



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2022

Marking Scheme

Computer Science

Higher Level

Note to teachers and students on the use of published marking schemes

Marking schemes published by the State Examinations Commission are not intended to be standalone documents. They are an essential resource for examiners who receive training in the correct interpretation and application of the scheme. This training involves, among other things, marking samples of student work and discussing the marks awarded, so as to clarify the correct application of the scheme. The work of examiners is subsequently monitored by Advising Examiners to ensure consistent and accurate application of the marking scheme. This process is overseen by the Chief Examiner, usually assisted by a Chief Advising Examiner. The Chief Examiner is the final authority regarding whether or not the marking scheme has been correctly applied to any piece of candidate work.

Marking schemes are working documents. While a draft marking scheme is prepared in advance of the examination, the scheme is not finalised until examiners have applied it to candidates' work and the feedback from all examiners has been collated and considered in light of the full range of responses of candidates, the overall level of difficulty of the examination and the need to maintain consistency in standards from year to year. This published document contains the finalised scheme, as it was applied to all candidates' work.

In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with their Advising Examiners when in doubt.

Future Marking Schemes

Assumptions about future marking schemes on the basis of past schemes should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination in a given year. The Chief Examiner in any given year has the responsibility to determine how best to ensure the fair and accurate assessment of candidates' work and to ensure consistency in the standard of the assessment from year to year. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination are subject to change from one year to the next without notice.

Marking Scheme – Section C

Structure of the marking scheme for Section C (Programming)

Candidate responses are marked according to different scales, depending on the types of response anticipated. For example, scales labelled B divide candidate responses into four categories (correct response, almost correct response, partially correct response, and response of no substantial merit), and so on. The scales and the marks that they generate are summarised in this table:

Scale Label	A	B	C
No. of categories	2	4	5
5 mark scale	0, 5	0, 2, 3, 5	
10 mark scale		0, 3, 7, 10	0, 3, 5, 8, 10

A general descriptor of each point on each scale is given below. More specific directions in relation to interpreting the scales in the context of each question are given in the scheme, where necessary.

Marking scales – level descriptors

A-scales (2 categories)

- response of no substantial merit
- correct response

B-scales (4 categories)

- response of no substantial merit
- response with some merit
- almost correct response
- correct response

C-scales (5 categories)

- response of no substantial merit
- response with some merit
- response about half-right
- almost correct response
- correct response

Answer any six questions.

Question 1**5 marks**

Output
5
6
15
5
6

Each correct response in the correct order 1 mark

Question 2**3 + 2(1,1) marks****(a)**

- A type of memory used to store data/programs when the computer is switched on/running.
- Called volatile because entire contents are cleared when the computer is switched off.

Very good description - clear understanding demonstrated

3 marks

Fair description - limited understanding

1 mark

(b)

- Physical location. Registers are located inside (part of) the CPU – RAM is not physically as close to the CPU.
- Access time/speeds. Contents of registers can be accessed much faster by CPU than contents of RAM.
- Cost. Registers are more expensive than RAM (per byte).
- Capacity. Registers hold less than RAM (because of cost).
- Material. Made from different materials.
- Any other valid difference.

1 marks for each difference clearly described

Question 3

4(2,2) +1 marks

(a)

Transistor

- A transistor is type of electronic switch.
- A transistor is a semiconductor device used to amplify or switch electronic signals and electrical power. It is composed of semiconductor material usually with at least three terminals for connection to an external circuit.
- A transistor is the fundamental building block of gates, logic circuits (adders, multiplexors etc.), integrated circuits and microprocessors.
- Transistors are used to represent binary 1's and 0's.

Integrated Circuit

- An integrated circuit (chip) is an electronic component that contains multiple discrete components combined together into logic circuits on a single silicon board.

For each term:

Very good explanation - clear understanding demonstrated 2 marks

Fair explanation - limited understanding 1 mark

(b)

- There is a physical limitation to the number of transistors that can fit on a single chip.

