GCST

2.1.1
THINKING ABSTRACTLY
TOPIC WISE EXAM QUESTIONS
ANSWERS

A-LEVEL OCR

GCSE

2023

9	(a)	(i)	1 mark for each description to max 2 and 1 mark for example e.g. • Removal of unnecessary detail… • ….to allow programmers to focus on core aspects of the problem…. • ….simplifies a complex problem Examples, e.g: • Treasure objects are replaced with text labels // no images of treasure are used • Island is set of coordinates and no info as to environment/layout and other objects	3	Allow other suitable examples that are relevant to the treasure game.
9	(a)	(ii)	1 mark each to max 3 e.g. • Reduces programming time • Reduces complexity of code (through abstraction by generalisation) • Reduces amount of memory required / computational power • Simplifies the problem so it's easier to solve / understand (by recognising common patterns) • Allows programmers to focus on core aspects of the problem	3	

AS - Level

2	a		1 mark per bullet to max 3 Any reasonable abstraction e.g. • will not be to scale not life size • will exclude features e.g. people, road markings etc • will only show what is relevant e.g. buildings	3	

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2022

<table>
<tr>
<td>4ai</td>
<td>Max 1 mark for each definition

e.g.
<table>
<tr><th>Term</th><th>Definition</th></tr>
<tr><td>Abstraction</td><td>Removal of unnecessary components // focus on only necessary components</td></tr>
<tr><td>Decomposition</td><td>Breaking down a problem into subproblems</td></tr>
</table>
</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4aii</td>
<td>1 mark for each
e.g.
• Removal of visual elements such as buildings on the ground
• Simplification of controls
• Focus on important elements such as weather, height, speed</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4aiii</td>
<td>1 mark for each to max 2
e.g.
• Reduce memory requirements
• Reduce processing requirements
• Simplify the problem being solved</td>
<td>2</td>
<td></td>
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</table>

2021

1a	1 mark per bullet to max 3. e.g. • Remove unnecessary details // remove character features that are not needed • e.g. remove the outside world • e.g. Remove complexity from the realistic entities // Simply real-life objects • e.g. simplify characters/animals/tents • e.g. by representing them with specific objects/shapes	3 AO2.1 (2) AO2.2 (1)	

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2020

1a	1 mark for definition • Removal of unnecessary detail // Simplification to allow development of a program more easily 1 mark to max 2 for application e.g. • The actual movements are represented by vertices/lines • State of the move is represented by a letter/symbol rather than the actual move position • Tree does not show details about what the moves are	3 AO1.1 (1) AO2.1 (1) AO2.2 (1)	Allow other suitable examples that are relevant to the scenario in the question.

AS - Level

1	(a)	(i)	1 mark per bullet up to a maximum of 3 marks, e.g: • Classroom displays have been removed • People have been removed / simplified with symbols • Wall/carpet colours/details have been removed • Diagram is not to scale.	3 A02.1 (3)	Allow other suitable responses that are applied to the scenario in the question.
1	(a)	(ii)	1 mark per bullet up to a maximum of 2 marks for each benefit (4 marks maximum in total), e.g: • Reduced development time (1) as factors that can detract from the program can be ignored (1) • Program more likely to solve the problem (1) as unnecessary aspects will not detract from the main purpose of the program (1) • Reduces complexity of programming code (1) therefore can run on lower spec computers(1)	4 A01.2 (2) A02.1 (2)	

2019

7ai	1 mark per example e.g. • No actual images shown • Items are named / labelled • Simplified layout with shapes	2 **AO2.1 (2)**	Allow any reasonable examples, but they must be for different aspects
7aii	1 mark per bullet to max 3 e.g. • Reduces complexity of design • Reduces complexity of programming • Reduce memory/processing requirements • Could involve a large number of images that would take excessive memory • Reality contains things that aren't relevant to a computer program	3 **AO1.1 (1)** **AO1.2 (1)** **AO2.1 (1)**	Note: do not allow answers related to the user experience / user interpretation, the question is about the production of the system

AS - Level

1	a	i	Abstraction	1 **AO1.1**	
1	a	ii	e.g. • Reduces the amount of memory / processing required • Reduces complexity • Reality contains things that aren't relevant to a computer program • Reduces design / programming effort	1 **AO1.2**	Need to allow FT from (a)(i) e.g. if decomposition is given as answer
1	a	iii	1 mark per bullet to max 4 e.g. • Remove details of the furniture • E.g. design elements • Remove details of the room • E.g. light switches • Replace objects with shapes/identifiers • E.g. set room shape as a rectangle	4 **AO2.1 (2)** **AO2.2 (2)**	Need to allow FT from (a)(i) e.g. if decomposition is given as answer

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2018

3	(a)	(ii)	1 mark per bullet to max 2 • The puzzle is not shown in the diagram • The graph shows different sequences of sub problems in the puzzle that can be solved to get to the final solution • The puzzle does not have all states visible at once	2 AO1.2 (1) AO2.1 (1)	Answers must be in context of the puzzle

