The final first teach date for **A Level Design and Technology: Fashion and Textiles (H405)** is **September 2026**. The final assessment opportunity for the H405 qualification will be **Summer 2028**. There is no resit opportunity.

Cambridge OCR Level 3 Advanced GCE in Design and Technology:

Fashion and Textiles (H405/02)

Problem Solving in Fashion and Textiles

Sample Question Paper Version 4.1

Date – Morning/Afternoon

Time allowed: 1 hour 45 minutes

You must have:
- Resource Booklet

You may use:
- a scientific calculator
- a ruler
- geometrical instruments

First name									
Last name									
Centre number						**Candidate number**			

INSTRUCTIONS
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions in **Part 1** and **Part 2**.
- The separate Resource Booklet will be found inside this document.
- The recommended reading time for the Resource Booklet is **35 minutes**.
- Write your answer to each question in the space provided. Additional paper may be used if necessary, but you must clearly show your candidate number, centre number and question number(s).
- Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.
- Do **not** write in the bar codes.

INFORMATION
- The total mark for this paper is **70**.
- The marks for each question are shown in brackets **[ ]**.
- Quality of extended responses will be assessed in questions marked with an asterisk (*).
- This document consists of **12** pages.

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Before responding to the questions you must spend time reading and familiarising yourself with the information in the Resource Booklet.

1.* An online retailer who specialises in luggage has commissioned a design team to explore the possibility of extending their range of products to cater for the needs of gap year students who are travelling the world.

Critically evaluate how the rucksack shown in **Fig. 1** meets the requirements of gap year students. Refer to the information on **Pages 2 to 4** of the Resource Booklet.

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2 **(a)** Market research undertaken by the design team identified opportunity for a new rucksack, designed specifically for gap year students intending to travel the world.

A concept design for the rucksack, shown in **Fig. 2**, was prototyped for user testing. Refer to the information on **Pages 5 and 6** of the Resource Booklet.

Use sketches and notes to determine suitable technical solutions that overcome each of the **main problems** identified by the consumer testing.

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[12]

2 **(b)** **(i)** Reviews of the prototype rucksacks have also identified the concept design does not have a large enough capacity for the number of items required for the average gap year.

Table 3 in the booklet shows the measurements of the current concept rucksack.

Using the measurements supplied, calculate the new height of the bag to enable it to have a capacity of 60 litres. The width and the depth of the bag must remain the same for ergonomic reasons. Show your workings.

Height = ……cm **[3]**

(ii) **Fig. 3** in the booklet shows how important it is that the weight in the rucksack is distributed correctly to avoid back strain. For each rucksack there will be a packing guide according to capacity.

Assume that:

- A and B combined is 42% of total volume of a rucksack.
- A : B = 1 : 1.2
- C : D = 1 : 1.4

Calculate how this would be indicated for the concept bag. Refer to the information on **Page 6** of the Resource Booklet.

A = …… litres

B = …… litres

C = …… litres

D = …… litres **[3]**

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3 The straps on the concept bag in **Fig. 2** have been ergonomically designed to minimise the strain on the users back when carrying a large weight. To support the comfort of the user memory foam sections have been incorporated on the shoulder straps.

When testing the prototype it was identified that when the rucksack is used in rainy weather, water penetrates the memory foam. The memory foam takes a long time to dry out and as it remains damp, it is susceptible to mould. The dampness also weakens the foam structure resulting in the risk of it falling apart.

Use sketches and notes to demonstrate suitable technical solutions and key methods of construction that resolve these problems without hindering the ergonomic aspect of the straps.

[8]

4.* The design team has considered using solar panels in the rucksack to allow students to charge electronic mobile devices easily whilst travelling.

Whilst in principle this is a good idea that could offer a unique selling point for the product, there are a number of wider issues associated with the use of solar panels in different environments.

Critically evaluate what these wider issues might be and any implications for any stakeholders connected to the product.

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5. Before modifying the design of the product, the design team has also considered exploring customisation of the rucksack as this is a popular trend with the proposed target market.

The manufacturers have requested the design team to present a range of methods to offer customization of the rucksack to their clients. Refer to the information on **Pages 5 to 8** of the Resource Booklet.

The team has identified two opportunities when it would be suitable for the users to apply customisation to the rucksack:

- when first ordering it
- subsequently adding features to it post purchase.

Critically examine how the introduction of customisation at these points would impact on the following:

- Design optionality
- Manufacturing
- Cost.

