

GCE

Design and Technology

H405/01: Principles of fashion and textiles

A Level

Mark Scheme for June 2025

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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MARKING INSTRUCTIONS

PREPARATION FOR MARKING

RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM 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 available in RM Assessor
3. Log-in to RM Assessor and mark the **required number** of practice responses (“scripts”) and the **required number** of standardisation responses.

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 RM Assessor 50% and 100% (traditional 40% 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 RM Assessor messaging system.
5. **Crossed-Out Responses**
Where a candidate has crossed out a response and provided a clear alternative then the crossed-out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed-out response where legible.

Rubric Error Responses – Optional Questions

Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM Assessor, which will select the highest mark from those awarded. (*The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.*)

Multiple-Choice Question Responses

When a multiple-choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).

When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses

When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only one mark per response)

Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth two or more marks)

If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space).

Longer Answer Questions (requiring a developed response)

Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

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 the annotation 'SEEN' to confirm that the work has been seen and mark any responses using the annotations in section 11.

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 is not an attempt at the question.
- Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).
8. The RM Assessor **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.**
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. For answers marked by levels of response:
- a. **To determine the level** – start at the highest level and work down until you reach the level that matches the answer
 - b. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of marks available)
Consistently meets the criteria for this level	At top of level

11. Annotations

Annotation	Meaning
	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	Tick
	Cross
	Noted but no credit given
	Benefit of doubt
	Level 1 response
	Level 2 response
	Level 3 response
	Error carried forward
	Omission
	Not answered question
	Confused (replaces the question mark)
	Too vague
	Own figure rule
	Repetition

12. 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.

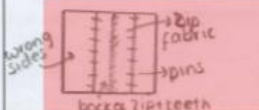
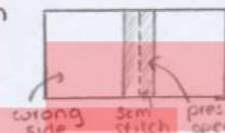
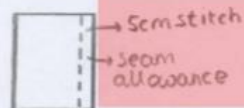
Question	Answer	Mark	Guidance
1 (a)	Possible advantages may include: Advantage: Woven fabrics are strong and durable (1). Justification: woven fabric comprises of two interlocking threads which reinforce fabric structure thereby giving the shoulder bag longer lasting use (1). Advantage: Woven fabrics are less likely to lose their shape through stretch/shrinkage (1). Justification: shoulder bag will withstand heavier items/use without the structure/shape being compromised (1) improves aesthetic longevity of shoulder bag (1). Advantage: Woven fabrics are easier to care for/clean (1). Justification: improved user confidence and ability to market shoulder bag (1). Advantage: Create a pattern design within the woven fabric (1). Justification: to enhance the aesthetics of the bag making it more desirable to the customer (1). Any other valid suggestion.	4	In each case: One mark for identifying an advantage of using a woven fabric for the shoulder bag. One mark for justifying answer given. Specific reference to the context in the question is needed for marks to be awarded.
(b)	Possible pre-manufactured components may include: Pre-manufactured component: Adjustable buckle on shoulder straps (1). Justification: allows shoulder bag to be adjusted in length to suit any shape/size of user for a more comfortable fit (1). Pre-manufactured component:	2	One mark for identifying a pre-manufactured component used to increase the functionality of the shoulder bag for the user. One mark for justifying answer given. Do NOT accept zip fastening.

		Eyelets for shoulder bag straps (1). Justification: allows for easy movement/sliding of adjustable straps (1)/reinforces the hole to strengthen against wear and tear from strap movement (1). • Pre-manufactured component: Lobster clasp fastening on shoulder straps (1). Justification: provides a larger opening that makes it easier for consumer to use to remove shoulder strap (1)/lobster clasps are very secure (1). • Pre-manufactured component: Buckle on the top flap(1) Justification: Gives the bag extra security (1) Any other valid suggestion.		Specific reference to the context in the question is needed for marks to be awarded.
	(c)	Indicative Content: The candidate is expected to demonstrate their understanding of the process involved through a series of annotated sketches and/or notes. There may be variations to the process as indicated but to get into L3 candidates must demonstrate a clear understanding of the end-to-end process. Invisible zip 1. Prepare the fabric by finishing the edges of the fabric using zigzag stitch or using an overlocker. 2. Mark a vertical 5/8" seam allowance or alignment marks with a fabric marker/tailors chalk where the zip will be placed. 3. Iron a piece of zipper tape onto edges of fabric to make it flat (on an invisible zip the edge curls slightly and ironing it helps to sew close to the teeth)	6	Level 3 [5-6 marks] The candidate demonstrates a good level of detail of the process needed to insert a zip using technical terms and considering any relevant equipment, machinery and materials. Sketches, if used will be clear and supported with relevant notes. The process includes all relevant stages. Level 2 [3-4 marks] The candidate will demonstrate a sound level of detail of the process needed to insert a zip using some technical terms and there will be some consideration of any relevant equipment, machinery and materials. Sketches, if used, will for the most