Full correct response 1 mark

Question 4

2+3 marks

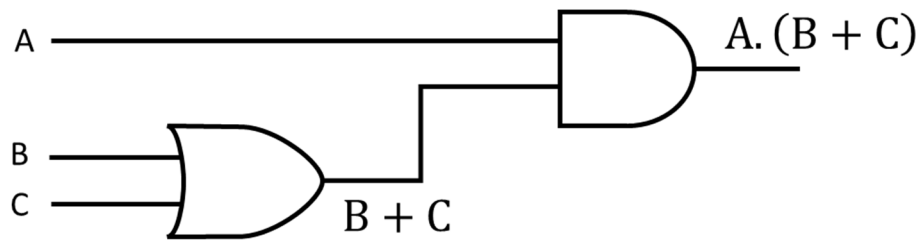
(a)

A	B	C	A AND (B OR C)
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

Every value correct 2 marks

3 (or more) correct values 1 mark

(b)



Gates combined correctly as above 3 marks

Use of AND and OR gates with either input correctly labelled 2 marks

Use of AND or OR gates with either inputs correctly labelled 1 mark

Question 5

5 marks

Letter	Missing Text
A	pH < 7
B	FALSE
C	TRUE
D	OUTPUT "Base"
E	OUTPUT "Neutral"

Each correct response 1 mark

Question 6

5 marks

- A web client sends a browser request to a web server. This browser request is then processed by the web server which responds by sending the result back to the client in the form of a server response.

Very good explanation - clear understanding demonstrated 5 marks

Good explanation - clear information, lacking demonstration of full understanding 3 marks

Fair explanation - limited understanding 1 mark

Question 7

3+2 marks

(a)

- Ransomware is a type of malicious software (malware) that threatens to publish or blocks access to data or a computer system, usually by encrypting it, until the victim pays a ransom fee to the attacker. In many cases, the ransom demand comes with a deadline. If the victim doesn't pay in time, the data is gone forever or the ransom increases.

Very good description - clear understanding demonstrated

3 marks

Fair description - limited understanding

1 mark

(b)

- Company policy and procedures (people controls).
- Password policies.
- Anti-virus software.
- Security systems (e.g. firewall, VPN).
- Encryption.
- Cloud (security services may be better than local organisations).
- Any acceptable measure.

Each correct response

1 mark

Question 8

5 marks

Cost (advantage)

- No need to for one-off up-front capital costs.
- No need for upgrading/replacements costs.

Cost (disadvantage)

- Costs are ongoing (pay-as-you-go) which could work out more expensive in the long run.
- Ongoing costs to cloud service provider to keep software and hardware up-to-date

Environment (advantage)

- Economy of scale meaning that cloud providers can offer shared services more efficiently thereby reducing carbon footprint.
- Many cloud companies generate their own energy (and supply to grid)
- Less paper.

Environment (disadvantage)

- Owing to its success there is a greater demand for cloud services – thus increasing the energy demand and greater carbon footprint.

Award 3 marks for better of cost or environment as follows:

2 marks for better of advantage/disadvantage as follows:

Very good description - clear understanding demonstrated

2 marks

Fair description - limited understanding

1 mark

(b)

