO1).

Award **one** mark (AO3) for each relevant and correct analytical point made in relation to the algorithm supporting accuracy and giving opportunities for automation, up to a maximum of **three** marks, for example:

- the application of the algorithm will reduce any potential bias in the decisions and ensure that the same principles are applied to each policy calculation which will improve consistency and therefore accuracy (1 AO3) the algorithm will also follow the same process each time and consider the same set of data, this will improve accuracy and there will be no risk of human error, when people are doing the calculations they could make errors or could miss pieces of data, therefore the algorithm will remove potential error and improve accuracy (1 AO3). The algorithm could support automation as it could lead to an automated system to send the determined policy price to the policy holder without the need for people to do this (1 AO3)
- as a further extension of the algorithm, machine learning techniques could be used to further analyse the data and may more efficiently produce policy prices based on outcomes of the analysis (1 AO3).

Accept any other suitable response.

20 An independent supermarket has stored data on sales and stock levels for the past 5 years of trading. This is shown below.

Item: disposable BBQs

| Year | Sales data | Stock Data/Information | |
|------|------------|------------------------|-------------------------|
| | | Surplus at year end | Extra order during year |
| 2019 | 23 010 | 1 100 | |
| 2018 | 16 520 | | 500 |
| 2017 | 33 130 | | 8 000 |
| 2016 | 10 900 | 220 | |
| 2015 | 8 110 | 20 | |

Item: disposable picnic sets

| Year | Sales data | Stock Data/Information | |
|------|------------|------------------------|-------------------------|
| | | Surplus at year end | Extra order during year |
| 2019 | 18 050 | 210 | |
| 2018 | 10 520 | | 900 |
| 2017 | 28 190 | | 5 500 |
| 2016 | 18 750 | 1 500 | |
| 2015 | 12 000 | | 1 700 |

It is approaching the summer season when sales of certain products increase.

Explain three ways in which the supermarket could use this data to ensure they have enough stock available for their customers. Support each explanation with an example.

[6 marks]

AO2 = 6 marks

Award **one** mark for each explanation of to ensure stock availability, up to a maximum of **three** marks.

Award **one** mark for each related example that supports the explanation, up to a maximum of **three** marks.

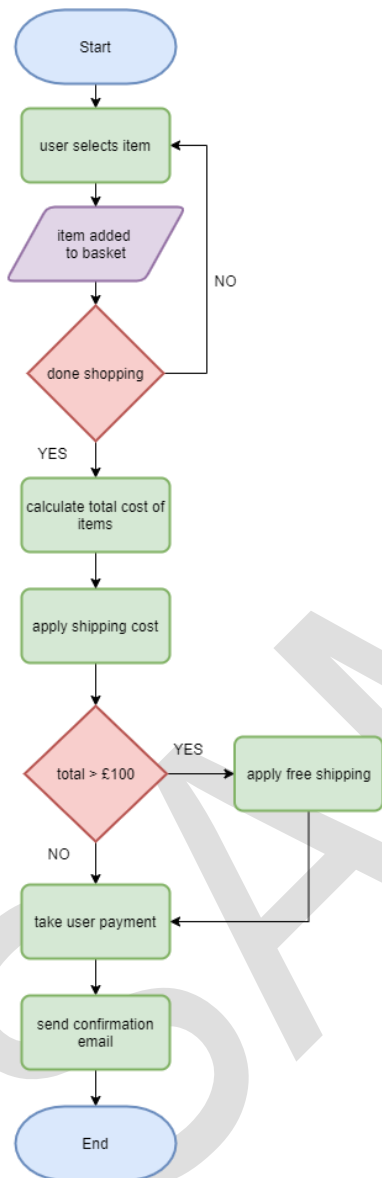
For example:

- the supermarket can look for links between their sales of picnic sets and BBQs to see if a rise in sales for one correlates to a rise in sales for the other and therefore what ratio of the 2 they need to have available (1)
- this can be seen across all years where the BBQs sales are consistently higher than picnic sets, they can work out the average ratio and use this to influence their stock management (1).
- the data can be used to monitor performance of the different levels of sales against stock, utilising stock control systems to ensure that there is sufficient stock when required. This would avoid problems of over stocking (1)
- an example of this is in 2016 where there was a large surplus of picnic sets and a smaller surplus of BBQs (1)
- the supermarket can use forecasting (predictive analytics) using past trends for forecast sales, to give

- them an idea of how many items they will sell based on the previous year's sales (1)
- the data shows a general increase in sales of both items other than 2017 when there was a surge of sales for both products. This can identify trends, but it would be difficult to identify potential surges such as 2017 (1)

Accept any other suitable response.

21 A clothing shop has asked you to advise on the design of the shopping basket component of their online shop. The diagram below shows the process.