		4. Prepare the zip – open up the zip fully, rolling and pressing out the curled teeth so they lay flat. 5. Place the zip to the edge of the right side of the fabric along the marked edge. Place the pins at right angles to the edge and tack into place. 6. Attach the invisible zipper foot to the sewing machine. The invisible sewing foot has two little grooves at the bottom. Slot the zip teeth into the left groove. 7. Machine stitch all the way down one side. Start at the top edge and stitch in place until the foot reaches the zipper stop. Back stitch to lock and remove. 8. Repeat for the other side. Make sure that the zip teeth are rolled out and flat. Close the zip. 9. Fold the right sides of the fabric together and move the zip ends out of the way. Lower the sewing machine needle as close to the last stitching line as possible. Lower the zipper foot. Sew the seam below the zip for about 2". 10. Change the foot to the regular sewing foot on the machine and stitch the seam. Press to neaten the seam. Any other valid suggestion.		part be clear and supported with notes most of which are relevant. The process includes some relevant stages. Level 1 [1-2 marks] The candidate will demonstrate a limited level of detail of the process needed to insert a zip evidencing a limited use of technical terms and there will be a basic consideration of any relevant equipment, machinery and materials. Sketches, if used, will be unclear with only basic notes to accompany them. Few relevant stages are included. 0 marks No response or no response worthy of credit.
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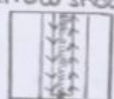
How to insert a zip:

- 1) ~~get~~ first, get the two pieces of fabric that will be either side of the zip. Place these pieces of fabric **right sides together**
- 2) ~~using a normal~~ ~~the~~ sewing machine, sew a stitch length of 5cm at 1.5cm
- 2) ~~pin at a 1.5cm~~ using pins, pin a 1.5cm **seam allowance**
- 3) using a sewing machine, use a straight stitch of 5cm length to sew the seam allowance.*
- 4) ~~press open the fabric with~~ remove the pins and press open the fabric with an iron to ensure a neat fold.
- 5) next, get the zip and place it in the fold, ensuring no teeth of the zip are covered by fabric.
- 6) once the zip is in the correct position, use pins to secure it.
- 7) on the sewing machine, change the normal sewing foot to a zipper foot to allow for a smooth stitch.



Question 1(c) continued...

- 8) ensure the thread used matches the colour of the fabric or the zip for quality control.
- 9) starting at the top left of the zip, sew down slowly and carefully, sewing as close to the zip as possible without sewing the teeth.
- 10) once you've sewn down a couple of cm, use a reverse stitch to secure the seam.
- 11) continue to sew down slowly, once you get to the bottom of the zip, place the needle down in the fabric and turn the fabric to the correct direction and carry on sewing, repeat this step to come back up the zip.
- 12) at the end, use a reverse stitch again to secure the stitches.
- 13) remove the pins.
- 14) turn the fabric around and using an unpicker, unpick