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Oxford Cambridge and RSA

…day June 20XX – Morning/Afternoon

Cambridge OCR Level 3 Advanced GCE in Design and Technology

H405/02 Problem Solving in Fashion and Textiles

SAMPLE MARK SCHEME

Duration: 1 hour 45 minutes

MAXIMUM MARK 70

This document consists of 24 pages

PREPARATION FOR MARKING

SCORIS

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *scoris assessor Online Training*; *OCR Essential Guide to Marking*.

2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are posted on the RM Cambridge Assessment Support Portal http://www.rm.com/support/ca

3. Log-in to scoris and mark the **required number** of practice responses ("scripts") and the **required number** of standardisation responses.

   YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

MARKING

1. Mark strictly to the mark scheme.

2. Marks awarded must relate directly to the marking criteria.

3. The schedule of dates is very important. It is essential that you meet the scoris 50% and 100% (traditional 50% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.

4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone, email or via the scoris messaging system.

5. Work crossed out:
   a. where a candidate crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks
   b. if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed out answer and award marks appropriately.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there then add a tick to confirm that the work has been seen.

7. There is a NR (No Response) option. Award NR (No Response)
   - if there is nothing written at all in the answer space
   - OR if there is a comment which does not in any way relate to the question (e.g. 'can't do', 'don't know')
   - OR if there is a mark (e.g. a dash, a question mark) which isn't an attempt at the question.

   Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).

8. The scoris **comments box** is used by your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**
   If you have any questions or comments for your Team Leader, use the phone, the scoris messaging system, or email.

9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. **Annotations**

Annotation	Meaning
BP	Blank page
✔	Point where mark is awarded
✘	Incorrect response
L1	Level one response
L2	Level two response
L3	Level three response
ECF	Error carried forward
BOD	Benefit of doubt accepted
REP	Repetition
SEEN	Noted, but no credit given
PD	Poor Diagram offering unclear response

11. **Subject-specific Marking Instructions**

INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

The breakdown of Assessment Objectives for A Level in Design & Technology

	Assessment Objective
AO3	**Analyse and evaluate –** • **design decisions and outcomes, including for prototypes made by themselves and others** • **wider issues in design and technology**
AO3.1a	Analyse design decisions and outcomes, including for prototypes made by themselves and others
AO3.1b	Evaluate design decisions and outcomes, including for prototypes made by themselves and others
AO3.2a	Analyse wider issues in design and technology
AO3.2b	Evaluate wider issues in design and technology
AO4	**Demonstrate and apply knowledge and understanding of –** • **technical principles** • **design and making principles**
AO4.1a	Demonstrate knowledge of technical principles
AO4.1b	Demonstrate understanding of technical principles
AO4.1c	Apply knowledge and understanding of technical principles
AO4.2a	Demonstrate knowledge of design and making principles
AO4.2b	Demonstrate understanding of design and making principles
AO4.2c	Apply knowledge and understanding of design and making principles

Question			Answer	Marks	Guidance	
1	*		Indicative content: • The inside has only one compartment which means it would be difficult to keep items organised and it would be time consuming looking for smaller items. • Suitability to protect items inside; as there is only one compartment, items could move around and get damaged. • Reference for durability the bag is a simple construction and is likely to serve its purpose for a short amount of time. The construction could have had piping to strengthen the edges and give the bag more structure. • If carrying the bag at night it would be helpful to have reflective strips to make it more visible. • Suitability for outdoor use as this is evident in the specification which leads the buyer to believe it is suitable for a range of outdoor conditions and weather. • The bag would be suitable for a range of temperatures but the zip fastenings are not concealed and therefore could let water in torrential downpours. • High density refers to the thickness of the fabric and the tight weave which makes it very suitable and durable for backpacking and multiple terrains. • The fibres have a polyethylene hydrocarbon backbone which makes the fabric hardwearing and water resistant. • Zip unless plastic coated will eventually rust, • The fabric will be smooth to touch/against back and other clothing. • Suitability for long use carrying weight on shoulders as the straps appear to have a thin layer of padding. • Ease of access to inside as the main zip allows the	**16** **AO3** **3 x 1a** **AO3** **3 x 1b** **AO4** **2 x 1c** **AO3** **8 x 2c**	**Content** If a candidate demonstrates generic knowledge about stakeholder/user considerations without utilising the rucksack shown in **Fig.1** or the contextual information given on **Pages 2 to 4** of the Resource Booklet, candidates should be awarded 0 marks. Candidates may extract information from the Resource Booklet. Any such lifted information can be used in support of the critical evaluation but no marks should be awarded simply for duplicating text. Credit should be given for responses which identify issues evident in the supplied information and which are then critically analysed and evaluated in terms of their significance to the given scenario and relating to design and technical principles. Candidates can draw on practical experience of iterative designing and product analysis to support their response to this question.	**Levels of response** **Level 4 (13–16 marks)** The candidate produces a detailed and comprehensive critical evaluation of how the rucksack meets the requirements of gap year students. Analysis and synthesis of information is thorough, bolstered by sustained lines of argument which consider how the product will fulfil the needs of this primary user. The use of information from Pages 2 to 4 of the Resource Booklet is effective and fully substantiates the points being made. This results in a narrative that is sophisticated and fully appropriate to the context being addressed. There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated with the use of examples. **Level 3 (9–12 marks)** The candidate produces a good level of detailed critical evaluation of how the rucksack meets the requirements of gap

