T-LEVELS | Institute for Apprenticeships & Technical Education

T Level Technical Qualification in Digital Support Services

Core knowledge and understanding

Paper B

Mark scheme

v1.1: Specimen assessment materials
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603/6901/2

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

The weightings of each assessment objective can be found in the Qualification Specification.

Section A: Digital Support Services pathway **Total for this section: 25 marks**

1 **Describe** one **way organisations can use instant messaging (IM) applications to improve external communication.**

[2 marks]

AO1 = 2 marks

Award up to **two** marks for accurate and relevant description of use of application (1), accurate and relevant description of application features that improve external communication (1), for example:

- IM provides customers with a way of directly communicating with a business (1) to make specific enquiries without the need to visit their location or telephone them (1)
- IM provides a way that customers can complain to the business (1) which can then be immediately addressed and resolved (1).

Accept any other suitable response.

2 **Describe** two **reasons why it is important for a digital support professional to maintain an asset register.**

[2 marks]

AO1 = 2 marks

Award up to **two** marks for a description of why it is important to maintain an asset register, for example:

- allows the professional to track the current condition of a digital asset. This will show the potential remaining life span of the asset (1)
- allows the professional to track maintenance of assets and plan future maintenance requirements (1).

Accept any other suitable response.

3 **Describe** three **routes that an individual may take if they want to become a digital support worker.**

[3 marks]

AO1 = 3 marks

Award **one** mark for describing each route up to a maximum of **three** marks, for example:

- an apprenticeship allows someone to gain experience while being paid to work in a specific job role (1)
- professional qualifications allow a student to show they have a level of competency within a specific product or framework (1)
- higher education and degree routes may allow students to gain more in-depth knowledge of digital support topics, and perhaps specialise in specific areas (1)
- professional recognition constitutes internal progression within an organisation through continued employment (1).

Accept any other suitable response.

4 **Users of a networked colour printer have reported that it is not working for the third time in two weeks.**

A support technician has completed all routine checks and troubleshooting steps recommended by the manual. The printer is still not working.

Select an appropriate root cause analysis approach and describe how this could be used to solve the printer problem.

[3 marks]

AO2 = 3 marks

Award **one** mark for selecting an appropriate root cause analysis approach, and up to a further **two** marks for the description of how this could be used, for example:

- the 5 'whys' (1) can be used to ask questions about the particular fault with the printer (1) in order to progress through the fault analysis to identify the root cause (1)
- fishbone diagram (1), group possible causes into categories, such as power, or toner and ink (1) once causes have been categorised, potential solutions can be applied to each category (1).

Accept any other suitable response.

5 **A support desk manager has been reviewing customer feedback. The manager has noticed that many customers feel that the agents answering their calls do not listen to their problems fully.**

The manager has now arranged training for the agents on active listening.

Discuss three **ways that active listening could benefit the business.**

[3 marks]

AO3 = 3 marks

Award **one** mark for each benefit described/discussed that is relevant to the business up to maximum of **three** marks, for example:

- this will improve resolution of customer queries as the agents will confirm understanding by paraphrasing back the customer's request and so can be sure they are taking the correct action to resolve the request (1)
- by ensuring that the support desk agents adopt active listening the business will receive useful insight that could support the resolution of queries first time as they may find that the root of the issue is different to the one the customer is communicating and they are able to find and resolve other problems (1)
- active listening will build trust and respect with the customers, it will demonstrate that the business values them and wants to provide the best possible service, this will then be communicated through word of mouth and promote the business' reputation (1).

Accept any other suitable response.

6 **A consultant has created the following infographic to be distributed to local schools:**

See question paper for infographic.

Discuss why the infographic would be effective in helping children to stay safe online.

[4 marks]

AO3 = 4 marks

Award up to **four** marks for a reasoned discussion of why the infographic will help ensure the intended audience stay safe online, **one** mark for each evaluative point given, for example:

- the infographic that has been provided is very visual, easy to read and has a clear message that can be understood by its audience, which are parents of children in the school (1)
- the language used adopts an informal tone and structure which are both appealing and appropriate for the target audience (1)
- the information provided on the infographic is effective as the seven tips provided are good advice that mirror guidance from organisations such as NCSC (1)
- the presentation of the infographic is straight to the point and provides memorable images that will ensure that the information is retained by those who view the infographic (1).

Accept any other suitable response.

7 **A helpdesk has received the following message from a customer:**

"A few minutes after logging into my computer, it starts running really slow. Lots of windows keep opening even though I am not opening any new programs up. Could you help me please?"

The helpdesk has decided to use screen share to resolve the situation.