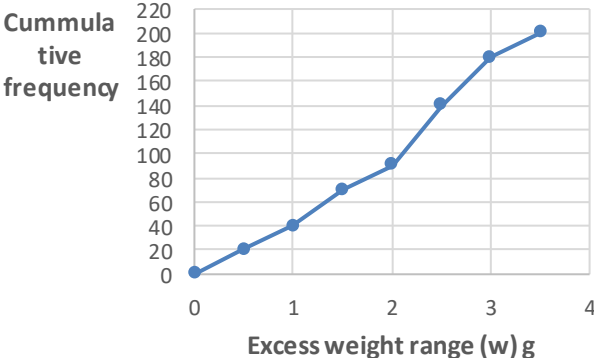


	(d)	Indicative Content: Laser cutting drastically minimises material waste leading to a more sustainable and cost-effective production process. less waste also helps the environment, saves resources and reduces project costs. With laser cutting technology manufacturers can create precise cuts with accuracy without wasting any materials along the way. Laser cutting machines use less energy compared to other cutting methods which saves the manufacturer money over time whilst still providing quality results. Using lasers instead of blades in the cutting process means there are no blades to be sharpened or replaced during manufacturing which reduces costs over time. • Digital textile cutting technology is versatile. Laser cutting is easily adapted to work in a wide range of situations and with a variety of materials. • Using lasers makes it possible to produce more complex 3D designs which would have been difficult to manufacture using other methods. • Modern laser cutting technology is able to cut through thicker materials more easily than other types of machines reducing labour required when working with these fabrics such as Kevlar for tactical gear and technical fabrics for heat and flame resistance. • Laser cutting provides an unrivalled level of precision to the manufacturing process. Human error is drastically reduced, so components are highly accurate and easily repeatable. With precision quality control also improves. • ideal for producing prototypes or small batches of products that require intricate designs quickly and more efficiently. Laser cutters can also be used to create textures and engravings on surfaces.	6	Level 3 [5-6 marks] The candidate has a clear understanding of how digital cutting technology is changing modern manufacturing systems. They produce a thorough discussion in relation to the question. The explanation of how digital cutting technology is changing modern manufacturing systems is clear and well-developed and several relevant examples are used to exemplify the points being made. Level 2 [3-4 marks] The candidate has a reasonable understanding of how digital cutting technology is changing modern manufacturing systems. They produce a reasonable discussion in relation to the question. The explanation of how digital cutting technology is changing modern manufacturing systems is sufficient although one or two opportunities are missed in referring to different examples. Level 1 [1-2 marks] The candidate has a basic knowledge of how digital cutting technology is changing modern manufacturing systems. Any reference to this issue is descriptive in nature and has little appreciation of digital cutting technology. The
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		• Faster production. Automation and computer control allow laser-cutting machines to work at really fast speeds, increasing productivity and shortening lead times. • Safe and clean. laser cutting is predominately a non-contact process, so it minimises physical interactions with materials, ensuring a safer workspace, reducing the risk of contamination, and creating a cleaner workspace for the manufacturing team. • An improved level of safety for workers due to the elimination of blade contact used in textile cutting processes. Automated systems can also be programmed to follow specific instructions such as not cutting certain parts of the fabric or only using certain types of lasers depending on what is being cut out at that time which helps reduce human error. • laser cutting, the fabric is guaranteed to be cut to the correct size. This is especially useful for manufacturers with high-end products where even small deviations can make a difference in quality. • Laser cutters remove jobs as not as many people are needed during the cutting stage of production. There are also high set up costs and servicing costs that must be factored in. If the laser cutter stops working, it can have a huge impact on the production meaning lead times may not be met. Blackman & White uses a laser conveyor cutter specifically for textiles, such as automotive airbags. The laser allows for the cutting of multiple layers of material in one pass and the ability to make continuous cuts directly from rolls of multi-layer material. This makes it a fast and efficient method for mass-produced fabrics using laser cutting of textiles. Recent technological advancements have made this process much more efficient. In particular, the use of CO2 lasers has revolutionised how textiles are cut. CO2 laser cutting machines emit high-energy light beams that can quickly and accurately cut through fabric.		response contains no analysis or evaluation. 0 marks No response or no response worthy of credit.
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		This technology is especially beneficial for the textile industry because it allows manufacturers to produce higher quality products in a shorter amount of time. Any other valid suggestion.		
	(e)	Possible benefits may include: • Benefit: Assesses manufacturer's design and development planning (1). Explanation: ensuring that systems are put into place to ensure smooth data handling/quality checks are in place throughout the design process of the shoulder bag (1). • Benefit: ISO compliance helps the manufacturer implement a systematic approach to quality management of the shoulder bag (1). Explanation: this streamlines processes and improves efficiency (1). • Benefit: Assesses manufacturer's design and development outputs (1). Explanation: these are documents needed by financial and manufacturing teams to produce a shoulder bag which complies to the original key criteria (1). • Benefit: ISO compliance helps manufacturers manage projects more effectively/ access new markets (1). Explanation: this is beneficial as they ensure international requirements for compatibility across borders/increasing consumer confidence in the company's products (1). • Benefit: By adhering to ISO standards manufacturers can identify/rectify defects early in the production process of the shoulder bag (1). Explanation: this ensures that only high-quality products reach the market which in turn builds consumer confidence (1).	6	In each case: One mark for identifying each benefit to the manufacturer of complying to ISO standards when selling the shoulder bag globally. One mark for explanation given. Specific reference to the context in the question is needed for marks to be awarded.

