

T Level Technical Qualification in Digital Production, Design and Development

Mark Scheme (Results)

Autumn 2021

Paper 1: Digital Analysis, Legislation and Emerging Issues

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	<p>Award one mark for each correct piece of pseudocode up to a maximum of four marks:</p> <p>If weight>=1000 (1) OR (1) dooropen=True (1) THEN display redlight(1)</p> <p>Additional Guidance Accept any recognisable variable name</p> <p>Accept dooropen=yes door=open</p>	(4)

Question Number	Answer	Mark
2(a)	<p>PI</p> <p>Additional Guidance Ignore capitalization Ignore additional wording e.g. CONST_PI</p>	(1)

Question Number	Answer	Mark
2(b)	a	(1)

Question Number	Answer	Mark
2(c)	<p>Award one mark for identification of a purpose and one mark for an appropriate linked explanation/expansion up to a maximum of two marks, such as:</p> <p>changes (casts) the input/variable (1) to an integer (from a string) (1)</p> <p>Additional Guidance</p> <p>‘so it can be used in calculations’ (or similar) can be awarded 1 mark.</p>	(2)

Question Number	Answer	Mark
3	<p>Award one mark for each of the following linked descriptive points, up to a maximum of three marks.</p> <ul style="list-style-type: none">• (open the file) by specifying the filename (1)• (and) file path of target file• (and) the write mode (1)• creates the file if it doesn’t exist (1)	(3)

Question Number	Answer	Mark
4	<p>Award one mark for each of the following linked descriptive points, up to a maximum of four marks.</p> <ul style="list-style-type: none"> • Abstraction is used to filter out unneeded detail (1) • Leaving only the information that is needed (1) • Desired outputs are identified (1) • Necessary inputs are identified (1) • Variables are identified (1) • Constants are identified (1) • Key program actions are identified (1) <p>Accept any other appropriate responses.</p> <p>Additional Guidance: Accept 'simplify the problem' for mark point 1</p>	(4)

Question Number	Answer	Mark
5	<p>Award one mark for identification of a health risk and one mark for each appropriate linked explanation/expansion up to a maximum of three marks:</p> <p>Eyestrain (1) from using a screen/display (1) and not taking sufficient breaks (1)</p> <p>Headaches (1) caused by screen glare/eyestrain (1) in poor lighting conditions (1)</p> <p>Back strain (1) due to poor working environment (1) and not getting up from desk often enough/using inappropriate chair (1)</p> <p>RSI injuries (1) due to repetitive use of keyboard/mouse (1) without wrist supports/using voice interfaces (1)</p> <p>Accept any other appropriate responses.</p>	(3)

Question Number	Answer	Mark
6(a)	<p>Award one mark for identification of a reason and one mark for each appropriate linked explanation/expansion up to a maximum of three marks:</p> <p>To handle unforeseen/user errors (1) and prevent the program from crashing (1) in order to provide a good user experience (1)</p> <p>Accept any other appropriate responses.</p>	(3)

Question Number	Answer	Mark
6(b)	<p>Award one mark for identification of a feature and one mark for an appropriate linked explanation/expansion up to a maximum of two marks per response (maximum total four marks):</p> <p>.</p> <p>The tests / testing method clearly identified (1) with the purpose of each test defined (1)</p> <p>A range of test data is used (1) with valid test data used to see if it is accepted / with invalid test data is used to see if it rejected / with extreme test data to test boundaries (1)</p> <p>Expected outcome identified (1) such as the expected result of a calculation (1)</p> <p>Actual outcomes of test (1) compared with expected results (1)</p> <p>Further actions required (1) describing steps to be taken to fix the code (1)</p> <p>Accept any other appropriate responses.</p>	(4)

Question Number	Indicative content:	Mark
7	<pre> graph TD Start([Start]) --> InputNBooks[/Input nbooks/] InputNBooks --> DecisionNBooks{ nbooks > 0 } DecisionNBooks -- No --> OutputVoucher[/Output Voucher/] DecisionNBooks -- Yes --> InputValue[/Input value/] InputValue --> DecisionValue{ value > 0 } DecisionValue -- No --> OutputVoucher DecisionValue -- Yes --> DecisionNBooks9{ nbooks > 9 } DecisionNBooks9 -- Yes --> Voucher15[Voucher = 15] DecisionNBooks9 -- No --> DecisionNBooks4{ nbooks > 4 } DecisionNBooks4 -- Yes --> DecisionValue50{ value > 50 } DecisionValue50 -- Yes --> Voucher5[Voucher = 5] DecisionValue50 -- No --> Voucher1[Voucher = 1] DecisionNBooks4 -- No --> Voucher1 Voucher15 --> OutputVoucher Voucher5 --> OutputVoucher Voucher1 --> OutputVoucher OutputVoucher --> Stop([Stop]) </pre>	
	<p>Award one mark for each of the following up to a maximum of six marks.</p> <ul style="list-style-type: none"> • Correct symbols used (1) • Number of books entered and Invalid number rejected (1) • Order value entered and Invalid number rejected (1) • Correct Logic for £15 voucher (10 books or more) (1) • Correct logic for £5 voucher (5 books value more than 50) (1) • Voucher value output (1) <p>Additional Guidance</p> <p>Allow books == 5 or >= 5 for £5 voucher</p> <p>Accept any other relevant phrasing/wording.</p> <p>Credit alternative solutions that use correct logic and would produce the expected outcome.</p>	(6)