Explain four **reasons why using screen share would be effective.**

[4 marks]

AO2 = 4 marks

Award **one** mark for each reason why the screen share would be effective, up to a maximum of **four** marks, for example:

- screen share will be effective because the helpdesk will be able to see what is actually meant by the user's statement of 'lots of windows' (1)
- the helpdesk will be able explore the device and try and understand what could be causing multiple 'windows' to open or slowness without having to go backwards and forwards with written responses or explain the steps on a phone call (1)
- screen share will allow the helpdesk to gauge how slow the machine is running without relying on the customer's interpretation (1)
- the helpdesk could observe the user interacting with the machine to identify if user error is causing the problems.

Accept any other suitable response.

8 **A technical support company noticed that some of their customers had started to use rival services. The company surveyed past customers to find out why. The most common reasons were 'slow response times to incidents' and 'poor security standards'.**

The company is considering the use of monitoring tools as a possible solution for this.

Describe each of the following system monitoring tools:

- **system alarms**
- **logs.**

Explain how each of these tools could be used to improve the performance of the support company.

[4 marks]

AO1 = 2 marks
AO2 = 2 marks

Award **one** mark (AO1) for a correct description of each monitoring tool, up to a maximum of **two** marks.
Award **one** mark (AO2) for a correct explanation of how each monitoring tool can be used to improve the performance of the support company, up to a maximum of **two** marks.

For example:

- system alarms allow for thresholds to be configured that will trigger an alert to the administrator when a threshold is met, making them aware of a problem instantly (1 AO1) this ensures that if a system goes down or sustains an error there will be a quicker response to incidents (1 AO2)
- logs allow for events around a specific application, system or service to be recorded and then evaluated at a later date, such as when a security issue occurs (1 AO1). Review the logs around prior security issues to identify past instances where security standards have not been met and identify ways to resolve these (1 AO2).

Accept any other suitable response.

Section B: Tools and testing

Total for this section: 21 marks

9 **Identify** two **project management methods that can be used to manage digital projects.**
[2 marks]

AO1 = 2 marks

Award **one** mark for identifying each correct project management method used in digital projects, up to a maximum of **two** marks, for example:

- agile (1)
- waterfall (1)
- spiral (1)
- rapid application development (1).

Accept any other suitable response

10 **A car manufacturer is launching a new model. They plan to brief staff on the specification, price and projected sales of the new model, at a training conference.**

Describe two **digital tools or methods that could be used to support this communication.**
[2 marks]

AO2 = 2 marks

Award **one** mark for each description of how a digital tool or method could support, up to a maximum of **two** marks, for example:

- presentation software could be used to present the new model details in a planned order (1)
- digital infographics such as posters and leaflets could summarise key features and benefits of the new model in a readable form (1)
- graphs could show projected sales or market comparisons (1)
- dashboards could show competitor analysis and business intelligence (1)
- video could be used to demonstrate the new model (1).

Accept any other suitable response.

11 **A haulage firm is based in the North West of England. They are looking to increase their share of the UK market and have started a nationwide marketing campaign to attract new visitors to their website.**

Below are the statistics of the marketing campaign:

See question paper for statistics.

Explain one **way in which the haulage company can use the statistics to target new customers.**
[2 marks]

AO2 = 2 marks

Award up to **two** marks for a contextualised explanation.

The explanation should include what is indicated by particular statistics (1) and how this can be used/what action can be taken to target new customers (1), for example:

- the company can target the areas that attracted the most visitors to the website (1) such as London, the North West and South East (1)
- areas that had a low bounce rate show that the interest of the visitor to the website is likely to be genuine as they have visited at least two pages on the website (1), areas with low bounce rate such as Wales and Scotland should be targeted with more specific ad campaigns (1).

Accept any other suitable response.

12 *See question paper for log.*

Figure 1 **shows an extract from a tier 1 technician's support request. You can see that a lot of calls to the helpdesk are about a recent operating system update.**

Describe the possible benefits to the helpdesk of using a root cause analysis.

[3 marks]

AO3 = 3 marks

Award up to **three** marks for describing the potential benefits of doing a root cause analysis on the helpdesk. Award **one** mark for each potential benefit described that is relevant to this situation, for example:

- root cause analysis allows the organisation to pinpoint the exact source of the problem, meaning that a fix can be applied (1)
- in this instance, there is clearly an issue with updates to the operating system which, if managed centrally, could be resolved before user experience issues (1)
- this would therefore reduce the number of calls to the helpdesk on this issue (1).

Accept any other suitable response.