			Any other valid suggestion.		
	(f)		Possible factors may include: • Factor: Transaction costs (1). Explanation: the costs related to the economic exchange behind trade, such as the gathering of information and negotiation (1). The full cost of shipping goods from the point of production to the point of use (1). Mode of transportation - containerisation, effective transport management systems and economies of scale can reduce transport costs significantly (1). • Factor: Tariff and non-tariff costs (1). • Explanation: levies imposed by governments (1). Levies can involve a direct monetary cost according to the product being traded (1). • Factor: Time costs (1). Explanation: delays related to the lag between an order and the moment it is received by the purchaser (1). Long-distance international trade is often associated with time delays that can be compounded by custom inspection delays (1). Efficiency of logistics operations to reduce the number of kilometres the products need to travel (1). Any other valid suggestion.	2	One mark for identifying a factor the manufacturer needs to consider when planning the global distribution of the backpack. One mark for explanation given. Specific reference to the context in the question is needed for marks to be awarded.

2	(a)		<table><thead><tr><th>Weight of gym bag in grams</th><th>Frequency</th><th>Cumulative frequency</th></tr></thead><tbody><tr><td>693</td><td>1</td><td>1</td></tr><tr><td>695</td><td>1</td><td>2</td></tr><tr><td>696</td><td>3</td><td>5</td></tr><tr><td>697</td><td>2</td><td>7</td></tr><tr><td>698</td><td>1</td><td>8</td></tr><tr><td>699</td><td>3</td><td>11</td></tr><tr><td>700</td><td>6</td><td>17</td></tr><tr><td>701</td><td>5</td><td>22</td></tr><tr><td>702</td><td>3</td><td>25</td></tr><tr><td>703</td><td>2</td><td>27</td></tr><tr><td>704</td><td>1</td><td>28</td></tr><tr><td>705</td><td>1</td><td>29</td></tr><tr><td>706</td><td>1</td><td>30</td></tr></tbody></table>	Weight of gym bag in grams	Frequency	Cumulative frequency	693	1	1	695	1	2	696	3	5	697	2	7	698	1	8	699	3	11	700	6	17	701	5	22	702	3	25	703	2	27	704	1	28	705	1	29	706	1	30	4	Award four marks as follows: One mark for two correct frequencies. One mark for other two correct frequencies. One mark for two correct cumulative frequencies. One mark for other two correct cumulative frequencies.
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693	1	1																																													
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	(b)	(i)	Cummulative Frequency Diagram 	2	Award two marks as follows: One mark for plotting the two nodes. One mark for extending the line through the nodes. If only one node and one line only award 1 mark.																																										

		(ii)	The median value is 2.1 [1] Accept between 2 – 2.2	1	One mark for estimating the median value.
		(iii)	interquartile range = upper quartile – lower quartile = approximately $2.65^* [1] - 1.15^* [1] = 1.5$ grams [1] (accept any answer between 1.4 and 1.6 grams)	3	Award three marks as follows: One mark for selecting upper quartile value. One mark for selecting lower quartile value. One mark for estimation of interquartile range. If correct answer is given without working out shown award full marks. Where an incorrect answer is given working out should be used to credit appropriate marks. *Allow error carried forward (ECF) where correct working out is shown.
		(iv)	$30+20+50+40 = 140$ [1] To convert to a percentage - $(140 / 200) \times 100 = 70\%$ [1]	2	Award two marks as follows: One mark for determining the number of rucksacks in the range given. One mark for calculating the percentage of rucksacks that had an