Question Number	Indicative content:	Mark
8	<p>Learners might refer to some/all of the following in their responses, but learners should be rewarded for other pertinent contextualised answers.</p> <p>Unauthorised access</p> <p>It is the lowest level offence to gain access to data without permission. This covers threats to data from external sources such as hackers and from internal threats such as staff accessing data that they are not authorised to view. This could occur due to finding out another employee's password and then logging in as them or using their specialist IT knowledge to gain access to network folders/personal folders that they should not be able to view. For this level offence it just enough to access the data.</p> <p>Unauthorised access with intent to commit or facilitate a crime</p> <p>This is a middle level offence, and it allows for prosecution if someone access unauthorised data and then attempts to commit a crime such as stealing confidential data or transferring money from another bank account into their own.</p> <p>Unauthorised modification of computer material</p> <p>This a higher tier offence and occurs if someone gains unauthorised access to computer files and then modifies or deletes those files. Planting a virus into a computer system or deliberately transferring a virus onwards is also covered by this section.</p> <p>Making, supplying or obtaining material that could be used in computer misuse offences</p> <p>This is another high tier offence and occurs when someone creates software that could be used in a computer crime. Examples of this type of software includes viruses, password crackers and keyloggers. This section of the Act makes some activities carried out by Penetration Testing companies illegal.</p> <p>Supplying this type of software to others is also covered by this section of the Act.</p> <p>Obtaining this type of software from others is also covered in this section.</p> <p>Penalties</p> <p>For low tier offences prison sentences of up to six months, and for middle and higher tier offences a prison sentence of up to five years.</p> <p>Conclusion</p> <p>The Act criminalises acts of deliberate damage to data, such as hacking and viruses and penalises those offences with potential prison sentences.</p>	

	However it does not protect against accidental damage such as employee mistakes or hardware failure. Also many threats to data come from international sources.	(9)
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Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-3	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
9(a)	<p>Example code</p> <pre> for index = 0 to length(patients) risk=0 risk= MissingTeeth(index)*5+Fillings(index)*2 Riskscore(index)=risk If risk>15 and PrivatePatient(index)="Y" then EmergencyAppointment(index)=True next index </pre>	
	<p>Award one mark for each of the following features of the code up to a maximum of six marks.</p> <ul style="list-style-type: none"> • Loop used (1) • Loop is count controlled by length of structure (1) • Set totals to 0 / declare variables (1) • Correct way of calculating risk is used (1) • Riskscore field is updated (1) • Correct logic used for appointment is used (1) <p>Additional Guidance</p> <p>Sample code is indicative only. Credit alternative solutions that use correct logic and would produce the expected outcome.</p>	(6)

Question Number	Answer	Mark
9(b)	<p>Award one mark for identification of a reason and one mark for an appropriate linked explanation/expansion up to a maximum of two marks per response (maximum total four marks):</p> <p>Saves development time (1) as the functions are already written (1)</p> <p>Will be error free / more robust (1) as the code will have been already tested (1)</p> <p>Size of code base can be reduced (1) as a single line can be used to call an external/existing function (1)</p>	(4)

Question Number	Answer	Mark
9(c)	<p>Learners might refer to some/all of the following in their responses, but learners should be rewarded for other pertinent contextualised answers.</p> <p>Discussion may include:</p> <p>The manager should constantly observe the behavior of office colleagues. Normal behaviour patterns should be recognised. This may include the time staff normally arrive and leave the office, the amount of time they spend on bathroom breaks, the amount of time spent using personal digital devices in the office. This may then be used as a baseline for situational awareness decisions.</p> <p>Observation of interactions and relationships with other members of staff. Changes in how they interact or in their relationships with others. Do they behave differently around some individuals compared to others?</p> <p>Quality of work/outcomes - take note of any significant changes in quality of work, meeting deadlines etc.</p> <p>Any changes in behaviour from this normal pattern should be noted, and if there are any suspicions then behaviour should be more closely monitored. A log of any abnormal/suspicious behaviour could be kept.</p> <p>If no suspicions are aroused by the member of staff then this new behaviour could be accepted as their new normal.</p>	(6)

Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-2	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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
10(a)	<p>Award one mark for identification of a validation technique and one mark for each appropriate linked explanation/expansion up to a maximum of three marks per response (maximum total six marks):</p> <p>Presence check (1) which checks if a field has been filled in (1) this would prevent fields being left blank (1)</p> <p>Length check (1) to see if the customer number is 8 characters long (1) this would reject data that is longer or shorter, e.g. Bill43 (1)</p> <p>Range check (1) to ensure that only a positive number is input for the current meter reading (1) this would reject negative numbers, e.g. -44 (1)</p> <p>Type check (1) to ensure that only a number is entered (for meter reading) (1) and would reject non-numerical characters (1)</p> <p>Accept any other appropriate response.</p>	(6)