- By ignoring irrelevant details such as coin colour, size and value

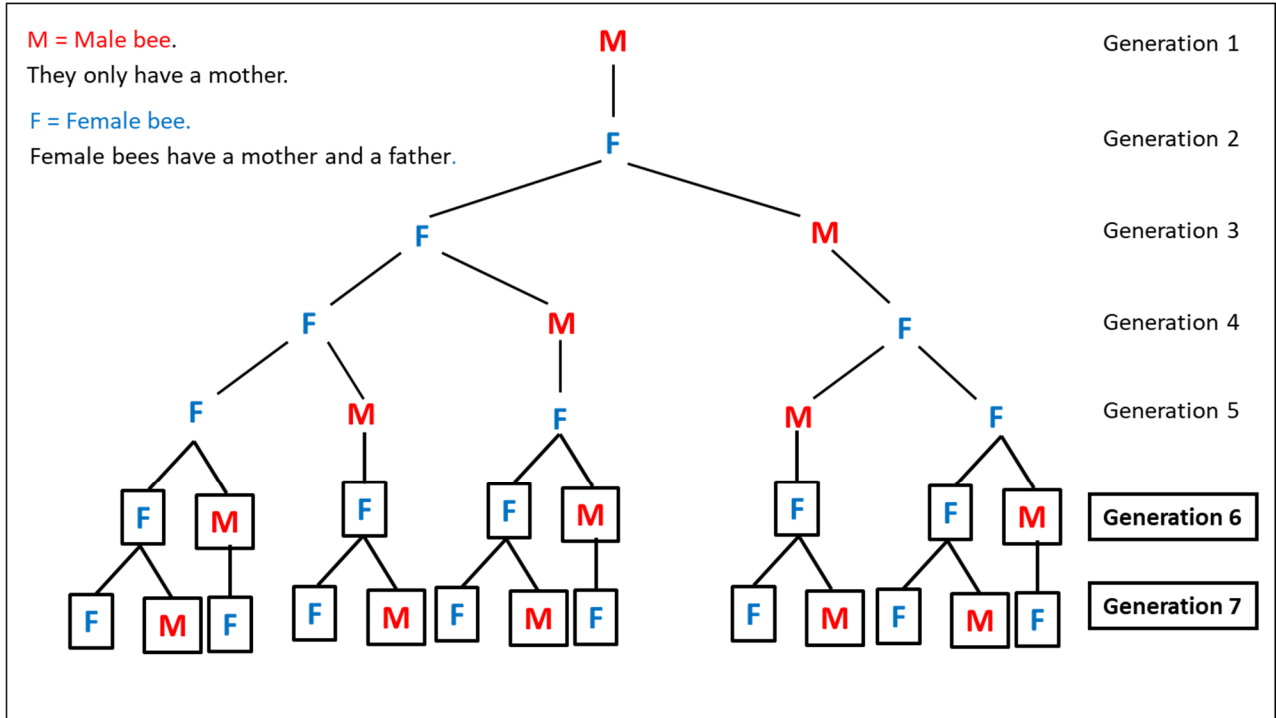
Very good description - clear understanding demonstrated

2 marks

Question 11

3+2 marks

(a)



Full correct response

3 marks

One fully correct generation

2 marks

Two or more branches from generation 7 fully complete

2 marks

Any correct value

1 mark

(b)

- Number of bees at each generation is the sum of the number of bees at the previous two generations (Fibonacci sequence).

Very good description - clear understanding demonstrated

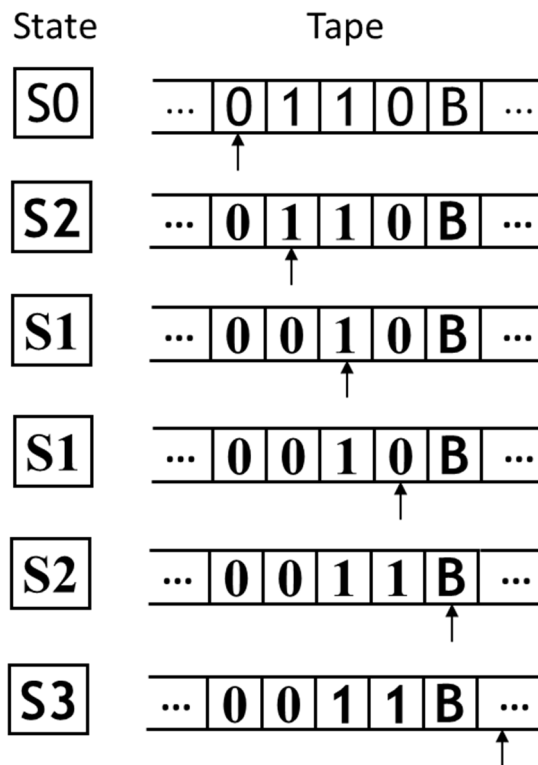
2 marks

Fair description - limited understanding

1 mark

Question 12

5 marks



- | | |
|-----------------------------|---------|
| Full correct response | 5 marks |
| Three or more correct tapes | 3 marks |
| Two correct tapes | 2 marks |
| One correct tape | 1 mark |