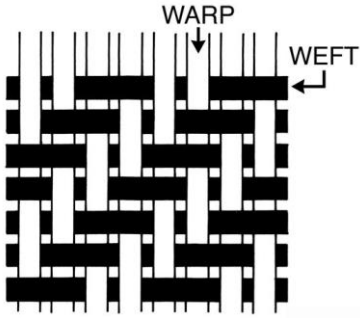
					excess weight between 1 and 3 grams. If correct answer is given without working out shown award full marks. Where an incorrect answer is given working out should be used to credit appropriate marks.
		(v)	$63.5 \times 15\% = 9.525\text{kgs}$ [1] $9.525 = 9.5 \text{ kgs (to 1 dec pl)}$ [1]	2	Award two marks as follows: One mark for calculating maximum safe packed rucksack weight for a person weighing 63.5 kgs. One mark for rounding to 1 decimal place. If correct answer is given without working out shown award full marks. Where an incorrect answer is given working out should be used to credit appropriate marks.

3	(a)	Possible methods of market research may include: • Method of research: Feasibility analysis (1). Justification: the designer needs to establish the viability of the proposed product and a feasibility analysis helps to identify potential challenges and opportunities (1) confirms market opportunities for the garment before investing in resources (1) identifies potential issues and risk early (1). • Method of research: User trialling (1). Justification: where the designer tests the electrochromic garment with selected consumers in a controlled setting and feedback is generated (1). • Method of research: Trend forecasting (1) Justification: the designer needs to identify opportunities for the design of the garment by gathering facts/compiling observations from wide ranging fields (1) to predict the colours/fabrics/textures/materials/street styles that will be popular for the upcoming seasons (1). Award marks for other methods including: Surveys, focus groups, interviews, questionnaires Any other valid suggestion.	4	In each case: One mark for identifying each method of market research. One mark for justifying answer given. Specific reference to the context in the question is needed for marks to be awarded.
	(b) *	Indicative Content: A smart material is a material that exhibits a useful property, reacting in a controlled way to a stimulus. Smart materials can be used to add functionality to a product. These fabrics are embedded with digital components that allow them to do many things like, conduct electricity, react to environmental changes, gather and transmit data, or even incorporate	8	Level 3 [6-8 marks] The candidate has a clear understanding of how smart materials have changed the functionality of products. They produce a thorough discussion in relation to the question. The explanation is clear and well-