Question			Answer	Marks	Guidance	
			top half of the bag to be opened. However, whilst this is useful to reach belongings at the bottom half of the bag, items at the top could easily fall out. • Length of straps; they are adjustable and therefore suitable for different heights and sizes to ensure even distribution of weight. • Padding on straps will protect the shoulders particularly when carrying heavy loads. • The cords on the zips make them easier to access and see/feel if you need to open/close the bag during the night or whilst carrying. • There is no evidence of locks on the zips for security. • The waist strap helps to distribute the weight as required to avoid back strain. This is referred to in the booklet to state that 70% of the weight should feel like it is fitting on the person's hips and the rest on the shoulders. • The webbing straps around the bag will help to compress the bag once it is packed. • The strap on the front of the bag has an adjustable cord which would allow a sleeping bag to be inserted. However, there would be no protection for it when carrying in poor weather conditions. • The volume is stated at 25 litres and whilst this would make it light to carry it states that the minimum required for a female would be 55 litres and for a male 65 litres. • The colour of the bag would make it easy to identify and it would not show the dirt. • When examining the list of requirements for students, there are many small items that could easily get lost if not kept safe. There is no evidence of pockets in the bag; outside or internally. This would mean the user would need to carry a separate bag for smaller belongings like money and passports which could be		Candidate operating at Level 4 will access the majority of the AO4 (1c/2c) marks, at least two of the AO3 (1a) marks and at least two of the AO3 (1b) marks. Candidate operating at Level 3 will access at least six of the AO4 (1c/2c) marks, at least two of the AO3 (1a) marks and at least one of the AO3 (1b) marks. Candidate operating at Level 2 will access at least three of the AO4 (1c/2c) marks, at least one of the AO3 (1a) marks and at least one of the AO3 (1b) marks. Candidate operating at Level 1 will access some of the AO4 (1c/2c) marks.	year students. Analysis and synthesis of information is for the most part well-considered, bolstered by sustained lines of argument which consider how the product will fulfil the needs of this primary stakeholder. The use of information from Pages 2 to 4 of the Resource Booklet is effective and for the most part substantiates the points being made. This results in a narrative that has a good level of detail and is appropriate to the context being addressed. There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated with the use of examples. **Level 2 (5–8 marks)** The candidate produces a sufficient critical evaluation of how the rucksack meets the requirements of gap year students. Analysis and synthesis of information adequately bolsters lines of argument which consider how the product will fulfil the needs of this primary stakeholder. The use of information from

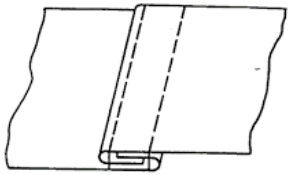
Question			Answer	Marks	Guidance	
			inconvenient.			Pages 2 to 4 of the Resource Booklet goes some way to backing up points being made. This results in a narrative that is sufficient and goes some way to addressing the context. There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence. **Level 1 (1–4 marks)** The candidate produces a basic explanation of how the rucksack meets the requirements of gap year students. Any understanding is basic, resulting in limited exploration of how the product will fulfil the needs of this primary stakeholder. The use of information from Pages 2 to 4 of the Resource Booklet is limited and adds little value to the points being made. This results in a narrative that is dislocated from the context being addressed. There is no analysis or evaluation. The information has some relevance and is presented with limited structure or detail

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th colspan="2">Guidance</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>The information is supported by limited evidence.

Level 0 (0 marks)
No response or no response worthy of credit.</td></tr>
<tr><td>2</td><td>(a)</td><td></td><td>Indicative content:

1. To strengthen the seams on the base, there could be an insert of strong waterproof plastic, (e.g. polypropylene) to distribute the weight across the base rather than put the stress on the seams.

2. The seams could be strengthened by adding binding or seam tape over the top on the inside. This would give the addition of an extra layer of fabric to take the weight.

3. Flat fell seams could be used as these are stitched 3 times making them very strong. However, they are time consuming to construct and would add to the cost. Also there are no raw edges which can be a point of weakness as the fabric frays.
 