The clothing shop allows for use of several payment methods and users can select between next day and standard shipping.

State one benefit of using a flowchart.

Name one other method of displaying the shopping basket design and give a benefit of using this method.

Analyse the flowchart showing the shopping basket design and discuss how sequence, selection and iteration could improve the efficiency of the design.

[6 marks]

AO1 = 3 marks

AO3 = 3 marks

Award **one** (AO1) mark for stating a benefit of a flowchart, for example:

- a flowchart is a visual representation of an algorithm that can be easily understood by a non-technical audience. (1)

Award **one** (AO1) mark for naming another method of displaying the design, and **one** additional mark (AO1) for giving a benefit of this method, for example:

Method:

- pseudocode. (1)

Benefit:

- allows the algorithm logic to be developed without committing to full code, thus saving time (1).

Award **one** (AO3) mark for each appropriate suggestion of improvement to the design, based on analysis of the flowchart, up to a maximum of **three** marks.

- The sequence of the process currently allows for free shipping to be applied after the shipping cost is added to the total. This could be reordered to make the process require less steps and therefore be more efficient (1 AO3).
- Iteration could be added to support error checking into the process. Examples of this could be checking if the basket is empty or if users have entered the correct details for the email confirmation to be sent (1 AO3).
- Currently the process is simplistic and does not allow users to select shipping types or payment methods. This could potentially discourage users from purchasing if they do not like the default options. It also does not meet the organisational needs of the scenario (1 AO3).

Accept any other suitable response.

22 A digital system used by a doctor’s practice to hold patient records is 8 years old and obsolete. The practice intends to develop a new system that can cope with an additional 10 000 patients over the next five years. Over the last eight years the number of patients has grown from 3 500 to 8 900.

The patients’ records contain personal data including commentary of visits, test results and medication prescribed.

Discuss the key considerations for the doctor’s practice when designing a possible new system of data storage that would meet their requirements. You should include consideration of data structure, types, storage, security and how to migrate data from the old system.

[12 marks, plus 3 for QWC]

AO1 = 4 marks

AO2 = 4 marks

AO3 = 4 marks

| Band | Mark | Descriptor |
|-------------|-------------|---|
| 4 | 10–12 | <p>AO3 Analysis of data, categories, structure, security and migration is comprehensive, effective, and relevant, showing detailed understanding and logical and coherent chains of reasoning throughout. Given conclusions are informed and are fully supported with rational and balanced judgements.</p> <p>AO2 Applied all relevant knowledge of systems of data to the context and shows a detailed functional understanding of digital operational integrity.</p> <p>AO1 A wide range of relevant knowledge and understanding of the factors which influence data, categories, structure and migration is accurate and detailed.</p> <p>The answer demonstrates comprehensive breadth and/or depth of understanding.</p> |
| 3 | 7–9 | <p>AO3 Analysis of data, categories, structure, security and migration is in most parts effective and mostly relevant, showing mostly logical and coherent chains of reasoning. Given conclusions supported by judgements that consider most of the relevant arguments.</p> <p>AO2 Applied mostly relevant knowledge of systems of data to the context, showing some functional understanding of digital operational integrity.</p> <p>AO1 Knowledge and understanding of the factors which influence data, categories, structure and migration is in most parts clear and mostly accurate, although on occasion may lose focus.</p> <p>The answer demonstrates reasonable breadth and/or depth of understanding, with occasional inaccuracies and/or omissions.</p> |

| | | |
|---|-----|---|
| 2 | 4–6 | <p>AO3 Analysis of data, categories, structure security and migration is in some parts effective and of some relevance, with some understanding and reasoning taking the form of generic statements with some development. Given brief conclusions supported by judgements that consider only the most basic arguments.</p> <p>AO2 Applied some but limited knowledge of systems of data to the context and may show a lack of functional understanding of digital operational integrity.</p> <p>AO1 Knowledge and understanding of the factors which influence data, categories, structure and migration show some but limited accuracy, focus and relevance.</p> <p>The answer is basic and shows limited breadth and/or depth of understanding, with inaccuracies and omissions.</p> |
| 1 | 1–3 | <p>AO3 Analysis of data, categories, structure, security and migration is minimal and very limited in effectiveness and relevance. Given tenuous conclusions that are unsupported and show little relevance to the question aims.</p> <p>AO2 Applied general knowledge and/or general assertions about systems of data with little relevance to the context.</p> <p>AO1 Knowledge and understanding of the factors which influence data, categories, structure and migration shows very minimal accuracy, focus and relevance.</p> <p>The answer has isolated points, showing very minimal breath and/or depth of understanding, with significant inaccuracies and omissions.</p> |
| | 0 | No creditable evidence. |

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 | <p>There is no answer written or none of the material presented is creditworthy.</p> <p>OR</p> <p>The answer does not reach the threshold performance level. The answer is fragmented and unstructured. The errors in grammar severely hinder the overall meaning.</p> |

Indicative content

AO1 Tools of data modelling to identify information categories and structure required by the doctor's practice:

- data flow diagram (DFD)
- entity relationship diagram (ERD).

