T Level Technical Qualification in Digital Production, Design and Development

Mark Scheme

Core Paper 1: Digital Analysis, Legislation and Emerging Issues

Autumn 2024

General Marking Guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Learners must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved. Examiners should also be prepared to award zero marks if the learner's response is not rewardable according to the mark scheme.
- Where judgement is required, a mark scheme will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the mark scheme to a learner's response, a senior examiner should be consulted.
- Crossed out work should be marked unless the learner has replaced it with an alternative response.
- Accept incorrect/phonetic spelling (as long as the term is recognisable) unless instructed otherwise.

Points-Based Mark Scheme Guidance

Points-based mark schemes are made up of:

1. Mark scheme rubric

   A mark scheme rubric instructs an examiner as to how each mark is awarded.
2. Example Responses

   These demonstrate the type of acceptable responses that a student might provide and where each mark is awarded.
3. Additional marking Guidance

   This informs examiners about any parameters which should be applied e.g. 'accept any other appropriate/alternative responses.

Applying the points-based mark scheme guidance

Examiners should follow the mark scheme rubric and use the example responses as a guide for the relevance and expectation of the responses. Students must be credited for any appropriate response. Should candidates provide answers that meet the rubric but in an alternative order, credit should be given.

Levels-Based Mark Scheme Guidance

Levels-based mark schemes (LBMS) have been designed to assess students' work holistically. They consist of two parts:

1. Indicative content

   Indicative content reflects content-related points that a student might make but is not an exhaustive list. Nor is it a model answer. Students may make 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 appropriate response.

2. Levels-based descriptors

   Each level is made up of a number of traits which when combined together articulate the quality of response that a student needs to demonstrate. The traits progress across the levels to demonstrate the different expectations of each level. When using a levels-based mark scheme, the 'best fit' approach should be used.

Applying the levels-based descriptors

Examiners should take a 'best fit' approach to determining the mark.

- Examiners should first make a holistic judgement on which level most closely matches the student's response. Students will be placed in the level that best describes their answer. Answers can display characteristics from more than one level, and where this happens markers must use any additional guidance (e.g. weighting of traits) and their professional judgement to decide which level is most appropriate.
- The mark awarded within the level will be decided based on the quality of the answer and will be modified according to how securely all traits are displayed at that level:
  - Marks will be awarded at the top of that level if the student has evidenced each of the descriptor traits securely.
  - Where the response does not securely meet all traits, the marks should be awarded based on how closely the descriptor has been met.

Section A

Question Number	Answer	Mark
1	Award one mark for each correctly identified data type, up to a maximum of two marks. • String • Integer • Real/Float/Double/Single • Boolean	(2)

Question Number	Answer	Mark
2(a)	Award one mark for each correctly identified technique, up to a maximum of two marks. • Top down (design) • Bottom up (design) • Modularisation • Abstraction	(2)

Question Number	Answer	Mark
2(b)	Award one mark for identification of the reason and one mark for an appropriate linked explanation, up to a maximum of two marks. • To break a complex problem down (1) into smaller parts. (1) • To identify the main features/actions (1) required to solve the bigger problem. (1)	(2)

Question Number	Answer	Mark
3(a)	Award one mark for identification of the reason, one mark for an appropriate linked explanation of the reason and one mark for a further expansion of the explanation, up to a maximum of three marks. • The loop (on line 3) goes up to 10 (1) and the list is only 7 numbers long (1) so the total would be wrong/could cause a crash if converted to code. (1) • The loop (on line 3) goes up to 10 (1) and the list is only 7 numbers long (1) so the program would access memory elements outside the list. (1) • The range of the loop is incorrect (1) the count goes up to 10 (1) but the list only has seven numbers. (1)	(3)

Question Number	Answer	Mark
3(b)	Award one mark for identification of the purpose, one mark for an appropriate linked explanation of the purpose and one mark for a further expansion of the explanation, up to a maximum of three marks. • Checks that the total (1) is bigger than 100 (1) and outputs a suitable message if true (1) • Outputs the message (1) if (the condition) Total > 100 (1) is TRUE (1)	**(3)**