4. The bag could be lined with strong fabric. This adds an extra layer of fabric inside the bag to take the weight.

5. The seam could be bound which means it is "wrapped with a folded strip of similar or stronger material and chain-stitched through all five layers in a single operation. This results in a tougher seam which also provides</td><td>12

AO3
2 x 2a

AO3
2 x 2b

AO3
6 x 1c

AO3
2 x 2c</td><td>Content

If a candidate demonstrates generic considerations of technical solutions without relating them to the ‘main problems’ outlined on Page 4 of the Resource Booklet, candidates should be awarded 0 marks. Likewise this question assesses applied knowledge of technical solutions to the existing design, so responses that focus on redesigning the existing solution should not be rewarded.

Candidates can draw on practical experience of iterative designing to support their response to this question.

Candidate operating at Level 4 will access the majority of the AO4 (1c/2c) marks, both AO3 (2a) marks and at least one of the AO3 (2b) marks.

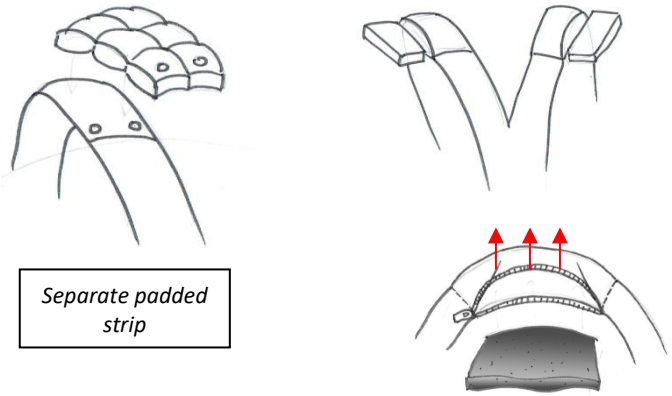
Candidate operating at Level 3</td><td>Levels of response

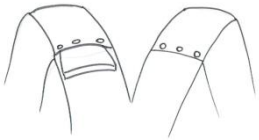
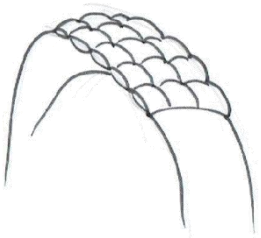
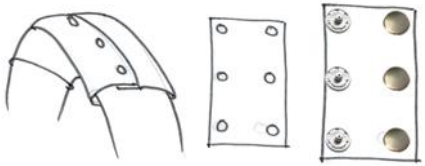
Level 4 (10–12 marks)
The candidate will demonstrate a series of detailed and comprehensive technical solutions that overcome the problems identified by user testing. Wide ranging and appropriate consideration is given to important technical information that needs to be taken into account with all the problems identified through user testing being effectively mitigated with technical solutions. The use of Pages 5 and 6 in the Resource Booklet to support the response is wholly effective and fully substantiates understanding through clear and detailed notes and sketches. Any technical solutions will be thoroughly justified and will provide evidence of a clear and relevant solution to the problems being encountered in the question.</td></tr>
</table>

Question			Answer	Marks	Guidance	
			improved liquid and particle repellency at the seams. 6. The handle could be reinforced with the addition of a lining inside the two layers of fabric. This could be constructed of Kevlar or Cordura for strength, 7. The handle could be 'cross' stitched where it is attached to the bag for strength, 8. The handle could have the addition of rivets where it is attached to the bag. This will ease the weight stress from the stitching to the bag and make the connection stronger. The rivets are attached with industrial machines and are very difficult to detach. 9. The handle could have metal rings connecting it to the bag. The strap is less likely to break under stress if less stitching is used. 10. The zip could have the addition of a placket to conceal and protect the zip form rain etc. 11. The zipper could be watertight to protect the inside. 12. A waterproof rubber strip can be added on top of the zip. 13. Welded, (glued) tape onto of the zip ensures the stitching is watertight. 14. To address the solar panel issue it could be made detachable so the user could have the option of putting the panel in the bag or carrying it with them. This could be achieved through having magnetic poppers to attach or other method to attach/detach.		will access at least five of the AO4 (1c/2c) marks, at least one of the AO3 (2a) marks and at least one of the AO3 (2b) marks Candidate operating at Level 2 will access at least two of the AO4 (1c/2c) marks, at least one of the AO3 (2a) marks and at least one of the AO3 (2b) marks Candidate operating at Level 1 will access some of the AO4 (1c/2c) marks	**Level 3 (7–9 marks)** The candidate will demonstrate a good level of technical solutions that overcome the problems identified by user testing. Wide ranging and for the most part appropriate consideration is given to important technical information that needs to be taken into account to effectively mitigate against the problems identified through user testing although one or two solutions could be clearer. The use of Pages 5 and 6 in the Resource Booklet to support the response is for the most part effective and substantiates understanding through clear and detailed notes and sketches. Any technical solutions will be to a large extent justified and will provide evidence for the most part of a clear and relevant solution to the problems being encountered in the question. **Level 2 (4–6 marks)** The candidate will demonstrate sufficient technical solutions that overcome the problems identified by user testing. Reasonable consideration is given to important technical