		embedded LED lights. A smart material can be categorised as being thermochromic, photochromic, electrochromic and shapeshifting. For example, a product could be designed to be worn on a user's wrist, which uses photochromic pigments to change colour when exposed to the ultra-violet light present in sunlight; therefore, the product could indicate to the user when sunscreen should be applied to protect their skin. Thermochromic materials change colour in response to a change in temperature. In the health and medical industry, temperature indicators can be used to monitor changes in body temperature. Colour-change fabric that reacts when exposed to UV radiation, for example, enables new products in adaptive sun protection. The term 'thermo' relates to heat, and chroma means colour - so thermochromic pigments change colour when they are heated up. These pigments can be mixed with paint or <i>polymers</i> to give the materials the same colour-changing <i>properties</i> as the pigment. Intelligent aesthetic cloth is used in the fashion business because of its ability to light up and change colour. One common and commercial use of fashionable smart textiles is in the creation of clothing that emits light, such as light-up clothes and shimmering evening dresses. Examples: In fashion, clothing has been made to be affected by the users heat. A shirt has been developed with vents on it that react to the high temperature of the body. These vents open, allowing air in so sweat can evaporate quickly. A company named 'The Unseen' developed a line of leather accessories and garments that change colour in response to environmental factors like air pressure and temperature. Thermo-sensitive sweaters from 'Stone Island'. Stone Island's "Ice Knit" sweaters made from colour changing yarn reacting to the weather. Photochromic materials change colour in response to the change in light level. They can be used in fashion, interior design, and functional textiles. A	developed with relevant and considered examples being made to exemplify the points discussed. <i>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.</i> Level 2 [3-5 marks] The candidate has a reasonable understanding of how smart materials have changed the functionality of products. The explanation is sufficient although one or two opportunities are missed to exemplify the points being made. <i>There is a line of reasoning presented with some structure. The information presented is for the most part relevant and supported by some evidence.</i> Level 1 [1-2 marks] The candidate has a basic knowledge of how smart materials have changed the functionality of products. Any reference to this area is descriptive in nature and has little appreciation of functionality and the use of smart materials. The response contains no analysis or evaluation. <i>The information has some relevance and is presented with limited structure or</i>
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		well-known application of photochromic is in spectacle lenses which automatically darken to become sunglasses in bright sunlight. These fabrics can be used in sensor-based systems for monitoring environmental factors such as UV radiation levels. They can serve as indicators of sun exposure, triggering a colour change when the wearer is exposed to harmful UV rays, thus promoting sun protection, and raising awareness about skin health. Electrochromic materials change colour when an electric voltage is applied to them. They can be found in 'smart glass' – a material whose transparency can be controllably changed by an electric signal. Smart glass is used in windows, mirrors and privacy screens. Energy-harvesting textiles: Fabrics that can generate and store energy from sources such as sunlight or body movement. These textiles are used to power electronic devices in wearable technology. Examples: Quantum-tunnelling composite (QTC) is an <i>insulating</i> rubber containing tiny particles of metal. When squashed, the metal particles meet and allow the flow of <i>electrical current</i>. As a result, QTC is an <i>insulator</i> when resting and a <i>conductor</i> when pressure is applied. It has been used in clothing to control smartphones and portable music players, and in touch-sensitive pads. Solar-Powered Clothing: Designer Pauline van Dongen, in collaboration with solar energy experts, created a solar panel-incorporated coat and dress. These garments can harness solar energy to charge mobile devices, blending practicality with fashion. Shapeshifting materials change their shape in response to a physical stimulus such as an electric current, a change in temperature or the presence of a magnetic field. Some materials will expand, contract or twist and can be used to construct artificial muscles. Shape-memory alloys (SMA) are metal <i>alloys</i> that can remember their shape when heated. These alloys have been utilised on spectacle frames	<i>detail. The information is supported by limited evidence.</i> 0 marks No response or no response worthy of credit.
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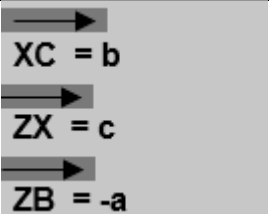
		that spring back to shape if they are squashed. They can return to their original shape after being deformed and are useful in various applications from aerospace to fashion. Examples: Tiny fluid pumps and valves are being developed to mimic or replace biological systems. Construction garments – body shape wear using memory foam for bra cups to enhance comfort. Interactive Children's Wear: Some brands have ventured into creating interactive children's clothing with integrated lights and sound modules that are activated by motion. This application of smart textiles showcases the potential for innovation in children's wear, making clothing more engaging and fun. Any other valid suggestion.		
4	(a)	Possible advantages may include: • Advantage: Acrylic wool fabric is resilient to wrinkling (1). Explanation: dog coat remains in its original shape/visual appeal enhanced (1). • Advantage: Acrylic wool fabric retains its colour when washed/worn (1). Explanation: visual appeal/original appearance remains intact longer (1). Possible disadvantages may include: • Disadvantage: Acrylic wool fabric has relatively poor insulation (1). Explanation: unsuitable for keeping dog warm in very cold temperatures (1).	4	One mark for identifying an advantage why acrylic wool fabric is suitable for the dog coat. One mark for explanation given. One mark for identifying a disadvantage why acrylic wool fabric is suitable for the dog coat. One mark for explanation given. Specific reference to the context in the question is needed for marks to be awarded.

		• Disadvantage: Acrylic wool fabric has poor water resistance (1). Explanation: dog gets wet/cold and uncomfortable in wet conditions! (1). Any other valid suggestion.		Do not award marks for sustainability.
(b)		 Tartan is usually woven in a two-over-two twill pattern, which forms the illusion of new colours blended from the original ones and gives the check pattern effect. (1) Tartan is woven by alternating bands of coloured yarns (the vertical warp threads and horizontal weft threads) at right angles to each other to form a woven fabric. (1) The resulting blocks of colour repeat vertically and horizontally forming distinct simple or complex rectangular or check patterns. (1) Any other valid suggestion.	2	Up to two marks for describing how the check pattern is created in a tartan fabric. Specific reference to the context in the question is needed for marks to be awarded.

