

2014 Product Design and Technology GA 3: Examination

GENERAL COMMENTS

Students displayed strength in the following areas in the 2014 Product Design and Technology exam.

- the use of isometric drawings
- describing an appropriate marketing approach
- writing an evaluation criterion as a question
- the ability to discuss the role of the design brief across the product design process

Students displayed weakness in the following areas.

- an understanding of quality measures
- how to evaluate the effectiveness of production processes
- the difference between working drawings and design options
- risk management steps
- research of materials prior to production
- the differences between manufacturing systems

The following is advice for students preparing for the examination and their teachers.

- Key knowledge needs to be clearly understood.
- The question should not form part of the answer.
- When students are asked for one point/idea/quality, they should discuss only one.
- Students should read questions carefully and follow the ‘command’ words. If students are asked to ‘discuss’, they should not give a list.

SPECIFIC INFORMATION

Note: Student responses reproduced in this report have not been corrected for grammar, spelling or factual information.

This report provides sample answers or an indication of what answers may have included. Unless otherwise stated, these are not intended to be exemplary or complete responses.

The statistics in this report may be subject to rounding resulting in a total more or less than 100 per cent.

Section A

Question 1

Marks	0	1	2	3	Average
%	60	17	14	9	0.7

Risk management steps	
1.	identify hazards
2.	control hazards and risks
3.	assess risks
4.	<i>check controls</i>

Students were asked to list three risk management steps. Most students had difficulty in listing all three steps; they tended to focus on the production plan risk assessment rather than risk management.

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Question 2

Marks	0	1	2	3	Average
%	14	11	17	58	2.2

The following are examples of appropriate questions.

- How much are you willing to pay for such a product?
- How important is it that the product is recyclable?
- What are the advantages of this bottle over other bottles that you use or have seen?
- What are some of the disadvantages of this bottle over others?
- Are certain materials more important to you than others?
- Would you buy new designs of old products?
- Are certain colours better than others for babies?
- How important is the feel of the product in your hand?

Students were asked to list three questions that they could ask a potential client of the Lifefactory baby bottle. Most students were able to list questions.

Question 3

3a.

Marks	0	1	Average
%	29	71	0.7

3b.

Marks	0	1	2	3	Average
%	23	25	29	23	1.6

Examples of attributes include recyclable, range of uses, grip, range of lids, bottle is small for a baby to hold, protective covering, looks attractive and transparent.

Most students were able to identify one attribute of the baby bottle; however, students also needed to understand and explain that there is a correlation between what the designer chose as important, compared to the use or reuse and maintenance of the bottle. Some students were able to clearly articulate this.

The following is an example of a high-scoring response.

Attribute: The bottle has a range of uses

Explain: The design will have a long LC because the designer can see a range of uses for the bottle after its initial use as a baby bottle. This will lead to a longer period in the use/reuse of the bottle prior to being recycled.

Question 4

4a.

Marks	0	1	2	3	Average
%	37	21	23	19	1.3

Students' understanding of cradle to cradle concept was quite good; however, some students tended to refer to 'cradle to grave', which is not part of the current study design.

The following is an example of a high-scoring response.

Cradle to cradle aims to incorporate social responsibility into product development.

Cradle to cradle includes sustainability and efficiency in manufacturing process, material properties, and toxicity as well as potential to reuse materials through recycling or composting.

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4b.

Marks	0	1	2	Average
%	27	33	40	1.1

Students focused on the ability to recycle the bottle, which was acceptable, but they also had to describe a long-term environmental benefit of the cradle to cradle concept.

The following is an example of a high-scoring response.

The use of sustainable materials – the ability of the product to be easily recycled because the materials can be separated. This will mean that they are recyclable and can be used again in their primary material.

Question 5

Marks	0	1	2	3	Average
%	33	20	26	21	1.4

Examples of international or Australian standards are degradability of plastics, chemicals used in the product, safety, size (for example, suitable size of parts so infant cannot swallow them), use of compounds, physical properties (for example, fingers not getting caught in plastic products), strength, breakability and ISO numbers.

Students needed to have an understanding of the role of international or Australian standards. The purpose of a standard is to make products safe, reliable and perform consistently. Standards establish a common language that defines quality and safety criteria.

The following is an example of a high-scoring response.

Identify: Chemicals used in the product.

Explain: the designer has made sure that the product is made of sound chemicals – that is glass that will not contaminate what is placed in the product – either heated or served cold.

Question 6

Marks	0	1	2	3	Average
%	7	21	35	38	2.1

The client can be anyone who may wish to buy or sell a baby bottle, such as grandparents, pregnant women, soon-to-be fathers or retailers.

The following is an example of a high-scoring response.