Section B	Long Questions	30 marks
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Question 13

30 (19, 11) marks

(a)

19 (2,2,6,2,4,3) marks

(i)

2 marks

An information system (IS) is the software used to help organise and analyse business data and streamline the day to day (transactional) operation of a business.

Very good description - clear understanding demonstrated 2 marks
 Fair description - limited understanding 1 mark

(ii)

2 marks

- **Improve operational efficiencies – an IS could be used to handle bookings and payments automatically, database could be used to organise and manage information about relevant entities such as dogs, customers or staff.**
- **Information could be used to improve decision making and strategic planning.**
- **Improve customer service – as system should be available 24/7. An IS would make it easier for customers to learn more about K-9 kennels.**
- **Cost reductions (increase in profits).**
- **Any valid example of a benefit for K-9 kennels.**

For each unique valid/correct example 1 mark

(iii)

6 marks

Stakeholder	Role
Dog owners / general public / customers	end-users
K9-Kennels / John and Mary and their employees	client / project sponsor Users of the system
Software company including any relevant job title e.g. project manager / analyst / designer / programmer / tester etc.	Any relevant description

For each correctly identified stakeholder 1 mark
 For each stakeholder role:
 Very good description - clear understanding demonstrated 2 marks
 Fair description – limited understanding 1 mark

(iv)

2 marks

- K-9's existing business services and the systems (hardware, software etc.) in place to support them.
- Customer requirements.
- Project feasibility (cost-benefit analysis).
- Contract / Memorandum Of Understanding (MOU).
- Project plan (e.g. deliverables, key milestones, schedule etc.).
- Any relevant topic.

For each topic:

Good description - clear understanding demonstrated

1 marks

(v)

4 marks

Reasons for choosing Web App

- Accessibility.
- Ease of updates.
- Better discovery on search engines. (SEO).
- Cost-effective development.
- Faster speed to market.
- Any valid reason.

Reasons for choosing Mobile App

- Speed and performance.
- Ability to send push notifications.
- Improved user experience.
- Offline access.
- Any valid reason.

For each reason:

Very good description - clear understanding demonstrated

2 marks

Fair description - limited understanding

1 mark

(vi)

3 marks

The choice of software development process/methodology (e.g. waterfall, agile etc.) is important as it enables a project to provide better estimates, deliver stable systems, keep the customer informed, create a clear understanding of the task ahead, and identify pitfalls earlier, allowing for ample time to make adjustments.

Very good explanation - clear understanding demonstrated

3 marks

Fair explanation - limited understanding

1 mark

(b)

11 (4, 2, 2, 3) marks

(i)

4 marks

Image and description of item	1 mark
Add to cart button	1 mark
Link to checkout page	1 mark
Overall aesthetic	1 mark

(ii)

2 marks

User-centred design features – involving the user throughout the design process

- Consistent page layout e.g. navigation at top/side of every page, footer content the same on every page.
- Good balance of content and white space.
- Good contrast between text and background.
- Use of consistent font – size, colour, formatting.
- Visited links change in appearance.
- Good use of basic design principles - repetition, contrast, proximity, alignment.
- Responsive design – works on different device sizes and in different browsers.
- Any valid feature.