13 **A new app has been designed.**

Describe three **recognised methods of testing this app that can lead to a successful launch.**

[3 marks]

AO1 = 3 marks

Award **one** mark for each correct type of system testing described, up to a maximum of **three** marks, for example:

- stress testing, a method of testing whether a system can function with expected demand by replicating real world load (1)
- black box testing, a method of software testing that doesn't have an expected outcome (1)
- white box testing, a method of software testing based on knowing the expected outcome (1)
- usability or audience testing, testing is completed by users to ensure it meets their requirements (1). Either terminology is acceptable.

Accept any other suitable response.

14 **A theme park has introduced a new interactive app. This app allows visitors to access additional information and educational videos as they walk around the park. The visitor numbers were extremely high in the week that the app was released.**

Many visitors gave feedback to say they were unhappy that at peak times the application crashed several times and performance was sluggish.

Explain two **ways in which stress testing could have improved the performance of the application when it was released.**

[4 marks]

AO2 = 4 marks

Award **two** marks for each explanation up to a maximum of **four** marks.

Each explanation should include what performance element is tested (1) and why the results could have helped improve performance before release (1), for example:

- when using stress testing, the developers of the app could have tested with the maximum expected concurrent users that the park would expect at its busiest times (1), this would have allowed the theme park to see how the app performs under the peak load that would be expected during the busiest times, such as launch day when the park is at capacity (1)
- the developers could have used stress testing to see how the app handles a large spike in active users for example when a new ride is introduced (1), this would ensure the app performs well when the users begin to use it at the start of the day or just after popular lunch times (1).

Accept any other suitable response.

15 **A business has recently completed a company-wide survey on staff efficiency and wellbeing. The business has six sites spread across the UK and several workers who are home-based.**

Feedback from the survey suggested that communication within the business was ineffective and that staff felt they lacked access to organisational news and updates. Home-based workers complained they sometimes felt isolated.

a) Discuss three **ways that digital collaborative communication tools could tackle the staff concerns and improve their efficiency and wellbeing.**

[3 marks]

b) Describe two **possible digital collaborative communication tools or technologies that the business could use.**

[2 marks]

AO3 = 3 marks
AO2 = 2 marks

a) Award up to **three** (AO3) marks for the discussion of how digital collaborative communication tools could tackle the staff concerns related to the context, for example:

- the impact that this may have on the company would be a possible increase as digital collaborative communication tools would immediately remove a barrier that has been identified in the survey (1)
- this improved communication would ensure that staff know more about the wider business and how their work links to it, which will give them a sense of pride in knowing that their work is important to the overall business (1)
- however, staff may feel that they are getting information overload and therefore important information gets lost. Also, staff may disengage from the communications as there could be too much and of little relevance to them and their role (1).

Accept any other suitable response.

b) Award one (AO2) mark for each description of possible digital collaborative communication tools or technology that the business could use, for example:

- Use of chat function within online software platforms to replace communication lost through not being in the same location (1)
- use of video conferencing software that all staff would be able to access regardless of working location, supporting home-based workers to feel less isolated (1).

Accept any other suitable response.

Section C: Security and legislation

Total for this section: 35 marks, plus 3 marks for QWC

16 **State** one **industry standard that must be considered when processing card payments.**

[1 mark]

AO1 = 1 mark

Award **one** mark for a correctly identified payment industry standard, for example:

- PCI DSS (Payment Card Industry Security Standards Council) (1).

Accept both the abbreviation and full name of standard.

17 **A small law firm has recently been the subject of a successful external cyber attack, during which sensitive information was stolen and leaked online.**

What is an 'intrusion detection system'?

Explain how this kind of system can be used to defend against further attacks.

[2 marks]

AO1 = 1 mark
AO2 = 1 mark

Award **one** (AO1) mark for a definition of intrusion detection system, for example:

- an intrusion detection system monitors a network to identify any malicious activity (1).

Award **one** (AO2) mark for explaining how an intrusion detection prevention system can defend against future attacks on the firm, for example:

- the intrusion detection system would give early warning of any unauthorised access, allowing the law firm to implement suitable mitigation (1).

Accept any other suitable response.

18 **You have been employed as a security consultant for a firm of accountants. The firm have asked you to investigate the security of their HR system that stores all their employee data. In your investigation, you have found several vulnerabilities within the system.**

Below is an example report that can be generated from the company's HR database:

See question paper for report.

An attacker has gained unauthorised access to the confidential data.