Question			Answer	Marks	Guidance	
			15. The solar panel could be disguised within a design to make it difficult to identify. As a rectangular panel it is clear it is a solar device.			information that needs to be taken into account to mitigate against the problems identified through user testing although evidence at times is patchy and could be clearer. The use of Pages 5 and 6 in the Resource Booklet to support the response goes some way to substantiate understanding made through for the most part clear and detailed notes and/or sketches. Some of the technical solutions will be justified but this justification will be underdeveloped and will not consistently align with the problems being encountered in the question. **Level 1 (1–3 marks)** The candidate will demonstrate basic technical solutions that overcome the problems identified by user testing. Any technical solutions will be limited and unclear and will be dislocated from the context provided. These technical solutions may be described but will remain unjustified and will provide only a basic solution to the problems being encountered in the question. There is no analysis of

Question			Answer	Marks	Guidance	
						evaluation. **Level 0 (0 marks)** No response or no response worthy of credit.
Question			**Answer**	**Marks**	**Guidance**	
2	**(b)**	**(i)**	60 x 1 000 = 60 000 (✓) 60 000* = 36 x 21 x H (✓) H = $\frac{60\,000}{36 \times 21}$ H = 79.4 cm (✓) **Award credit for any other appropriate method**	**3** **AO4 1c**	1 mark for conversion of 45l into 45000 cm^3. 1 mark for recalling cuboid volume formula and substituting values in. 1 mark for solving for new height. *Allow error carried forward (ECF) where correct working out is shown. **Correct answers scores full marks**	
2	**(b)**	**(ii)**	60 x 0.42 = 25.2 litres (✓) 25.2* ÷ (1 + 1.2) = 11.5 A = 11.5* litres, B = 11.5* x 1.2 = 13.7 litres (✓) 60 – 25.2* = 34.8 litres 34.8* ÷ (1 + 1.4) = 14.5 C = 14.5* litres, D = 14.5* x 1.4 = 20.3 litres (✓) **Award credit for any other appropriate method**	**3** **AO4 1c**	1 mark for calculating the volume of A+B 1 mark for calculating A and B (both must be correct for this mark) 1 mark for calculating C and D (both must be correct for this mark) *Allow error carried forward (ECF) where correct working out is shown. **Correct answers scores full marks**	

Question			Answer	Marks	Guidance	
3			Indicative content: • Creating pockets in the strap so the foam could be removed prior to washing, • Having a separate padded strip that attaches to the strap when required. • Sourcing an alternative method of padding that can be washed without affecting its structure; for example air cushion technology using water-resistant material to eliminate the water penetration and degradation seen with the memory foam and retaining some of the ergonomic qualities of the memory foam. • Having a padded strip that slots onto the existing strap. • Other technical solutions could be considered such as, the padding being inflatable; similar to an air bed, allowing the variable comfort that would have similarly been offered by the memory foam. This could be made using water-repellent materials or finishes.  	8 **AO3** **1 x 1a** **AO3** **1 x 1b** **AO4** **4 x 1c** **AO4** **2 x 2c**	**Content** If a candidate demonstrates generic knowledge for tackling mould and disintegration of the memory foam or considerations are not linked to the concept design shown in **Fig. 2**, candidates should not be awarded 0 marks. Likewise this question assesses applied knowledge of technical solutions to the existing design, so responses that focus on redesigning the existing solution should not be rewarded. Candidates can draw on practical experience of iterative designing and product analysis to support their response to this question. --- Candidate operating at Level 3 will access at least five of the AO4 (1c/2c) marks, the AO3 (1a) mark and the AO3 (1b) mark Candidate operating at Level 2 will access at least two of the AO4 (1c/2c) marks, the AO3 (1a) mark and the AO3 (1b) mark	**Levels of response** **Level 3 (7–8 marks)** The candidate demonstrates a detailed and comprehensive analysis of how the problems around mould and disintegration can be overcome. Wide ranging and appropriate consideration is given to technical solutions and key methods of construction that overcome the problems, shown through clear and detailed notes and sketches. The suggested modifications provide evidence of a clear and relevant technical solution to the main problems being encountered in the question and will ensure ergonomic aspects of the strap are fully retained. **Level 2 (4–6 marks)** The candidate demonstrates a sound level of analysis of how the problems around mould and disintegration can be overcome. Wide ranging and, for the most part, appropriate consideration is given to technical solutions and key methods of construction that overcome the problems,