Question Number	Answer	Mark
3(c)	Award one mark for each of the following linked points, up to a max of two marks. • Inserting annotation is a much quicker process (1) as the code is already written (1). • Some complex code (1) is harder to map onto flowcharts (1) • If the audience consisted of technical specialists (1) who could read code/are programmers (1) **Accept any other appropriate responses.** **Note** – do not accept 'easier process' instead of quicker	**(2)**

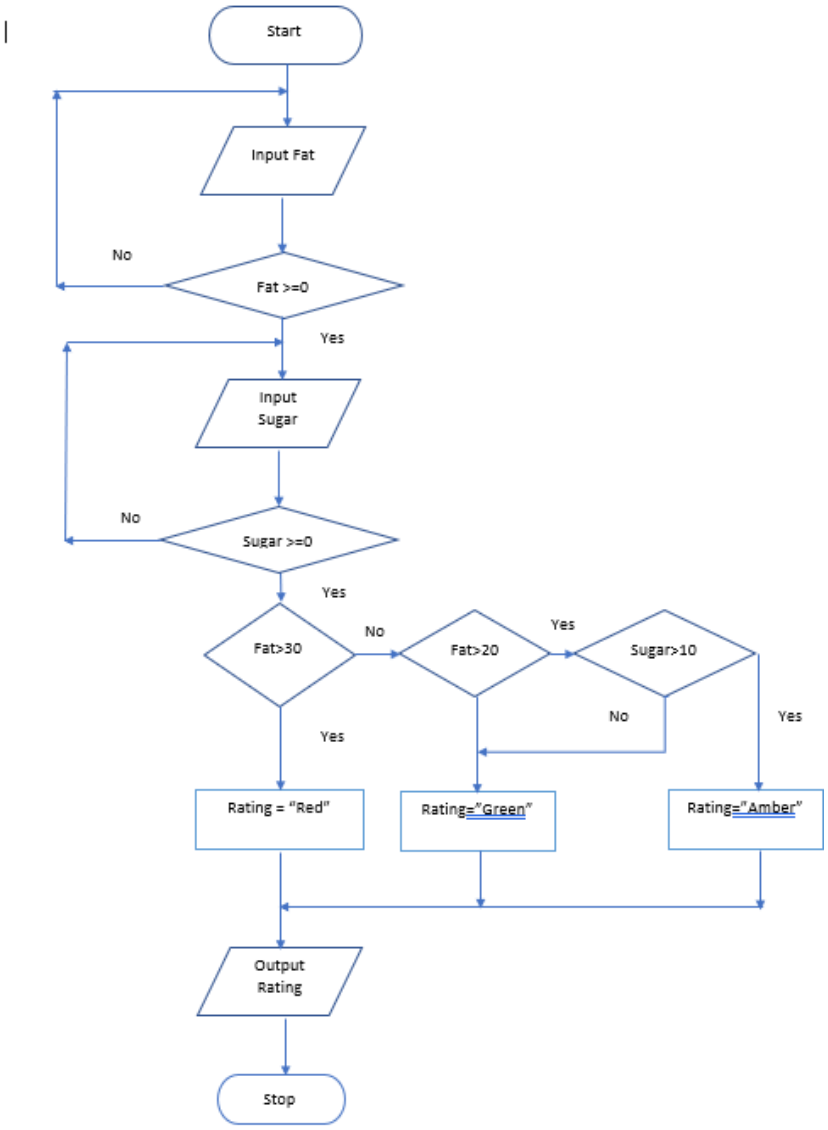
Question Number	Answer	Mark
4(a)	Award one mark for identification of the purpose and one mark for an appropriate linked explanation, up to a maximum of two marks. • To carry out a command in the correct order/ in its correct place (1) to ensure correct outcomes (1).	(2)

Question Number	Answer	Mark
4(b)	Award one mark for identification of the reason and one mark for an appropriate linked explanation, up to a maximum of two marks. • When the number of iterations (needed) is unknown (1) so a condition is used to break the loop (1).	(2)

Question Number	Answer	Mark
4(c)	Award one mark for each of the following linked descriptive points, up to a maximum of three marks. • Open the file (1) • by specifying the filename/path (1) • (and) the read mode (1) • (then) reading data from the file **Accept any other appropriate responses.** **Note** Do not accept write/append etc for mode – must be input from file Only accept read OR read/write	(3)