For each user-centred design feature:

Good description - clear understanding demonstrated

1 marks

(iii)

2 marks

Wireframe

- A wireframe is a sketch of diagram of a webpage that shows the overall structure of the page (i.e. elements such as navigation menu, headings, images, content area and footer).
- Wireframes are drawn during the design stage of the design process.
- Wireframes are low-fidelity visual representations of some aspect of a system.
- Wireframes do not contain real content (when the content is added they may need to change).
- Wireframes are relatively quick to develop and change.
- Wireframes are relatively cheap.

Prototype

- A prototype is a 'trimmed down' working version of the system (or some aspect of the system) used for demonstration and evaluation purposes.
- Prototypes are developed in the implementation (create) stage of the design process
- A prototype is software whereas wireframes are sketches (digital or hand-drawn) – they are relatively costly to develop.
- Prototypes provide a mid to high fidelity visual representation of the system 'look and feel'. They take colours, content and branding into account and also allow users to engage/experience the system (button clicks etc.).

For each difference

1 mark

(iv)

3 marks

String

- Customer name, address, contact details, product details

Integer

- Quantity ordered, credit card number, CCV, phone number

Boolean

- Delivery address same as customer address?
- Receive product promotions, updates, mailing list etc.
- Accept terms and conditions?

For each valid/correct example

1 mark

Question 14

30 (13, 17) marks

(a)

13 (3, 2, 3, 2, 3) marks

(i)

3 marks

State after Pass #2	list1	<input type="text"/>	<input type="text" value="28"/>	<input type="text"/>	<input type="text" value="21"/>
	list2	<input type="text" value="14"/>	<input type="text" value="15"/>	<input type="text"/>	<input type="text"/>
State after Pass #3	list1	<input type="text"/>	<input type="text" value="28"/>	<input type="text"/>	<input type="text"/>
	list2	<input type="text" value="14"/>	<input type="text" value="15"/>	<input type="text" value="21"/>	<input type="text"/>
State after Pass #4	list1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	list2	<input type="text" value="14"/>	<input type="text" value="15"/>	<input type="text" value="21"/>	<input type="text" value="28"/>

Each correct pass

1 mark

(ii)

2 marks

- Select the largest (instead of the smallest) element from list 1 and move it to list2
- Any valid response.

Good description - clear understanding demonstrated

2 marks

(iii)

3 marks

- Initialise the minimum to be the first element in the list. Then, working/walk across the list compare each element to the minimum element so far. If the current element is less than the minimum element so far then let it be the new minimum. Continue in this manner until the end of the list is reached.
- Pseudocode / flowchart / code are also acceptable

Very good description - clear understanding demonstrated 3 marks

Fair description - limited understanding/use of built in functions 1 mark

(iv)

2 marks

- The same element would always be copied.
- list1 will remain unchanged.
- This would result in an infinite loop.

Very good explanation - clear understanding demonstrated 2 marks

(v)

3 marks

- The selection sort algorithm works by passing across every element in the list to sort (from left to right). The element being passed over is called the current element. For each current element the algorithm looks for the minimum (smallest) element to its right. This minimum element is selected and swapped with the current element. The algorithm then moves on to the next element.
- Pseudocode / flowchart / code are also acceptable.

Very good description - clear understanding demonstrated 3 marks

Fair description - limited understanding 1 mark

(b)

17 (4, 4, 4, 5) marks

(i)

4 marks

After Pass #3:	B	C	E	F	A	G	D
After Pass #4:	A	B	C	E	F	G	D
After Pass #5:	A	B	C	E	F	G	D
After Pass #6:	A	B	C	D	E	F	G

Each correct pass

1 mark

(ii)

4 marks

- **The insertion sort works by passing across each element in the list starting from the second element. At the start, the first element is considered sorted and all elements to its right are considered unsorted. On each pass the first element in the unsorted list is inserted into the sorted list at its correct position.**
- **Pseudocode / flowchart / code are also acceptable.**

Very good explanation - clear understanding demonstrated

4 marks

Good explanation - clear information, lacking demonstration of full understanding