A potential client is a grandparent who wishes to buy a product for their daughter's baby because they are concerned about the safety of plastic bottles. They believe that products served in 'natural materials' such as glass are better. The Grandparent wishes to make sure that the child has the right start in life.

Question 7

Marks	0	1	2	3	Average
%	8	11	39	41	2.2

Students were able to give a range of places the bottle could be sold, such as baby shops like Babyco and supermarkets such as Coles and Woolworths. The question referred to place, which is one of the Five Ps of marketing.

The following is an example of a high-scoring response.

Identify: fair trade shop

Justify: The product is designed for a specialised market of people interested in the environment and willing to 'invest' in a glass bottle. Most people would not think about a baby bottle and the impact it has on the environment. Hence the market would not allow a product to be sold in large retail shops that tend to sell cheap mass-produced products.

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Question 8

Marks	0	1	2	3	Average
%	15	14	35	36	1.9

The following are examples of specific forms of promotion for the Lifefactory baby bottle.

- The product could be promoted on a website of a baby shop such as Babyco.
- The product could be promoted during TV shows that deal with parental or family issues, such Better Homes and Gardens.
- The product could be promoted in family or green magazines, such as *Parenting*, *Australian Geographic* and *Wildlife Australia*.
- The product could be promoted in pamphlets and posters.

Students were asked to identify and explain a specific marketing promotion. The question referred to promotion, which is one of the Five Ps of marketing.

The following is an example of a high-scoring response.

Identify: Wildlife Australia

Explain: The product is not made for general consumption; it is aimed at people who have a baby, who will have a baby or know someone who has had a baby and have a conscious. These are people (target group) who would be interested in buying such a product that does more than just heat milk.

Question 9

Marks	0	1	2	3	Average
%	48	13	19	20	1.1

Students need to be careful that they use the revised study design for correct information. Answers that used style, technical or functional obsolescence were accepted; planned obsolescence was not accepted.

The following is an example of a high-scoring response.

Form of obsolescence: Style

Problem: For users to feel up-to-date they need to continually update and for this to occur there is a cost involved for user in continually updating the product. The updates are only superficial not a benefit to the use of the product.

Question 10

Marks	0	1	2	Average
%	21	25	54	1.4

Most students showed a clear understanding of the difference between primary and secondary functions of a product.

The following is an example of a high-scoring response.

A bookshelf has a primary function of storing books. However the secondary function is placement of photos and trinkets.

Question 11

Marks	0	1	2	3	4	5	6	Average
%	15	18	25	21	12	5	3	2.3

For this question, students needed to explain the influence of human-centred design (human needs and wants) on the design of a product, not just explain what human-centred design is. Marks were allocated on the basis of the extent to which the student demonstrated an understanding of the impact/relationship human-centred design has on the designer and the product. It was the ability of the student to show this impact/relationship that determined their mark.

The following is an example of a high-scoring response.

Products are not constructed by a designer in a vacuum and one of the basic understandings is how focussing on the user (human) affects the design. The designer must have a clear understanding of the user, not the client because it is the way the user interacts with the product that affects the effectiveness and success of the product. The product must be needed by the target user otherwise will not achieve the objective of the product. The quality of life of the user or a fashion trend will have impact on the look and the way the product is constructed. When there is a need to improve quality life this may mean the user feels good about having and using, the product, such as having a jacket that keeps you dry on wet days or desk that can hold your iphone when studying. The fashion trend may make the designer think more about the visual aspect or appearance rather than the function of the product but this does not devalue the product, but may make more appealing and therefore more acceptable to the user, such as having a functional wheel chair which is also flashy and colourful. Hence the factors that are within the Human-centred design are very important to the designer and therefore have a major impact on the way the product is approached.

Section B

Question 1

Most students had a clear idea of constraints and evaluation criterion.

1a.

Marks	0	1	Average
%	10	90	0.9

The range of students' answers included:

Maximum size 1000 mm in length x 1000 mm in height

Combine two or more materials.

Winter retail cycle (Date)

Head covering

Maximum height 1800 mm

Minimum length 100 mm for scarf clip

1b.

Marks	0	1	Average
%	17	83	0.9

The range of students' answers included:

Does the multi function unit have a Maximum size 1000mm in length x 1000mm in height?

Does the product Combine two or more materials?

Was the product completed prior to the Winter retail cycle (Date)?

Does the outdoor winter clothing outfit have a Head covering?

Does the multi function floor lamp have a Maximum height 1800mm?

Does the scarf clip have a Minimum length 100mm?

1c.

Marks	0	1	2	Average
%	14	29	57	1.5

The range of students' answers included:

I will do this by making sure that, at design stage, the constraints are incorporated into the design.