Question Number	Answer	Mark
10(b)	<p>Award one mark for each of the following linked descriptive points, up to a maximum of four marks.</p> <ul style="list-style-type: none"> • A selection structure is used to determine which price plan is applied (1) • A logical test is made to see if the number of units used is greater than the threshold value (1) • If the test is true, then the lower price plan is used (1) • If the test is false, then the higher price plan is used (1) <p>Accept any other appropriate response.</p>	4

Question Number	Answer	Mark
10(c)	<p>Learners might refer to some/all of the following in their responses, but learners should be rewarded for other pertinent contextualised answers.</p> <p>Possible positive implications</p> <ul style="list-style-type: none"> • People will not/may not need to pass their driving test and this will afford greater freedom to young people at an earlier age • It will allow older people to retain their mobility, as there would be no need to reevaluate suitability to driving • Disabled users may experience more autonomy • Drink driving incidents would decrease/be irrelevant/obsolete • Safety would be improved as human error would be eliminated • Vehicles would be able to convoy along motorways, improving aerodynamics/saving fuel • Vehicle use could be easily tracked aiding the authorities • Accidents due to driver error would be eliminated • Convoying on motorways could be implemented thereby saving energy <p>Possible negative implications</p> <ul style="list-style-type: none"> • Cost of vehicles could initially be prohibitive leading to further digital divide • Loss of connectivity could cause massive problems • Vehicles could be vulnerable to hacking • Liability in the case of an accident could be difficult to establish • Moral decisions might not be made on instinctive but rather coded in a cold manner • Hardware/software failures could be catastrophic, with little driver override available 	(9)

Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-3	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
11(a)	<p>Award one mark for identification of a benefit and one mark for an appropriate linked explanation/expansion up to a maximum of two marks per response (maximum total four marks):</p> <p>Objects/modules written for other projects can be reused (1) speeding up development time (1)</p> <p>Programs designed in a bottom-up fashion rely on a high degree of interactivity between modules (1) and focuses on reusable code (1)</p> <p>Many decisions can be made later in the development cycle (1) thus allowing for flexibility in user requirements (1)</p> <p>(Smaller sections of) working code/modules are created earlier (1) allowing testing to occur sooner / making unit testing easier (1)</p> <p>Accept any other appropriate response.</p>	(4)

Question Number	Answer	Mark
11(b)	<p>Award one mark for each of the following linked descriptive points, up to a maximum of three marks.</p> <ul style="list-style-type: none">• use symbols/lines/arrows (1)• to show the logic/data flow/order (of an algorithm) (1)• in a non-technical manner (1)	(3)

Question Number	Answer	Mark
11(c)	<p>Award one mark for each of the following linked descriptive points, up to a maximum of four marks.</p> <ul style="list-style-type: none"> • Identify/define the problem (1) • Eliminate/disregard related factors (that are not the specific cause) (1) • Establish five whys (1) • If there are many causes, then they should be prioritised (1) • Rectify the problem (1) • Ensure change does not cause unintended issues (1) <p>Accept any other appropriate response.</p>	(4)

Question Number	Answer	Mark
11(d)	<p>Award one mark for identification of a style convention and one mark for an appropriate linked explanation/expansion, up to a maximum of two marks, such as:</p> <p>Limit line length (to 72 characters) (1) to avoid text wrapping/ so it fits on the screen more easily (1)</p> <p>Use consistent naming conventions (1) to clearly indicate purpose of variables (1)</p> <p>Consistent variable cases (e.g. camel case) (1) to make multi-word variable names more readable (1)</p> <p>Use spacing / indentation (1) to make code structures is easy to follow (1)</p> <p>Avoid inline commenting (1) to reduce the amount of text per line (1)</p> <p>Accept any other appropriate response</p>	(2)

Question Number	Indicative content:	Mark
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11(e)	<p>Learners might refer to some/all of the following in their responses, but learners should be rewarded for other pertinent contextualised answers</p> <p>Discussion may include:</p> <p>For loops</p> <p>For loops are used to repeat a block of code a predetermined number of times. Although it is possible to use an early break from a loop they are designed to repeat a block of code for a set number of iterations which is known before the loop is entered. Examples of using a for loop include iterating through a data structure of a known size to process each element in turn.</p> <p>While loops</p> <p>While loops are used to repeat a block of code a number of times, but the number of iterations is not known when the loop is entered. The number of iterations could be zero. Breaking from the loop is done when certain condition are met. While loops are used when the number of iterations needed in the loop is unknown at design time. Examples include reading data from a file of indeterminate length.</p> <p>Contextual factors that may be considered</p> <ul style="list-style-type: none"> • The number of books on loan each day will vary • Iteration used will vary depending on the data structure used, e.g. list or external file • May need nesting of loops to loop through main file and individual records <p>Conclusion</p> <p>Both types of loop are powerful programming constructs, which each have their place writing code. If the number of iterations is known when the code is written, then a for loop should be used but if the number is unknown then a while loop should be used.</p>	(12)
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Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-4	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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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