2 marks

Fair explanation - limited understanding

1 mark

(iii)

4 marks

- **A list that is already sorted.**
- **A list where all the values are the same.**
- **A list with only two distinct values.**
- **A list where all the values are different.**
- **A list with just one element – list size 1.**
- **An empty list – list size zero.**
- **Any valid test case.**

For each unique test case:

Very good description - clear understanding demonstrated

2 marks

(iv)

5 marks

- **Worst case is $O(n^2)$ – list in reverse order. For each of the n elements there are n comparisons required to make the insertion at the correct position.**

AND

- **Average case is also $O(n^2)$ / best case is $O(n)$ – list is already sorted so no there is need to execute inner loop.**

Very good discussion - clear understanding demonstrated

5 marks

Good discussion - clear information, lacking demonstration of full understanding

3 marks

Fair discussion - limited understanding

1 mark

Question 15

30 (3, 11, 16) marks

(a)

3 marks

Step 1. $1 \times 10 = 10$
 $0 \times 9 = 0$
 $2 \times 8 = 16$
 $0 \times 7 = 0$
 $0 \times 6 = 0$
 $4 \times 5 = 20$
 $1 \times 4 = 4$
 $1 \times 3 = 3$
 $0 \times 2 = 0$
 $2 \times 1 = 2$

Step 2. $10 + 16 + 20 + 4 + 3 + 2 = 55$

Step 3. $55 / 11 = 5$ remainder 0

Step 4. Remainder = 0 \Rightarrow ISBN is valid

Full correct response	3 marks
Two or three correct steps	2 marks
Any correct step	1 mark

(b)

11 (2, 4, 3, 2) marks

(i)

2 marks

- Make code more readable / understandable for self / others.
- To enable programmer to isolate a part of the code for testing.
- Comments when used as doc strings can become part of the system documentation.
- Comments can contain information about the author, date, version log etc.
- Any reasonable use for comments should be accepted.

Each unique correct response 1 mark

(ii)

4 marks

Variable.

- A variable is a placeholder for data that can change as a program runs.
- A named entity that has a value.
- A reference to a memory/storage location.
- A parameter is a special kind of variable.

Examples from code: isbn, total, i, check_digit

Datatype

- A category of data that can be held in a variable.
- A restriction on the values that can be stored in a variable.

Examples from code: isbn is a string, total, i and check_digit are all integers

For each term:

Good description - clear understanding demonstrated 1 mark

Valid example 1 mark

(iii)

3 marks

- `int` converts (casts) the string representation of each character of the `isbn` to an integer. This happens on each iteration of the loop. This is done so that the digit can be multiplied (integer multiplication) by its position.

Very good description - clear understanding demonstrated

3 marks

Fair description - limited understanding

1 mark

(iv)

2 marks

- As a loop counter / iterating variable
- As an index into the list, `isbn` (to retrieve the next digit) / As a means of scanning the digits from left to right
- As the digit position

Very good description - clear understanding demonstrated

2 marks

Fair description - limited understanding

1 mark

(c)

16 (5, 3, 2, 4, 2) marks

(i)

5 marks

<code>i</code>	<code>digit</code>	<code>total</code>	<code>isbn</code>
		0	102004110
2	0	0	10200411
3	1	3	1020041
4	1	7	102004
5	4	27	10200
6	0	27	1020
7	0	27	102
8	2	43	10
9	0	43	1
10	1	53	0

Full correct answer

5 marks

Two or more correct rows/cols

3 marks

Any one correct row/col

1 mark

(ii) 3 marks

- `isbn1` is used to store the original `isbn` as the value of `isbn` is changed

Very good description - clear understanding demonstrated 3 marks

Fair description - limited understanding 1 mark

(iii) 2 marks

- `%` is the modulus/remainder operator. It returns the remainder when one number is divided by another e.g. `9%4 -> 1`
- `//` is the floor division operator. It returns the result of a division rounded down to the next smallest whole number e.g. `9//4 -> 2`

For each operator:

Good description - clear understanding demonstrated 1 mark

(iv) 4 marks

- Use of string in program 1 and int in program 2 (to store the ISBN)
- Program 1 traverses string left to right – program 2 takes digits from right to left
- Program 1 uses range to count from 10 down to 2 (or 10 down to but not including 1) whereas program 2 uses range to count from 2 up to 10 (or 2 up to but not including 11)
- Program 1 does not modify the original `isbn` number – program 2 does. Program 2 needs to use `isbn1` to keep track (remember) the original `isbn`.