I will write this constraint into every drawing I make.

I will refer back to the constraints prior to developing my design options to make sure that they are correct.

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Question 2

Marks	0	1	2	3	4	Average
%	11	12	33	22	21	2.3

The ability of the student to identify a specific material was important in gaining full marks. Students could not refer to generic research.

Examples of types of research include strength, flexibility, stain application, paint, welding joints, appliqué techniques and bending.

The following is an example of a high-scoring student response.

Describe: I will research the strength of pine by gradually adding weights in the middle of the shelf until it breaks. I will measure how much it flex's and how much weight it takes to break.

Explain: The reason would be to make sure that the shelf does not bend and it is able to support objects placed on them. This will allow me to choose how thick I need to make the shelf so that it does not bend or break too easily.

Question 3

Marks	0	1	2	Average
%	46	21	33	0.9

In order to answer this question, students were required to understand the idea of copyright.

The following is an example of a high-scoring response.

To make sure that all images, from textbooks, magazines, books, the internet have been acknowledged correctly. To make sure that the product is not a copy of a product already on the market.

Question 4

Students who had come prepared with coloured pencils, water-based pens and markers were able to clearly communicate the design option. Students need to remember that the design option needs to communicate what the final product would look like. This is the objective of the task.

4i.

Marks	0	1	2	3	Average
%	4	21	38	37	2.1

High-scoring responses were able to bring together the idea of organic or industrial style and meet the requirements of the product. Too often students tended to focus on the product and saw the style as secondary.

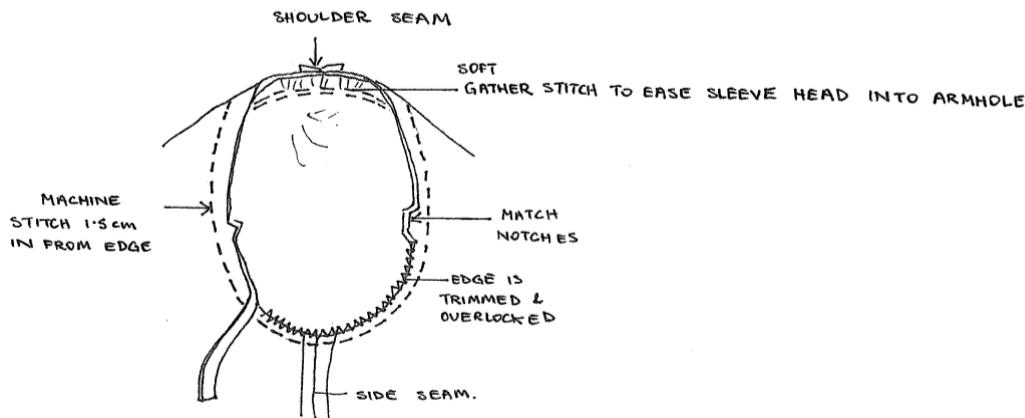
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4ii.

Marks	0	1	2	3	4	Average
%	17	10	29	17	27	2.3

Students were required to show a process and explain this process to receive full marks. No marks were awarded if process could not be directly verified with the design.

The following is an example of one process (sleeve insertion).



4iii.

Marks	0	1	2	3	Average
%	11	39	31	18	1.6

Students needed to understand that the design option needs to communicate effectively the feel, look or texture of the product. Students who used just pens or lead pencil did not receive full marks for this area.

4iv.

Marks	0	1	2	Average
%	6	25	69	1.6

Students needed to clearly annotate two specifications to receive full marks.

4v.

Marks	0	1	2	Average
%	7	51	42	1.4

High-scoring responses kept their design option clear of over-annotation and were able to clearly show either:

- front and back view or exploded view of specific details
- isometric views.

4vi.