Question	Answer	Marks	Guidance	
	  *Foam slotted into pocket on straps and secured with poppers* *Air cushion technology* *Inflatable section*  *Wraparound detachable strip*		Candidate operating at Level 1 will access some of the AO4 (1c/2c) marks	although one or two could be clearer. Sketches and/or notes will for the most part be clear and detailed. The suggested modifications go some way to providing adequate technical solutions to the main problems being encountered in the question and will, for the most part, ensure ergonomic aspects of the strap are retained. **Level 1 (1–3 marks)** The candidate demonstrates only a basic explanation of how the problems around mould and disintegration can be overcome. Limited consideration is given to technical solutions or key methods of construction that could be used to overcome problems with some omitted entirely from the candidate's response. Sketches or notes may at times being misleading. The suggested modifications will provide only limited technical solutions to the main problems being encountered in the question and there will be doubts that the ergonomic aspects of the strap would be retained. There is no analysis

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th colspan="2">Guidance</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>or evaluation.

Level 0 (0 marks)
No response or no response worthy of credit.</td></tr>
<tr><td>4</td><td>*</td><td></td><td>Indicative content:

Discussion could include:
• The addition of the solar panels will increase the overall cost of production and therefore this will increase the cost of the rucksack. This would impact on all manufacturers involved in manufacturing the component parts and construction of the bag.
• The extra processes and component parts involved in including the solar panel will support other industries involved in producing the solar voltaic panel.
• The fact that the rucksack has the addition of the panel is a USP that will attract a wider audience as the use of mobile technology is used by a huge population that depend on electronic devices whilst travelling.
• The addition of the panel does encourage theft as it ‘advertises’ the fact that there are probably mobile devices in the rucksack or on the person. This could put the user in a compromising situation and have a negative effect on the manufacturers. However, sales could increase with the addition of add-ons in the form of a method of removing the panel and storing it as a separate component when required.
• The use of solar technology has a positive reflection on the manufacturers as they are encouraging renewable energy and the retailers could advertise this fact to attract a wider audience.
• Incorporating the electronics into the bag would increase manufacturing and assembly time.</td><td>12

AO3
2 x 2a

AO3
2 x 2b

AO4
4 x 1c

AO4
4 x 1c</td><td>Content

If a candidate demonstrates generic knowledge of the wider issues related to the use of solar panels and no consideration is not made in connection to use within the concept design shown in Fig.2, candidates should be awarded 0 marks.

Candidates may extract information from the Resource Booklet. Any such lifted information can be used in support of the critical evaluation but no marks should be awarded simply for duplicating text.

Credit should be given for responses which identify issues evident in the supplied information and which are then critically analysed and evaluated in terms of their significance to the given scenario and relating to design and technical principles.</td><td>Levels of response

Level 4 (10–12 marks)
The candidate produces a detailed and comprehensive critical evaluation of the wider issues involved with using solar panels on the rucksack in different environments. The narrative is well-considered and bolstered by sustained lines of argument which consider possible implications for a diverse range of stakeholders who will be connected to the product. Evidence will be prioritised effectively in terms of wider issues and stakeholder impact and the use of the Resources Booklet will fully substantiate the points being made. This results in an evaluation which is well considered and fully appropriate to the context being addressed.

There is a well-developed line of reasoning which is clear and logically structured. The</td></tr>
</table>