Describe three **ways in which the attacker could use this data inappropriately.**

[3 marks]

AO2 = 3 marks

Award **one** mark for each accurate description of how the data could be used inappropriately, relevant to the situation, up to a maximum of **three** marks, for example:

- as the system under investigation relates to HR then the data in the system will contain personally identifiable information such as name, date of birth and address. This could be used by an attacker to undertake fraudulent activity under a victim's identity (1)
- the information in the report provides two contact numbers which could be used to make unsolicited sales calls (1)
- the database contains extremely sensitive information such as reasons for termination, which could be used to cause embarrassment to a former employee or even for the purpose of blackmail (1).

Accept any other suitable response.

19 **A company wants to check that they are complying with the Freedom of Information Act 2000.**

The company has had problems with staff leaving unprofessional notes about customers on the customer management system.

Evaluate how the business could be impacted if a customer requested a copy of their records under the Freedom of Information Act 2000.

[4 marks]

AO3 = 4 marks

Award **one** mark for each impact given as an outcome of their evaluation, up to a maximum of **four** marks, for example:

- customers that request information held about them would see the unprofessional comments left by employees on their records which would cause reputational damage to the business (1)
- the customers would see the comments left on the management system. This would likely lead to unhappy customers who would not be willing to deal with the company

anymore, having a financial impact (1)
- the ability for the business to compete with other businesses would be impacted because other businesses may not have experienced this damaging release of information. This could lead to existing and potential customers trading with other businesses (1)
- employees would need to be disciplined where instances of unprofessional comments are found to have been made, which might affect the morale of the workforce (1).

Accept any other suitable response.

20 **A clothing brand has expanded their sales operation. They now have a website so they can sell to customers outside of the local area. The website is heavily promoted through the social channels of their brand influencer.**

Describe the following two IT security threats and explain how each threat could affect the clothing brand:

- **distributed denial-of-service (DDoS)**
- **spear phishing.**

[4 marks]

AO1 = 2 marks
AO2 = 2 marks

Award **one** (AO1) mark for each accurate description of the identified security threats, up to a maximum of **two** marks, for example:

- a distributed denial-of-service (DDoS) attack is a malicious attempt to render a server unable to provide its intended service. This can disrupt services that a business is attempting to offer (1)
- spear phishing is a targeted attempt to get someone's personal details, such as log in details, made by someone creating a fake communication made to appear as though it is from a company or organisation (1).

Award **one** (AO2) mark for explaining the likely impact on the organisation of each security threat, up to a maximum of **two** marks, for example:

- a DDoS attack will make the organisation's website unavailable. Without backing this up with a secure system, customers may not be able to access the service, resulting in lost revenue (1)
- a successful spear phishing attempt would harm the reputation of the organisation, which may make customers shop elsewhere (1)
- it is common for spear phishing attempts to focus on specific people within a business, such as the well-known influencer who has information about them in the public domain (1).

Accept any other suitable response.

21 **A gaming retailer specialising in PCs and consoles only sells online and has built an excellent reputation with their customers.**

Confidentiality and integrity are two principles of network security.

Describe each principle.

Explain how each principle applies to this gaming retailer business:

- **confidentiality**
- **integrity.**

[4 marks]

AO1 = 2 marks
AO2 = 2 marks

Award **one** mark (AO1) for a description of each computer security element, up to a maximum of **two** marks.

Award **one** mark (AO2) for explaining how each element applies to the business in the scenario, up to a maximum of **two** marks.

Confidentiality

- confidentiality is the principle of keeping communication or data private (1 AO1).
- as this business only operates online they must keep non-physical customer data that has been transferred secure from unauthorised access to ensure that it remains confidential (1 AO2)
- this requires that relevant security protocols are in place such as access control and encryption which will ensure that their excellent reputation is not damaged (1 AO2).

Integrity

- integrity is the principle of keeping information accurate, free from errors and without unauthorised modification (1 AO1).
- the business must ensure they are able to track whether the data that they store has been accessed and processed, this can be done through security logging techniques (1 AO2)
- to give the customers piece of mind that the transfer of online data when making a purchase is secure (1 AO2).

Accept any other suitable response.

22 **A software business wants to make sure that its latest security product meets the required industry minimum security standards.**

a) Explain why it is important to the business that their product can meet these standards.

[2 marks]

b) Evaluate the potential impact of not being able to comply with the security standards.

[3 marks]

AO2 = 2 marks
AO3 = 3 marks

- a) Award **one** (AO2) mark for each explanation for the importance to customers of the product meeting the standards, up to a maximum of **two** marks. without these standards the business could suffer damage to their reputation in the eyes of potential customers, which is vital for a business that sells security products (1)
- this will protect their data and the data of their customers (1).

Accept any other suitable response.
b) Award **one** (AO3) mark for each evaluation of the potential impact on the company of the product not meeting the security standard, up to a maximum of **three** marks.