	(c)	Possible reasons may include: • Reason: Adding the tartan kilt improves the market appeal of the dog coat (1). Explanation: helps to promote sales through visual/aesthetic appeal (1). • Reason: Makes the dog coat look like a complete outfit (1). Explanation: consumer perceives better value for money (1). • Reason: Tartan kilt feature creates a classic and timeless style (1). Explanation: helps to maintain longevity and product popularity (1) increase brand visibility to boost sales (1). Any other valid suggestion.	2	One mark for identifying a benefit to the company of adding the pleated tartan kilt to the dog coat. One mark for explanation given. Specific reference to the context in the question is needed for marks to be awarded.
	(d)	Possible design features may include: • Design feature: Metal press stud fastenings (1)/buttons. Justification: easier for owner to take coat on and off the dog (1). • Design feature: Adjustable strap around waist/middle of dog (1). Justification: secures coat around waist/middle of dog to help keep it in place so that it does not slip from the dog's body (1) adjustable strap to fit comfortably to the size of the dog (1). • Design feature: Openings at neck and around legs (1). Justification: openings prevent jacket from restricting the dog's shoulder and leg movement and ability to move, jump run (1). Any other valid suggestion.	2	One mark for identifying a design feature which increases the functionality of the dog coat for either the dog and/or the owner. One mark for justifying answer given. Specific reference to the context in the question is needed for marks to be awarded. Do NOT accept pleated tartan kilt.

	(e)	Indicative Content: The candidate is expected to demonstrate their understanding of the process involved through a series of annotated sketches and/or notes. There may be variations to the process as indicated but to get into L3 candidates must demonstrate a clear understanding of the end-to-end process. 1. Prepare the fabric. Iron to remove any creases. 2. Calculate fabric consumption – consider the visible width and depth of the individual pleats before cutting the fabric. $\text{fabric width} = \text{number of knife pleats} \times (\text{visible width} + 2 \times \text{pleat depth})$ $\text{fabric length} = \text{pleat length}$ 3. *Do not forget to add seam allowances and hem allowances before cutting the fabric. 4. Choose the direction of folds and mark the seam-allowance. If completing folded knife pleats towards the right-hand side, mark the seam allowance on the right edge of the fabric. ... 5. Draw pairs of markings. Use a quilting ruler and textile marker, draw pairs of markings on the RIGHT SIDE of the prepared fabric. 6. Connect the markings and create vertical lines. By connecting the markings, draw vertical lines that will indicate the fold lines of the knife pleat and a line, towards which the knife edge should be moved. 7. Fold and pin the lines. Pinch the first knife pleat line (the one not indicating the seam allowance, but the fold) and move it to the right. Use pins to keep the folded fabric in place. Pin the knife pleats at the top. Use multiple pins along the folds to secure the fabric.	6	Level 3 [5-6 marks] The candidate demonstrates a good level of detail of the process needed to work a series of three knife pleats using technical terms and considering any relevant equipment, machinery, and materials. Sketches, if used will be clear and supported with relevant notes. The process includes all relevant stages. Level 2 [3-4 marks] The candidate will demonstrate a sound level of detail of the process needed to work a series of three knife pleats using some technical terms and there will be some consideration of any relevant equipment, machinery, and materials. Sketches, if used, will for the most part be clear and supported with notes most of which are relevant. The process includes some relevant stages. Level 1 [1-2 marks] The candidate will demonstrate a limited level of detail of the process needed to work a series of three knife pleats evidencing a limited use of technical terms and there will be a basic consideration of any relevant equipment, machinery, and materials. Sketches, if used, will be unclear with only basic notes to accompany them. Few relevant stages are included.
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		8. Continue pinching, moving and folding the fabric until the end of the fabric is reached. 9. Press the pleats. Before pressing the folds, make sure the lines drawn are aligned accurately, and the folds are straight. 10. Sew the top of the knife pleats with a straight machine stitch. Any other valid suggestion.		0 marks No response or no response worthy of credit.
	(f)	Possible finishes may include: • Finish: Antibacterial (1) • Finish: Stain resistance (1) • Finish: Anti-pilling (1) • Finish: Wax finish (1) • Finish: Water resistant (1) Any other valid suggestion.	1	One mark for identifying a finish that could be applied to the fabric of the dog coat. Specific reference to the context in the question is needed for marks to be awarded.
	(g)	Possible IP legislation types may include: • IP Legislation: Copyright (1) a set of exclusive rights or protection given to the designer of the original dog coat idea (1). The copyrighted dog coat can only be copied, used, or recreated with the designer's permission (1).	2	Up to two marks for describing one way in which IP legislation would protect the designer of the dog coat. Specific reference to the context in the question is needed for marks to be awarded.