For each difference:

Very good description - clear understanding demonstrated 2 marks

(v) 2 marks

- letter/digit errors, such as `l -> 1` or `O -> 0`
- single digit errors, such as `1 -> 2`
- transposition errors, such as `12 -> 21`
- twin errors, such as `11 -> 22`
- jump transpositions errors, such as `132 -> 231`
- jump twin errors, such as `131 -> 232`

Very good description - clear understanding demonstrated 2 marks

Fair description - limited understanding 1 mark

Question 16

(a)

50 (5, 5, 5, 5, 10, 10, 10) marks

Possible solution:

```
1 # Question 16(a)
2 # Examination Number:
3 from random import randint
4
5 print("Dice simulation and analysis program") # part (i)
6 results = []
7 frequencies = [0, 0, 0, 0, 0, 0]
8
9 # Generate 100 random values between 1 and 6 and append them to the results list
10 for i in range (100):
11     throw_result = randint(1,6)
12     results.append(throw_result)
13
14     # Start to build up a list of frequencies for each number thrown
15     if throw_result == 1:
16         frequencies[0] = frequencies[0] + 1
17     elif throw_result == 2:
18         frequencies[1] = frequencies[1] + 1
19     # part (iii) - start
20     elif throw_result == 3:
21         frequencies[2] = frequencies[2] + 1
22     elif throw_result == 4:
23         frequencies[3] = frequencies[3] + 1
24     elif throw_result == 5:
25         frequencies[4] = frequencies[4] + 1
26     elif throw_result == 6:
27         frequencies[5] = frequencies[5] + 1
28     # part (iii) - end
29
30 print()
31 #print("Results:",results) # part (iv)
32
33 print("Frequencies:", frequencies) # part (ii)
34
35 # part (v) - start
36 print()
37 print("Dice\tFrequency")
38 print("----\t-----")
39 for i in range(6):
40     print(i+1,"\t",frequencies[i])
41
42 # part (vi) - start
43 print()
44 largest = max(frequencies)
45 print(frequencies.index(largest)+1, "was rolled most often -", largest, "times")
46
47 # part (vii)
48 # Horizontal Bar Chart ... nested loop
49 print()
50 for freq in frequencies:
51     for i in range(freq):
52         print("*", end="")
53     print()
54
```

(i)

5 marks (A-5 scale)

5 marks	Correct response Correct implementation using solution above or similar.
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(ii)

5 marks (B-5 scale)

5 marks	Correct response Correct implementation using solution above or similar.
3 marks	Almost correct response <ul style="list-style-type: none">• Correct implementation using solution above or similar but with syntax error.• Correct output displayed but spread over more than a single line.• Correct output displayed in the wrong position.
2 marks	Response with some merit Any other reasonable attempt.

(iii)

5 marks (B-5 scale)

5 marks	Correct response Correct implementation using solution above or similar.
3 marks	Almost correct response Correct implementation using solution above or similar but with syntax error or 'off by one' index error.
2 marks	Response with some merit Any other reasonable attempt.

(iv)

5 marks (A-5 scale)

5 marks	Correct response Correct implementation using solution above or similar.
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(v)

10 marks (B-10 scale)

10 marks	Correct response Correct implementation using solution above or similar.
7 marks	Almost correct response Actual frequency values displayed correctly and any 2 of: <ul style="list-style-type: none">• First header row displayed correctly.• Second header row displayed correctly.• Correct column alignment.• Dice values displayed correctly.
3 marks	Response with some merit Any other reasonable attempt.