- if security software does not meet this minimum standard, then the business would not be competitive in the market (1)
- this would lead to less customers having the confidence to purchase which would directly impact on the financial health of the company (1)
- if the software did not protect a customer's assets in the way intended, then they may be liable to legal action from customers that have purchased the software (1).

Accept any other suitable response.

23 **A local school is planning an upgrade of their IT systems. Their current network OS and client OS is over 10 years old.**

The school plans to migrate the classroom register from a shared spreadsheet to a system hosted on a database in the cloud. Recently, there have been several successful unauthorised access attempts on the shared drives due to teacher passwords being guessed.

All teacher passwords have now been reset to a random word and distributed to each teacher individually.

Evaluate the school's digital security. You must **comment on:**

- one **technical and** one **non-technical vulnerability**
- **potential impacts of these vulnerabilities**
- **potential components that can be put in place to make unauthorised access less successful.**

[12 marks plus 3 for QWC]

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

Band	Mark	Descriptor
4	10–12	AO3 Evaluation of digital vulnerability mitigation is **comprehensive**, **effective,** and **relevant**, showing **detailed** understanding and **logical** and **coherent** chains of reasoning throughout. The answer demonstrates informed conclusions that are fully supported with rational and balanced judgements. AO2 Applied all relevant knowledge of security vulnerabilities and their impacts to the context given and shows a **detailed** functional understanding of digital security. AO1 A **wide range** of relevant knowledge and understanding of digital security and critical bugs, which is **accurate** and **detailed**. The answer demonstrates **comprehensive** breadth and/or depth of understanding.
3	7–9	AO3 Evaluation of digital vulnerability mitigation 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 vulnerabilities, impacts of vulnerabilities and mitigation components to the context, showing **some** functional understanding of digital security. AO1 Knowledge and understanding of digital security and critical bugs 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 digital vulnerability 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 brief conclusions are supported by judgements that consider only the most basic arguments. AO2 Applied some but limited knowledge of vulnerability, impacts of vulnerabilities and mitigation components to the context and may show a lack of functional understanding of digital security. AO1 Knowledge and understanding of digital security and critical bugs show **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 digital vulnerability mitigation 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 vulnerability, impacts of vulnerabilities and mitigation components with little relevance to the context. AO1 Knowledge and understanding of digital security and critical bugs 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

Band	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 are 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 are 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 are 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, with inappropriate use of technical terms. The errors in grammar severely hinder the overall meaning.

Indicative content

Key principles

AO1 Technical vulnerabilities may include:

- outdated operating systems. These are likely to be unsecure and therefore sources of vulnerabilities due to no longer being serviced by updates that protect against the latest threats.
- as the operating system is outdated then it is likely that the software being used will also be outdated. This would potentially have critical bugs within the software as it is likely to be no longer supported by the vendor.

AO1 Non-technical vulnerabilities may include:

- the security knowledge of teachers is not strong enough. This is shown by the fact that several teacher's passwords have been guessed recently, allowing unauthorised access to shared drives
- as the new passwords are only 'a word' then this is susceptible to brute force attack as the password is not sufficiently complex. For example, a word does not include special characters or numbers that increase the strength of a password.

AO2 Potential impacts of vulnerabilities:

- malware could cause the school a serious problem, especially if something like a ransomware attack against the school network was successful. This would likely mean that teachers and students would not be able to access their important data such as coursework that has marking deadlines. This would impact massively on the school's reputation and potentially cause issues with regulatory bodies such as the local education authority and Ofsted
- successful unauthorised access attempts will mean that unauthorised users can access files that they would not be allowed to see. These files could include background information about a child's home life and medical conditions. This could lead to a serious data breach which could contravene data protection laws and require a report and subsequent investigation from the data commissioner, which could lead to fines or even legal action against responsible individuals.

AO3 Evaluation:

- the school network must be brought up to date and be shown to be adequately secure. The use of cloud hosted systems will ensure that data cannot be accessed through such simple methods as they have been. A cloud provider will ensure that data is encrypted when in use and when at rest, while the school will require strong authentication policies to be in place such as multifactor authentication. However, this will take users slightly longer to log in so could be considered less convenient
- a move to newer operating systems will ensure that the latest threats are mitigated against using patches. This will provide a much more solid base of security than that which has currently been provided, which is not adequate. However, this will be costly for the organisation and requires system downtime when being installed
- training for all staff in the school must be implemented to ensure that the bad behaviours that have been displayed and have led to unauthorised access attempts are ended immediately. Staff would be trained in how to select a strong and easy to remember password and given refresher training on good password management to ensure that these issues do not happen again
- a final mitigation would be the introduction of a security framework to take stock of all

aspects of the school security policy. The school would likely find it beneficial to work towards a framework such as Cyber Essentials or ISO 27001 to ensure that all aspects of their IT security system is to the right standard to ensure the protection of both pupil and school data.