Question			Answer	Marks	Guidance	
			• More problems could occur during production and during use which could impact on the cost and negative publicity for the company. • The direct impacts would occur as a result of expenses in the form of wages and salaries as well as the attaining of goods and services which are required for the rucksack construction. • Impact would occur in the form payment for the extra materials and components which could be sources locally to encourage and support UK companies or it could be outsourced abroad to support economies in other countries. • Outsourcing the materials and components abroad could be lower in cost but this could encourage poor working conditions and low wages. This could have a negative impact on the manufacturers and retailers. • Currently the recycling of solar panels is a concern as there aren't enough locations to recycle old solar panels, and there aren't enough non-operational solar panels to make recycling them economically attractive. Recycling of solar panels is particularly important because the materials used to make the panels are rare or precious metals, all of them being composed of silver, tellurium, or indium. Due to the limitability of recycling the panels, those recoverable metals may be going to waste which may result in resource scarcity issues in the future. • Silicon is needed to make the majority of present day photovoltaic cells and which there an abundance is currently of. However a silicon-based solar cell requires a lot of energy input in its manufacturing process. • The addition of the solar panel does make the recycling more problematic at the end of use and there is a lack of awareness regarding the		Candidates can draw on practical experience of iterative designing and product analysis to support their response to this question. Candidate operating at Level 4 will access the majority of the AO4 (1c/2c) marks, both AO3 (2a) marks and at least one of the AO3 (2b) marks. Candidate operating at Level 3 will access at least five of the AO4 (1c/2c) marks, at least one of the AO3 (2a) marks and at least one of the AO3 (2b) marks Candidate operating at Level 2 will access at least two of the AO4 (1c/2c) marks, at least one of the AO3 (2a) marks and at least one of the AO3 (2b) marks Candidate operating at Level 1 will access some of the AO4 (1c/2c) marks	information presented is relevant and substantiated with the use of examples. **Level 3 (7–9 marks)** The candidate produces a good level of detailed critical evaluation of the wider issues involved with using solar panels on the rucksack in different environments. The narrative is for the most part well-considered and bolstered by sustained lines of argument which consider possible implications for a diverse range of stakeholders who will be connected to the product although one or two opportunities for stakeholder analysis are missed. Evidence will for the most part be prioritised effectively in terms of wider issues and stakeholder impact and the use of the Resources Booklet will to a large extent substantiate the points being made. This results in an evaluation which has a good level of detail is largely appropriate to the context being addressed. There is a well-developed line of reasoning which is clear and

Question			Answer	Marks	Guidance	
			manufacturing process of solar panels. • The manufacturers could introduce a return policy or maintenance program if the rucksack components for some reason do fail. The rucksacks could be returned when no longer required and the company could have a program where the components could be distributed to people and groups that find them valuable and make sure any other parts do not end up in landfills. The consumers could be encouraged to do this by offering as discount on further purchases.			logically structured. The information presented is relevant and substantiated with the use of examples. **Level 2 (4–6 marks)** The candidate produces a sound critical evaluation of the wider issues involved with using solar panels on the rucksack in different environments. The narrative is reasonable and bolstered by lines of argument which consider implications for a narrow range of stakeholders who will be connected to the product. Evidence will be prioritised in a haphazard way and the use of the Resources Booklet will go some way to substantiate the points being made. This results in an evaluation which is adequate to the context being addressed. There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence. **Level 1 (1–3 marks)** The candidate produces a

Question			Answer	Marks	Guidance	
						basic explanation of the wider issues involved with using solar panels on the rucksack in different environments. Any understanding is basic, resulting in limited exploration of how the product modification will affect stakeholders. There will be little prioritisation of evidence and the use of the Resources Booklet is limited and adds little value to the points being made. This results in a narrative which is dislocated from the context being addressed. There is no analysis or evaluation. The information has some relevance and is presented with limited structure or detail The information is supported by limited evidence. **Level 0 (0 marks)** No response or no response worthy of credit.

Question			Answer	Marks	Guidance	
5			Indicative content: • The rucksack options could be relating to the shape. There could be slight difference to the shape or with choices relating to pockets/dividers etc. This would impact at the pattern stage as a range of templates would need to be stored ready for cutting. It would be vital that the patterns allowed for the most economical pattern lay to reduce wastage and cost. The shape options would have taken this into consideration. • Lay planning programs save time and fabric because computers have the ability to assess the most economical lay. Given a set of pattern shapes and width of cloth, the computer can try thousands of different arrangements in seconds showing the best layout and allowing optimal usage of fabric. • When ordering the manufacturers could offer a range of colour options print options. The number of options would have to be enough to make the buyer feel they are purchasing a rucksack individual to their requirements but without having a negative impact on the production process. The addition of print fabrics would increase the cost and would therefore have to be considered on the retail price. The option of color options should not affect the overall cost of the bag for the consumer but will the cost for the manufacturer. This could be due to having to calculate how popular certain colors are likely to be and therefore not over ordering and wasting funds. • The addition of other colours or prints could impact on manufacturing time as the fabrics will need to be prepared for cutting depending on the orders and would take more time. It could mean the sewing machines would have to be ready prepared to sew in	**16** **AO3** **3 x 1a** **AO3** **2 x 1b** **AO4** **6 x 1c** **AO4** **5 x 2c**	**Content** If a candidate demonstrates generic knowledge in relation to the issues surrounding customisation and/or they are unable to connect this to the context set out in the question, candidates should not be awarded higher than Level 1. Candidates may extract information from the Resource Booklet. Any such lifted information can be used in support of the critical analysis but no marks should be awarded simply for duplicating text. Credit should be given for responses which identify issues evident in the supplied information and which are then critically analysed and evaluated in terms of their significance to the given scenario and relating to design and technical principles. Candidates can draw on practical experience of iterative designing to support their response to this question.	**Levels of response** **Level 4 (13–16 marks)** The candidate provides a detailed and comprehensive critical analysis of how the introduction of customisation could impact on design optionality, manufacturing and cost. Analysis and synthesis of information is thorough which results in multiple impacts being explored in relation to the two points at which customisation is applied. The use of information from Pages 5 to 8 of the Resource Booklet is effective and fully substantiates the points being made. This results in a narrative that is sophisticated and fully appropriate to the context being addressed. **Level 3 (9–12 marks)** The candidate provides a good level of detailed critical analysis of how the introduction of customisation could impact on design optionality, manufacturing and cost. Analysis and synthesis of information is for the most part detailed which results in multiple impacts being explored in relation to the two