(vi)

10 marks (B-10 scale)

10 marks	Correct response Correct implementation using solution above or similar.
7 marks	Almost correct response <ul style="list-style-type: none">• Most frequent value determined but not correctly displayed.• Minor error in code to determine the most frequent value.• Minor error in code to display the number that was rolled most often.
3 marks	Response with some merit Any other reasonable attempt.

(vii)

10 marks (C-10 scale)

10 marks	Correct response Correct implementation using solution above or similar.
8 marks	Almost correct response Correct solution structure but problem with newline e.g. <ul style="list-style-type: none">• Separate newline for each row• No blank lines between rows
5 marks	Response about half-right Correct solution structure but incorrect number of asterisks
3 marks	Response with some merit Any other reasonable attempt.

Coursework (90 marks in total)	
1. Investigation and Plan	Marks
<ul style="list-style-type: none"> Initial research into the context of the brief and existing solutions. Planning and outlining potential solutions to the brief; identifying the potential stakeholders and end-users; consider social implications and how the artefact can be inclusive for all users; refine, list and describe the objectives for the artefact that you will develop. Deeper research on the chosen solution and potential technical solutions that will achieve the artefact objectives. 	20
2. Design	
<ul style="list-style-type: none"> Clearly describes how the requirements of the system are met. Description of the key aspects of how the artefact will be structured; an overview of how different parts of the system will interact which may include a system architecture diagram or system flowchart, data flow diagram(s), algorithms or flowcharts, data model, wireframes, hardware selection and similar. 	20
3. Implementation and Testing	
<ul style="list-style-type: none"> A brief timeline of key dates and milestones achieved in the development of the artefact. Clearly describes the development of the artefact and any problems that were encountered during the process Clearly demonstrates the operation of the system. This should be demonstrated through the use of the video and supporting text if required. Fundamental programming skills are demonstrated, such as using a modular approach, using high level data structures, algorithms, programming constructs, minimal duplication of code, readability, effective use of commenting and similar. A description of the type and extent of testing that took place which may include test cases/table and test data; an explanation of the impact of testing on the development of the artefact. 	40
4. Evaluation	
<ul style="list-style-type: none"> Explains the extent to which your artefact meets your design objectives; how well the needs of the envisaged end-user are met. Describes with justification how your artefact could be modified and improved. 	10
References and Summary word count	
<ul style="list-style-type: none"> You must also include references and/or a bibliography. Include a summary of the word count of the report, including the total word count. 	0

Higher grade	Ordinary grade	Reference Mark	Higher Mark	Ordinary Mark
1		81 – 90	81 – 90	90
2		72 – 80	72 – 80	90
3		63 – 71	63 – 71	90
4		54 – 62	54 – 62	90
5	1	45 – 53	45 – 53	81 – 90
6	2	36 – 44	36 – 44	72 – 80
7	3	27 – 35	27 – 35	63 – 71
8	4	23 – 26	23 – 26	54 – 62
	5	18 – 22	18 – 22	45 – 53
	6	14 – 17	14 – 17	36 – 44
	7	9 – 13	9 – 13	27 – 35
	8	0 – 8	0 – 8	0 – 26

COURSEWORK – conversion from reference mark to Ordinary-level mark

For Ordinary-level candidates, the final mark is found from the reference mark as follows:

- If the reference mark is 54 or more the final mark is 90.
- If the reference mark is at least 27 but less than 54, then add 36 to the reference mark to get the final mark.
- If the reference is at least 1 but less than 27, then double the reference mark and add 9 to get the final mark.
- If the reference mark is 0 the final mark is 0

Reference Mark	Conversion
54 or more	Award 90 marks
27 – 53	Add 36 marks
1 - 26	Multiply the reference mark by 2 and add 9 marks
0	0

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