Section D: Data and digital analysis

Total for this section: 44 marks, plus 3 marks for QWC

24 **State** one **possible purpose of an algorithm.**

[1 mark]

AO1 = 1 mark

Award **one** mark for stating a purpose of an algorithm, for example:

- to automate calculations (1)
- computational actions (1)
- problem solving (1)
- support machine learning (1).

Accept any other suitable response.

25 **Describe an iterative algorithm.**

[2 marks]

AO1 = 2 marks

Award **one** mark for each element of an iterative algorithm described, up to a maximum of **two** marks.

- repeating a series of steps (1)
- repeating steps until a task is accomplished (1)
- count-controlled loops (1).

Accept any other suitable response.

26 *See question paper for diagram.*

The data modelling for a company is shown in the diagram above.

Describe how this entity relationship diagram can improve the control and monitoring of the company's IT assets.

[2 marks]

AO2 = 2 marks

Award **one** mark for each description of how the entity relationship diagrams (ERDs) can improve the control and monitoring of the company's IT assets, up to a maximum of **two** marks, for example:

- the entity relationship diagram shows that employees and assets will be modelled within tables in the database. The assets and employees will be linked by an employee assets table that allows for an entry to be made each time an asset is allocated to an employee (1)

- each asset can be allocated to an employee in a 'many to one' relationship, allowing for assets to be returned and then allocated to other employees (1).

Accept any other suitable response.

27 **A junior developer is creating a piece of software for a non-technical client. The client has asked for an overview of how the software will work.**

Explain three **benefits of using pseudocode to give this overview.**

[3 marks]

AO2 = 3 marks

Award **one** mark for each benefit explained, up to a maximum of **three** marks, for example:

- it allows the developer to express the logical ideas of the program to the client without using technical language (1)
- writing pseudocode allows a developer to plan out the logic of a piece of software without writing all the code (1)
- it can be implemented into a real piece of code relatively quickly due to its similarity to real programming language, as opposed to a flowchart (1)
- pseudocode allows the junior developer to express the logical ideas without complete reliance on a specific technical coding language, therefore allowing them to test the effectiveness of their idea before implementing it (1)
- receiving guidance from the more senior colleague will allow the junior developer to ensure that the pseudocode is correctly linking to problem solving and algorithm design requirements (1).

Accept any other suitable response

28 **A large organisation with 1000 users has reviewed its current access control policies. The organisation has found that many users can access files and folders on the network that they should not be able to access.**

The organisation currently uses a mandatory access control system where administrators are responsible for assigning access rights to users. The administrator has suggested that a role-based access control system might be better.

Explain why replacing the current access control system with a role-based access control system would be beneficial to the organisation.

[4 marks]

AO2 = 4 marks

Award **one** mark for each explanation given for replacing the current system with a RBAC system relevant to the context, up to a maximum of **four** marks, for example:

- the current system of using mandatory access control is simply too ineffective to work given the large amounts of users within the organisation (1)
- because access control in this organisation must be assigned manually by the

administrators, there is a lot of scope for human error which is clearly the case given the issues that the organisation is experiencing (1)
- replacing the current system with role-based access control will simplify the access control process, allowing it to be managed much more effectively and ensure that the current problems stop and the 1000 users only have access to their authorised files and folders and cannot access, download or amend other files (1)
- administrators will be able to manage using groups that reflect a user's job role, which will ensure that users can only access objects that are required to be able to perform their duties and take the pressure off the administrators of the organisation which would likely be the case with an organisation of this size (1).

Accept any other suitable response.

29	**A business has recently seen a large increase in demand for their services. The business currently operates from their original premises, which are small and cannot physically expand. The business also currently struggles to store and process their customers' data on a small on-premises server.** **Identify** two **benefits of cloud storage and describe** two **reasons why cloud storage would be suitable for this business.** [4 marks]

AO1 = 2 marks
AO2 = 2 marks

Award **one** (AO1) mark for each benefit of cloud storage, up to a maximum of **two** marks.
Benefits of cloud storage include:

- it allows an organisation to access an internet-based storage solution (1)
- it offers high performance and scalability to grow / meet the growth demands of an organisation (1).