AS - Level

3	a	i	Removing characteristics/elements/detail from a problem	1 AO1.1 (1)	
3	a	ii	1 mark per bullet to max 2 • Reduce processing requirements • Simplify programming • Reduce memory requirements	2 AO1.2 (1) AO2.1 (1)	
3	a	iii	1 mark per identifying difference, 1 for expansion e.g. • Removal of feature • e.g. no stations/signals • Symbols/keys are used to represent elements • E.g. the train • May not be to scale • Relative distances may not be true	2 AO2.1 (1) AO2.2 (1)	

2017

6	e		**Mark Band 3 – High level** **(7-9 marks)** The candidate demonstrates a **thorough** knowledge and understanding of abstraction; the material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Mark Band 2 – Mid level** **(4-6 marks)** The candidate demonstrates **reasonable** knowledge and understanding of abstraction; the material is generally accurate but at times underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation. The candidate provides a reasonable discussion, the majority of which is focused. Evaluative comments are, for the most part appropriate, although one or two opportunities for development are missed. *There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.* **Mark Band 1 – Low Level** **(1-3 marks)** The candidate demonstrates a **basic** knowledge of abstraction with limited understanding shown; the material is basic and contains some inaccuracies. The candidates makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides a limited discussion which is narrow in focus. Judgements if made are weak and unsubstantiated. *The information is basic and comunicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.*	9 AO1.1 (2) AO1.2 (2) AO2.1 (2) AO3.3 (3)	**AO1: Knowledge and Understanding** **Indicative content** • Removal of unnecessary elements • Uses symbols to represent elements of the problem • Increase chance of creating the prograr successfully • Reduces programming time and factors that can detract from the program **AO2: Application** • Examples of use in this system e.g. o Environment is not shown o Movements reduced/removed o Other factors that can be done/affect the 'pet' are removec o Time may not represented as minutes, seconds **AO3: Evaluation** • Reduces complexity of programming • Requires less computational power, so the game can be played on lower spec devices e.g. phones • Focus is on the core aspects of the program rather than the extras • Too much abstraction can detract from the appeal of the game, may be too simplistic/not realistic enough, may not have enough scope to engage users
			0 marks No attempt to answer the question or response is not worthy of credit.		

2	e		Max 2 for description of abstraction, max 3 for examples. Description, max 2 • Remove unnecessary elements [1] • Reduce computational resources required [1] • Focus on the main purpose of program//does not detract from main purpose of program [1]	4 AO1.2 (4)	Allow any reasonable example that could be applied to the game
			Examples, max 3, 1 mark per example e.g. • Appearance of characters is replaced by object // a character is a stick man [1] • Places on the board are replaced with shapes and place name//e.g. a square that says 'town' rather than an actual town with buildings[1] • Scenery is removed // e.g. trees, rivers are not included [1]		

EXTRA

1	a		• Abstraction is the process of separating ideas (1 – AO 1.1) from particular instances / reality (1 – AO 1.1). It is a means of hiding detail / only using relevant detail (1 – AO 1.1), it is a representation of reality (1 – AO 1.1), using symbols to show real-life features (1 – AO 2.1) or irrelevant features (e.g. such as buildings) left out (1 – AO 2.1).	4	Up to 4 marks for a valid definition. Up to 2 marks for demonstrating knowledge (AO1.1). Up to 2 marks for demonstrating application of knowledge and understanding (AO2.1).
2	a		• A real town contains things that aren't relevant to the simulation (1) which would require unnecessary programming / design effort (1). • … would require extra computational resources … (1). • … could detract from the main purpose of the program (1).	2	Up to 2 marks for a valid explanation.
	b	i	• Road signs / road markings (1) – so the user can practise obeying these when driving (1). • Traffic Lights (1) – so user can practise obeying traffic light signals (1). • Zebra crossing (1) – so user can practise slowing down / stopping at zebra crossing (1). • Cars / vehicles (1) – so user can practice driving with other cars on the road (1). • Pedestrians (1) – so user can practice looking out for and avoiding pedestrians (1).	4	1 mark for each correct identification up to a maximum of two identifications plus up to a further 1 mark for each of two valid explanations.

		ii	• Scenery may be simplified (1). • Smaller roads may be removed (1). • Potholes may be removed (1). • Buildings may be simplified (1). • Imperfections / wear / damage in road markings and signs will be ignored (1). • No need to worry about sounds of real town (1).	2	1 mark for each correct identification up to a maximum of two identifications.
3			e.g. • Reduces track scenery • Limited functionality on car dashboard • Simplified controls • Simplified physics • Simplified / removed weather	2	Accept any reasonable answer **Examiner's Comments** Many candidates confused the concept of abstraction (simplification) with the requirement to make a genuinely realistic simulation.

If you found this useful, drop a follow to help me out!

THANK YOU!

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