AO1 Data entry:

- assign common data types to screen input boxes as required by the organisation. For example, this might include patient names, addresses and regular medication. This data could be in the following forms:
 - numeric; integer, float, double
 - text; strings, characters
 - Boolean
- data entry checking and risk mitigation to ensure that patient records are accurate:
 - validation – check that user-entered data is in correct format
 - verification – check that user-entered data is accurate.

AO1 Data migration:

- data must be prepared in advance
- each field in the new system must have a source to pull from the old system
- any new fields will need to have consideration to how they're completed if the data does not exist in the old system
- data cleansing may be required in advance of migration

Application (AO2)

- The importance of data, categories and structure to the doctor's practice and selecting the appropriate data for the organisation (AO2).
- Ensuring that the data is correct is of vital importance to this organisation because they are dealing with the health of people and therefore it is important that validation of verification is part of their data handling processes (AO2).
- Compliance with standards and legislation for usage and storage, regulatory bodies, location of data, policies and procedures is important to the doctor's practice to ensure that they comply with the law and other regulation (AO2).
- It is vital to ensure that the organisation can continue to operate and has the trust of its stakeholders. The main stakeholder in this case would be the patients and the local community in which it serves (AO2).
- The practice would need to appoint a systems administrator who would be responsible for the data, categories and structure (AO2).
- Other users within the practice such as doctors and physiotherapists will be able to input and access data and therefore must be aware of their responsibility for accuracy (AO2).

Analysis (AO3)

- It is particularly important to this organisation to ensure that confidential medical records are viewed only by those who have a need to access them, as they have some of the most sensitive information that any business could hold and therefore are both protected under law and the practice has an ethical obligation to protect the data (AO3).
- Should they fail to do this they could be liable for legal prosecution leading to reputational damage (AO3).
- Should the practice fail to comply with these standards they might not only lose patients, and therefore income, but could also be investigated by regulatory bodies because the practice might have breached policies (AO3).
- This person would be the only one able to change the categories and structure of any patient data systems and must therefore be trained appropriately and have the necessary skills. This may require the recruitment of a new member of staff or training of a current staff member (AO3).
- Having a clear split between a user and system administrator will ensure that each person within the practice will have a clear understanding of what data they can and cannot edit or manipulate (AO3).
- This will give the practice confidence that the data is secure, as data privileges are only allocated to users in a way that permits them to change data that is directly linked to their role (AO3).

Accept any other suitable response.

Assessment Objective Grid

| Question | AO1 | AO2 | AO3 | QWC | Total |
|--------------|-----------|-----------|-----------|----------|------------|
| 1 | 1 | 1 | | | 2 |
| 2 | 3 | | | | 3 |
| 3 | 2 | 2 | | | 4 |
| 4 | | | 4 | | 4 |
| 5 | 2 | 2 | | | 4 |
| 6 | | 3 | 3 | | 6 |
| 7 | 2 | | | | 2 |
| 8 | | 2 | | | 2 |
| 9 | | 4 | | | 4 |
| 10 | 2 | 2 | | | 4 |
| 11 | | 2 | 4 | | 6 |
| 12 | | 2 | 4 | | 6 |
| 13 | 4 | 4 | 4 | 3 | 15 |
| 14 | 1 | | | | 1 |
| 15 | 1 | | | | 1 |
| 16 | | 2 | | | 2 |
| 17 | | 2 | 2 | | 4 |
| 18 | 2 | 2 | | | 4 |
| 19 | 2 | | 3 | | 5 |
| 20 | | 6 | | | 6 |
| 21 | 3 | | 3 | | 6 |
| 22 | 4 | 4 | 4 | 3 | 15 |
| Total | 29 | 40 | 31 | 6 | 106 |

Document information

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Owner: Head of Assessment Design

Change History Record

| Version | Description of change | Approval | Date of Issue |
|---------|---|---------------|------------------|
| v1.0 | Published. | | 2020 |
| v1.1 | NCFE rebrand. | | September 2021 |
| v1.2 | Question and mark update | October 2021 | January 2022 |
| v1.3 | P8, 17 and 27 – correction to distribution of marks. ODSR_DBS_069. | February 2023 | February 2023 |
| v1.4 | Sample added as a watermark. | November 2023 | 16 November 2023 |