Award **one** (AO2) mark for each reason given for why cloud storage is a suitable solution for this business, up to a maximum of **two** marks:

- this solution would be ideal for the business as cloud storage is scalable and therefore the business will be able to purchase greater capacity to cope with the increase in demand (1)
- as the business has no further physical capacity to expand the current data centre then cloud storage will overcome this limitation (1).

Accept any other suitable response.

30 **A large technology solutions provider operates in the UK. The business uses call logging and statistics to monitor the performance of their sales operators. Every call that an operator makes or receives is logged. The duration of calls is also logged. Each operator is expected to log around 60 calls per day.**

Below is an extract of yesterday's call log:

See question paper for call log.

The business uses digital analysis to inform their decisions.

Describe two **methods of abstraction. Explain how** each **method could be used with the data set provided.**

4 marks]

AO1 = 2 marks
AO2 = 2 marks

Award **one** (AO1) mark for the description of each abstraction method, up to a maximum of **two** marks.

Award **one** (AO2) mark for each explanation of using abstraction, up to a maximum of **two** marks.

For example:

- filtering data allows for the consideration of only necessary detail (1 AO1), data in the log can be filtered for each sales operative to be able to investigate and review their own performance; in the data set provided, for example, the operative Frank Smith has much longer call durations than his colleagues (1 AO2)
- removing unnecessary data (1 AO1), a strange event seems to have occurred at 09:10 where many operatives received calls from an origin that is listed as 'unknown'. These calls were extremely short in length and so provide no statistical value and should be removed from the data set as to not influence the analysis of data (1 AO2).

Accept any other suitable response.

31 **Your company is part of a movie streaming service. The company collects large amounts of data on viewing habits of customers and operational performance data. This data includes:**

- **most-watched genre**
- **most-watched actors**
- **keywords associated with watched items.**

When they register, new customers select viewing preferences. The system also monitors how many people are streaming at the same time, streaming speeds and new subscriptions per month.

The movie streaming service wants to identify trends and patterns to support marketing and operational activities.

Discuss three **ways that the service could use the collected data to do this.**

In each **case, explain the benefit to the business of using this data.**

[6 marks]

AO3 = 6 marks

Award **one** mark for a relevant discussion point and **one** mark for an appropriate justification, up to a maximum of **six** marks.

Possible application of data:

- creation of customer profiles (1):
  - possible benefits: viewing behaviour can be used to build customer profiles and recommend movies likely to be watched or target customers based on their preferences (1). This allows for a more personalised experience and may increase engagement with the platform (1)

- the monitoring and control of operations:
  - possible benefits: volume of users streaming at certain times could be monitored to ensure there is no impact on level of service (1). Extra resources could be implemented to cover the level of demand for a movie or time of day, based on the analysis of data (1)

- the setting and monitoring of key performance indicators (KPIs):
  - possible benefits: KPIs around new subscriptions per month could be monitored, which would indicate popularity of the streaming platform. (1) This would inform financial business decision making. (1)

Accept any other suitable response.

32	**Your organisation wants to automate processes to save cost, categorise customer complaints about packaging and reduce their carbon footprint. As a result, some of the packaging decisions will now be made by an algorithm. All products must be packaged based on number of items and weight and dimensions of those items.** **Analyse how pattern recognition and decomposition could help design an effective algorithm to make this packaging process effective.** [6 marks]

AO3 = 6 marks

Award **one** mark for each appropriate analysis of pattern recognition to support algorithm design, up to a maximum of **three** marks, for example:

- allows for identifications of patterns that may make the packaging process more efficient (1). One example of this could include the algorithm identifying ways to group products together, similar products could then be packaged in the same way which may increase the efficiency of the packaging process (1)
- allows for identification of products that often receive customer complaints relating to packaging (1). This would then allow for an analysis of possible reasons of these complaints such as the quality or quantity of packaging being appropriate. More appropriate packaging could then be identified by the algorithm to reduce complaints (1)
- allows for identification of products by the algorithm which have excessive packaging for product size or weight (1). Reducing this may save cost and reduce the carbon footprint of the organisation. This reduction in packaging may also reduce any customer complaints related to excessive packaging for the products and have a positive impact on organisational reputation (1).

Accept any other suitable response.

Award **one** mark for each appropriate analysis of decomposition to support algorithm design, up to a maximum of **three** marks, for example:

- decomposition which would allow the packaging process to be broken down into smaller parts that are easier to understand and manage (1). This would allow the algorithm to analyse the cost of each step (1). This would support identification of areas where packaging could be reduced and therefore reduced costs (1). The reduction in packaging would also reduce their carbon footprint (1)
- decomposition of customer packaging complaints would allow the specific nature of the complaint to be identified by the algorithm (1). Complaints could then be categorised, and all packaging complaints could then be addressed by specific packaging processes suggested by the algorithm (1).