		• IP Legislation: Trademark (1). Used by the company or designer to identify their brand and distinguish their dog coat from those of others (1). • IP Legislation: Patents (1). Patents protect the design of the dog coat for 20 years, providing protection against copying technical and functional aspects of the dog coat. (1). Any other valid suggestion.		
	(h)	 Three vectors are shown, each with a label and an arrow pointing to the right: $XC = b$ $ZX = c$ $ZB = -a$	3	Award three marks as follows: One mark for each correct vector.
	(i)	Indicative Content: Fabric pleating is a type of fabric manipulation, which has advanced with material and technological development. Pleats and pleating are formed through the pattern structure and a heat setting technique where fabric is placed between a two-part mould and put inside a steaming machine. The development of permanent pleats where an oversized piece of fabric is cut and sewn into the shape of a garment first and then sandwiched in between two layers of washi paper and fed into a heat-press is a method used in the collection Pleats Please – Issey Miyake and involves this type of pleat forming process involving pleating the clothes/products which are two to three times their intended size before folding and placed in a heat press. A pleating machine is used which produces tiny folds that are four millimetres wide and can be set into the fabric giving an intricate and delicate appearance.	6	Level 3 [5-6 marks] The candidate has a clear understanding of how surface pattern technology such as pleating and embossing can be used to enhance the aesthetic qualities of textile products. They produce a thorough discussion in relation to the question. The explanation of how surface pattern technology is used is clear and well-developed and several examples are used to exemplify the points being made. Level 2 [3-4 marks]

		Pleat finishing processes have now developed to incorporating a special chemical treatment or heat-setting method. Fabric becomes soft when the heat is applied to it and then eventually becomes hardened and fixed after the heat cools down. This method is used to create a thermoplastic product. Polyester has such qualities which make it a great thermoplastic. In addition, it has unique resilience, providing good pleat retention and crease recovery which further enhances the aesthetics of the surface pattern alongside its ability to retain its shape. Machine pleats are made industrially, with a machine automatising the entire pleating process. To pleat natural fabrics, chemicals must be used, as the heat pressing method does not last on natural fibres. Depending on the surface pattern needed, different chemicals are applied on fabrics, as well as heat and sometimes pressure. The ability to create shape and structure without additional cutting or joining pieces makes pleating a potentially less wasteful design technique. Pleated garments also require less ironing and can be designed to adjust to different body types, enhancing their longevity and wearability. Textile embossing is typically performed on smooth surfaces. The fabric is pressed under high pressure and temperature into a special mould or rollers are used, creating a 3D effect giving the textile a distinctive surface. The imitation of relief-like structures is achieved by embossing. The material is heated beforehand, so the material adopts the new 3-D patterns and retains them when cooling. The desired surface structure is created in the final step of the process by heating the surface and then embossing it with an engraved roller. The steel calendaring rollers create a characteristic surface structure. Examples include, synthetic leather embossed for footballs, rugby balls where the upper layers are heated and then embossed to create a specific surface structure. Velvets or other pile fabrics are often embossed, as are some satins and other weaves.	The candidate has a reasonable understanding of how surface pattern technology such as pleating and embossing can be used to enhance the aesthetic qualities of textile products. They produce a reasonable discussion in relation to the question. The explanation of how surface pattern technology is used is sufficient although one or two opportunities are missed. Level 1 [1-2 marks] The candidate has a basic knowledge of how designers could use surface pattern technology such as pleating and embossing can be used to enhance the aesthetic qualities of textile products. Any reference to this issue is descriptive in nature and has little appreciation of how surface pattern technology is used. The response contains no analysis or evaluation. 0 marks No response or no response worthy of credit.
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		The structures of leather and other materials such as wood, are imitated in a deceptively real way on textile surfaces or functional structures are brought to the surface. Embossing is also used in the production of wallpaper and floor coverings as well as interior decoration layers. Adds interest to the product by giving the fabric further texture and dimensions creating the fabric to hold a shape rather than naturally drape. Award marks for printing methods and machine embroidery. Any other valid suggestion.		
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