Question			Answer	Marks	Guidance	
			a range of colours to suit individual orders and therefore more machines would be required. • Digital textile printing could be an option at the design stage which would allow for unique designs to be printed onto pre-cut fabric which would then be sewn into the rucksack. The pattern pieces would be ready for printing when a customer order for a particular print is received. This could impact on cost due to the equipment required to complete the print designs. However, if the patterns are ready cut before printing no resources will be wasted. • At the design stage, components could be chosen by the consumer in the form of zip options for the rucksack. The straps have webbing that would be a cost effective way of offering customization options as there would be no alteration to the manufacturing process and the straps could be ready cut in a range of colors. This would have no effect on the cost for the retailer or the manufacturer. • The manufacturers could off logo options at the design stage of production. The logo could be completed by CAD/CAM. A computerized sewing machine could be used and the logo options would be pre stored to save time. If the fabric was precut the positioning of the logo would be easy for the operator. This would affect the final rucksack cost for the consumer as there would be extra manufacturing processes and materials used to complete the logo. The logo could be created using a wide range of vinyl options which would be cut out using CAM heat applied. Again, this would affect the cost to the manufacturer and the consumer.to position retailers can add the store logo or request a specific color during the design stage of production. • Post Purchase adjustments could be built into the		Candidate operating at Level 4 will access the majority of the AO4 (1c/2c) marks, at least two of the AO3 1a marks and at least one of the AO3 (1b) marks. Candidate operating at Level 3 will access at least seven of the AO4 (1c/2c) marks, at least one of the AO3 1a marks and at least one of the AO3 (1b) marks Candidate operating at Level 2 will access at least three of the AO4 (1c/2c) marks, at least one of the AO3 1a marks and at least one of the AO3 (1b) marks Candidate operating at Level 1 will access some of the AO4 (1c/2c) marks	points at which customisation is applied although one or two opportunities are missed. The use of information from Pages 5 to 8 of the Resource Booklet is effective and for the most part substantiates the points being made. This results in a narrative that has a good level of detail and is appropriate to the context being addressed. **Level 2 (5–8 marks)** The candidate produces a sound critical analysis of how the introduction of customisation could impact on design optionality and/or manufacturing and/or cost. Analysis and synthesis of information adequately results in a narrow coverage of impacts being explored in relation to one/both points at which customisation is applied. The use of information from Pages 5 to 8 of the Resource Booklet goes some way to backing up points being made. This results in a narrative that adequately addresses the context. **Level 1 (1–4 marks)** The candidate provides basic knowledge of how the

Question			Answer	Marks	Guidance	
			rucksack for customers to do it themselves. This could be through the addition of add on sections/compartments. This would cost more for the manufacturer due to materials and production costs but they could keep stock of a certain number and ranges ready to be delivered on order. • Offering customization at the design stage will have an impact on the buyer's choice and reflection on the company as it means the latest color options can be offered to follow the latest trends.			introduction of customisation could impact on design optionality or manufacturing or cost. Any understanding is basic, resulting in limited exploration of the impacts at the ordering or post purchase stage at which point customisation is applied. The use of information from the Resource Booklet is limited and adds little value to the points being made. This results in a narrative that is dislocated from the context being addressed. There is no analysis or evaluation. **Level 0 (0 marks)** No response or no response worthy of credit.

Assessment Objectives (AO) grid

Question	AO3	AO4
1*	6	10
2a	4	8
2bi		3
2bii		3
3	2	6
4*	4	8
5	5	11
Total	21	49
Overall	70	

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