Accept any other suitable response.

33 **A small local bakery has decided to digitalise their business. The bakery will offer online ordering, payment and delivery service to customers.**

Recommend usable relational database systems and evaluate your decisions.

Your response must include:

- two **resource considerations of data entry and maintenance**
- two **key functions that the relational database should perform**
- **considerations of validation and verification of data entry.**

[12 marks plus 3 for QWC]

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

Band	Mark	Descriptor
4	10–12	AO3 Evaluation of data entry considerations relating to relational database systems is **comprehensive**, **effective,** and **relevant**, showing **detailed** understanding and **logical** and **coherent** chains of reasoning throughout. The answer demonstrates informed conclusions that are fully supported with rational and balanced judgements. AO2 Applied all relevant knowledge of database functions to the context and showed a **detailed** functional understanding of validation and verification. AO1 A **wide range** of relevant knowledge and understanding of resources involved in developing a database system, 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 data entry considerations relating to relational database systems 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 database functions to the context, showing **some** functional understanding of validation and verification. AO1 Knowledge and understanding of resources involved in developing a database system **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 data entry considerations relating to relational database systems 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 are supported by judgements that consider only the most basic arguments. AO2 Applied some but limited knowledge of database functions to the context and may show a lack of functional understanding of validation and verification. AO1 Knowledge and understanding of resources involved in developing a database system show **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 data entry considerations relating to relational database systems 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 database functions with little relevance to the context. AO1 Knowledge and understanding of resources involved in developing a database system 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 are 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 are 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 are 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, with inappropriate use of technical terms. The errors in grammar severely hinder the overall meaning.

Indicative content

Business resource considerations:

- time is a resource that must be considered by the bakery when developing the new

database system (AO1). Due to the launch of the online offering, it is likely that the database must be ready to be used quickly, while containing the correct functionality to be useful to satisfy the needs of the business and their customers (AO2)
- budget is a resource that must be decided before the development of the database commences (AO1). It is likely that the budget is modest due to the type of business that the bakery is. This is likely to limit the functionality of the database (AO2).

Key functions of the database:

- the database must have a create function to allow the bakery to add both products and customers to it (AO1). This will allow for customer orders to be tracked within the system from the initial order to the product being delivered, while also ensuring that stock levels can be tracked to ensure that only orders that can be fulfilled will be taken (AO2)
- the database should include functionality to integrate with an online payment system. (AO1) This will allow the bakery to take payment when an order is made which will ensure that orders do not go to customers who have no means to pay. This will have a positive impact on the cash flow of the business as they will be able to be paid upfront for upcoming orders, meaning that supplies can be purchased ahead of the products being made (AO2).

Evaluation

AO3

- Due to the nature of the business, the database and its data should be simple to use and maintain. During the development of the database, techniques that encourage correct data only to be used, such as data validation, should be employed to ensure that non-technical users are able to input data accurately which will not cause functionality issues.
- It would also be wise to ensure that users of the database cannot make modifications to the back end of the database, including its design and user interface. Again, it is likely that the users will have a low skill level in this area and could cause problems that would make the database an ineffective tool for the business.
- User groups should be used to ensure that those accessing the system only have user level rights to it. However, these take time and resources to established and must be maintained as people leave and join the organisation. Without this maintenance the process would not succeed as intended.
- The developer of the database should retain system administrative rights to be able to make authorised or requested changes to the database, with remote access to it advised to allow for issues to be resolved quickly should they occur.

Assessment Objective Grid

Question	AO1	AO2	AO3	QWC	Total
1	2				2
2	2				2
3	3				3
4		3			3
5			3		3
6			4		4
7		4			4
8	2	2			4
9	2				2
10		2			2
11		2			2
12			3		3
13	3				3
14		4			4
15		2	3		5
16	1				1
17	1	1			2
18		3			3
19			4		4
20	2	2			4
21	2	2			4
22		2	3		5
23	4	4	4	3	15
24	1				1
25	2				2
26		2			2
27		3			3
28		4			4
29	2	2			4
30	2	2			4
31			6		6
32			6		6
33	4	4	4	3	15
Total	**35**	**50**	**40**	**6**	**131**

Document information

The T Level Technical Qualification is a qualification approved and managed by the Institute for Apprenticeships and Technical Education.

Owner: Head of Assessment Design

Change History Record

Version	Description of change	Approval	Date of Issue
v1.0	Published.		December 2020
v1.1	NCFE rebrand.		September 2021