Question Number	Answer	Mark
5	One mark for each complete row, up to a maximum of four marks. 19 35 56 8 40 72 84 19 35 8 40 56 72 84 19 8 35 40 56 72 84 8 19 35 40 56 72 84	**(4)**

Question Number	Indicative content:	Mark
6	Award one mark for any of the following up to a maximum of six marks. • Correct symbols used (1) • Grams of fat input (1) • Grams of sugar input (1) • Invalid numbers rejected (1) • Health rating calculated correctly (1) • Health rating output (1) **Example flowchart, note other solutions can be used. Penalise incorrect symbols once only.**	



Accept any other relevant phrasing/wording.

Credit alternative solutions that use correct logic and would produce the expected outcome.

(6)

Question Number	Indicative content:	Mark
7	Learners might refer to some/all of the following in their responses, but learners should be rewarded for other pertinent contextualised answers. **Description of RCA** Clearly define problem/remove ambiguity Use 5 whys technique/continuous questioning to determine root cause of problem Prioritise causes Find solutions to causes **Benefits** Simple iterative process to follow Easy to implement Suitable for a wide range of problems human, software, hardware, physical, logistical Helps to focus on underlying problem rather than symptoms Can help to prevent future problems by removing causes of problems Focuses on teamwork as a collective **Drawbacks** It can be time consuming Requires skilled personal with in-depth knowledge of the system Does not provide immediate solutions so cannot be used in emergency situations **Conclusion**	

	Root cause analysis is a lengthy but relatively simple process, which focuses on solving the cause of the problem rather than eliminating the symptoms. Therefore, if it is not an emergency situation then it is a suitable technique for problem solving.	**(9)**

Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-3	• Demonstrates a basic analysis of the situation by superficially breaking down the different aspects into component parts (AO3) • Demonstrates basic application of knowledge and understanding that is partially relevant to the context of the question (AO2) • Demonstrates a basic evaluation which partially considers different factors/events and their relative importance, leading to a conclusion which is superficial or unsupported (AO3)
Level 2	4-6	• Demonstrates a good analysis of the situation by breaking down the different aspects into component parts (AO3) • Demonstrates good application of knowledge and understanding that is relevant to the context of the question (AO2) • Demonstrates a good evaluation which considers different factors/events and their relative importance, leading to a conclusion which is partially supported (AO3)
Level 3	7-9	• Demonstrates a thorough analysis of the situation by comprehensively breaking down the different aspects into their component parts (AO3) • Demonstrates comprehensive application of knowledge and understanding that is consistently relevant to the context of the question (AO2). • Demonstrates a thorough assessment which comprehensively considers different factors/events and their relative importance, leading to a conclusion which is well supported (AO3)

Section B

Question Number	Answer	Mark
8(ai)	Award one mark for each of the following linked points, up to a max of three marks. The number is divided by 10 (1) to give the whole part/quotient (1) and remainder (1). **Accept any other appropriate response.**	**(3)**

Question Number	Answer	Mark
8(aii)	Award one mark for each of the following linked points, up to a maximum of three marks. Identifies that lines (2 and 3 are similar to lines 4 and 5/6 and 7) are repeated (1) so can be controlled using a loop/defined in a function (1) to reduce the number of lines of code (1). **Accept any other appropriate response.**	**(3)**

Question Number	Answer	Mark
8(b)	Award one mark for each of the following linked points, up to a maximum of two marks. • Use the company whistleblowing policy (1) to report their concerns to the appropriate people (1) **Accept any other appropriate response.** **Note** Do not accept actions that the employee could take such as removing the code, setting file permissions, observing etc/ Focus on whistleblowing as this is what an employee should do	**(2)**

Question Number	Indicative content	Mark
8c	Learners might refer to some/all of the following in their responses, but learners should be rewarded for other pertinent contextualised answers: More natural resources are required to make these new devices, leading to greater scarcity of these resources. In some cases, there is pollution associated with the extraction of these resources. These new devices are more powerful therefore they have higher power consumption, resulting in more greater electricity demand. Many old devices are destroyed, resulting in a loss of scarce resources. Many devices end up in landfill potentially causing pollution. Many devices are sent to other countries to be recycled, which requires fuel to transport them.	**(6)**

Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-2	• Demonstrates a basic analysis of the situation by superficially breaking down the different aspects into component parts (AO3) • Demonstrates basic application of knowledge and understanding that is partially relevant to the context of the question (AO2)
Level 2	3-4	• Demonstrates a good analysis of the situation by breaking down the different aspects into component parts (AO3) • Demonstrates good application of knowledge and understanding that is relevant to the context of the question (AO2)
Level 3	5-6	• Demonstrates a thorough analysis of the situation by comprehensively breaking down the different aspects into their component parts (AO3) • Demonstrates comprehensive application of knowledge and understanding that is consistently relevant to the context of the question (AO2)

Question Number	Answer	Mark
9(a)	**Sample code, note other solutions can be used.** SET Distance to 0 RECEIVE Start_Distance FROM DEVICE RECEIVE End_Distance FROM DEVICE RECEIVE Average_Speed FROM DEVICE Distance = End_Distance – Start_Distance Risk_Score = Distance *2 IF Average_Speed > 60 THEN Risk_Factor = 1.6 ELSE Risk_Factor = 0.9 Risk_Rating = Risk_Score * Risk_Factor SEND Risk_Rating TO DISPLAY **Award one mark for each related descriptive point up to a maximum of six marks.** All required data is input (1) Distance calculated correctly (1) Risk_Score calculated correctly (1) Correct logic used to decide on Risk_Factor (1) Risk_Rating calculated correctly (1) Risk_Rating output (1) **Accept any other relevant phrasing/wording.** **Credit alternative solutions that use correct logic and would produce the expected outcome.** **Note** Accept minor logical error on boundary i.e. >=	**(6)**

Question Number	Answer	Mark
9(b)	Award one mark for each identification and one mark for an appropriate linked explanation, up to a maximum of four marks. Members must act in the public interest (1) through having due regard for the wellbeing of others/rights of third parties/not discriminating against others/promoting equal access (1) Members must act with competence and integrity (1) through not falsely claiming competence/taking part in CPD/being aware of legislation/respecting different viewpoints/avoiding malicious or negligent action/refusing to take unethical inducements (1) Members must act with duty relevant authority (1) through acting in accordance with relevant authorities/accepting responsibility for own work and work of people they supervise/not disclosing confidential information/not misrepresent or withhold information (1) Members must act with duty to the profession (1) through not bringing the profession into disrepute/seeking to improve standards/treating other members with respect/encouraging other members in their development	**(4)**

Question Number	Indicative content:	Mark
9c	Learners might refer to some/all of the following in their responses, but learners should be rewarded for other pertinent contextualised answers. More electronics are being embedded into cars using features such as GPS systems, tracking devices, telemetry devices to monitor driving patterns, autonomous driving features. **Benefits** Allows for tracking of vehicle locations, which can aid in recovery in case of theft, notifying arrival times to others and parental monitoring. Can feed into larger systems to monitor real time traffic conditions. Can be used to monitor driving habits and to modify insurance premiums accordingly. Can be used to help determine liability in case of accidents. Can remove some human input, such as automatic braking, which may help in safety. **Drawbacks** Very expensive to insert more and more electronics into cars, resulting in high purchase prices, repair bills and insurance costs. Maintenance can be complex and may require specialist equipment and training. Some people may see it as an intrusion into their private lives. **Conclusion** Vehicles are becoming more and more embedded into the IoT and the drawbacks are numerous in terms of better safety, although their full potential may not be reached until all vehicles become part of the IoT.	**(9)**

Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-3	• Demonstrates a basic analysis of the situation by superficially breaking down the different aspects into component parts (AO3) • Demonstrates basic application of knowledge and understanding that is partially relevant to the context of the question (AO2) • Demonstrates a basic assessment which partially considers different factors/events and their relative importance, leading to a conclusion which is superficial or unsupported (AO3)
Level 2	4-6	• Demonstrates a good analysis of the situation by breaking down the different aspects into component parts (AO3) • Demonstrates good application of knowledge and understanding that is relevant to the context of the question (AO2) • Demonstrates a good assessment which considers different factors/events and their relative importance, leading to a conclusion which is partially supported (AO3)
Level 3	7-9	• Demonstrates a thorough analysis of the situation by comprehensively breaking down the different aspects into their component parts (AO3) • Demonstrates comprehensive application of knowledge and understanding that is consistently relevant to the context of the question (AO2). • Demonstrates a thorough assessment which comprehensively considers different factors/events and their relative importance, leading to a conclusion which is well supported (AO3)

Question Number	Answer	Mark
10(a)	Award one mark for each of the following linked points, up to a maximum of four marks. **Email address** Use a format check (1) to ensure that the data contains an @ symbol (1). **Password** Use a length check (1) to check that the data entered contains the required number of characters (1). **Accept any other appropriate response.**	**(4)**

Question Number	Answer	Mark
10(b)	Award one mark for each of the following linked points, up to a maximum of four marks. Perform unit testing (1) to ensure that an individual module works as intended (1). Perform boundary testing (1) to ensure correct treatment of extreme data (1). Perform integration testing (1) to ensure that different modules interact correctly (1). Carry out performance testing (1) to ensure that the system responds within agreed timescales (1). Perform system testing (1) to ensure that the complete system works as intended (1). Smoke test (1) to ensure that the main features of the system work (1) **Accept any other appropriate response** **Note** Examples include smoke testing, Stress testing, A/B testing	**(4)**

Question Number	Answer	Mark
10(c)	Award one mark for each of the following linked points, up to a maximum of three marks. Purpose of the test is described (1) with appropriate test data (1) and the expected result (1). **Accept any other appropriate response.** Allow descriptions of specific tests.	**(3)**

Question Number	Answer	Mark
10(d)	Award one mark for each identification and one mark for an appropriate linked explanation, up to a maximum of four marks. Register the design (1) such as screen designs/graphics used (1). Apply for a patent (1) on items such as original algorithms/code/ software methods (1). Take action using unregistered design (1) if it can be proved that another company has copied visual elements (1).	**(4)**

Question Number	Indicative content:	Mark
10(e)	Learners might refer to some/all of the following in their responses, but learners should be rewarded for other pertinent contextualised answers: **Discussion may include:** **Benefits of lists** Lists support multiple data types, so it would allow for dates, numbers and names to be stored. Lists are mutable/dynamic, so the number of responses is not limited by a predetermined number. Lists have many built in functions to process the whole list, so system development costs would be reduced due to less coding required. **Drawbacks of lists** More RAM is required to hold lists, so cost of hardware might increase. If memory is limited then errors could occur. List processing is slower, so response time is slower. **Benefits of arrays** Can easily perform mathematical operations on individual elements, so could return results faster. Arrays use less RAM, so less errors could occur. **Drawbacks of arrays** Arrays can only hold elements of 1 data type only, so response options must be encoded. Arrays have less supported functions, so more user coding is required. **Conclusion**	

	Both structures have their own strengths and weaknesses. If the machine running the code has a fast CPU and much free memory, then a list should be used as they are more flexible and have more built-in functions.	
		(12)

The 2nd trait (AO2) carries twice as much weighting as traits 1 & 3.

Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-4	• Demonstrates a basic analysis of the situation by superficially breaking down the different aspects into component parts (AO3) • Demonstrates basic application of knowledge and understanding that is partially relevant to the context of the question (AO2) • Demonstrates a basic evaluation which partially considers different factors/events and competing points, leading to a conclusion which is superficial or unsupported (AO3)
Level 2	5-8	• Demonstrates a good analysis of the situation by breaking down the different aspects into component parts (AO3) • Demonstrates good application of knowledge and understanding that is relevant to the context of the question (AO2) • Demonstrates a good evaluation which considers different factors/events and competing points, leading to a conclusion which is partially supported (AO3)
Level 3	9-12	• Demonstrates a thorough analysis of the situation by comprehensively breaking down the different aspects into their component parts (AO3) • Demonstrates comprehensive application of knowledge and understanding that is consistently relevant to the context of the question (AO2) • Demonstrates a thorough evaluation which comprehensively considers different factors/events and competing points, leading to a conclusion which is well supported (AO3)

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