Marks	0	1	2	3	4	Average
%	9	34	35	16	6	1.8

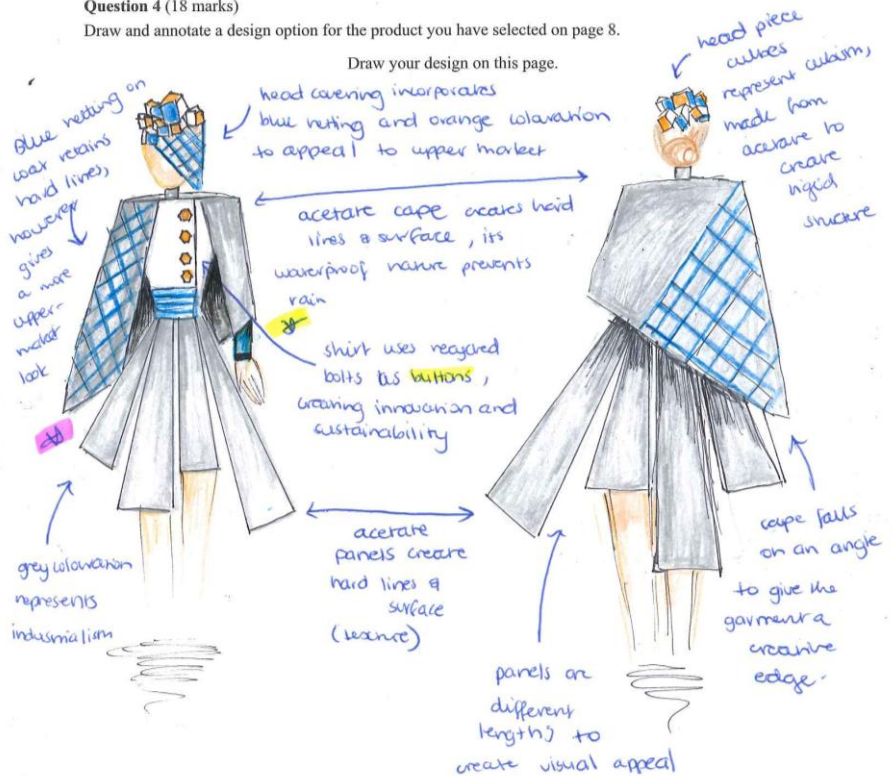
Students were required to combine materials, process and design to create a creative and innovative product in order to receive full marks. Students had to demonstrate innovation and creativity, not merely state that the product was innovative and creative.

The following are examples of high-scoring responses.

Question 4 (18 marks)

Draw and annotate a design option for the product you have selected on page 8.

Draw your design on this page.



- ✚ netting over acetate incorporates two materials in a decorative way
- ✚ shirt waist band is pleated (complex process) and buttons are used (button holes are a degree of difficulty)
- ✚ Blue and orange colors create aesthetic appeal, as opposed to only grey

Question 4 (18 marks)

Draw and annotate a design option for the product you have selected on page 8.

Draw your design on this page.

Material 1
VICTORIAN AJH
- durable
- hard
- long life

MATERIAL 2
JARAKAN
- Natural
- strong
- easy to maintain

PROCESS 1
- biscuit joint
to ~~create~~ connect

The drawing shows a perspective view of a product with a rounded, organic form. It features a high platform base and a lid that lifts up. The design is annotated with various notes and dimensions:

- Material 1 (VICTORIAN AJH):** durable, hard, long life.
- Material 2 (JARAKAN):** Natural, strong, easy to maintain.
- Process 1:** biscuit joint to connect.
- Design Features:**
 - rounded forms to represent bear stature in a cave, reflecting
 - lid lifts up for more storage and is built on hinges.
 - high sitting platform for secondary function
 - natural soft texture to create organic feel visually appealing
 - soft rounded form to reflect brief and gentle innovative shapes
 - space between floor and product metal legs to contrast against timber
 - Draws to store items in and can be open and closed easily or removed.
 - Contrasting timber is innovative and creative visually appealing
 - height and length reflect brief
 - metal handles to create contrast and visually appealing
 - 1000mm (height and length)
 - rounded form like natural mountain
 - rounded decorative edge for innovative edge feature

SECTION B - Question 4 - continued

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Question 5

Marks	0	1	2	3	Average
%	13	23	31	32	1.8

High-scoring students described how either an organic or industrial style was incorporated into their design, in order to meet the needs of the client.

The following are examples of high-scoring responses.

The design has a range of curves that reflect an organic look. This allows the product to look soft and creates a sense of softness. The use of tulle which has a soft look allows the design to have an organic look.

The design has incorporated metal into the design. The shape of the legs has sharp edges to them. The door handles do not look soft but harsh. All these aspects reinforce an industrial look.

Question 6

Marks	0	1	2	3	Average
%	33	28	23	16	1.2

Students were required to describe the benefits of a low-volume manufacturing system. High-scoring responses demonstrated an understanding of this form of production and were able to describe in detail the benefits of this manufacturing system.

The following is an example of a high-scoring response.

Products can be made for specialised markets rather than have to meet mass market appeal to be produced. Products can be easily modified or altered after a small run allowing to modifying/altering the product as market needs and tastes change. Products can easily meet very quickly the needs of the market.

Question 7

Marks	0	1	2	3	Average
%	62	6	11	21	0.9

Acceptable examples of a component of the production plan include a Gantt chart, timeline, detailed work plan, risk assessment, materials and costing list, and measures to ensure quality.

The following are examples of high-scoring responses.

Identify: Gantt chart

Explain: It provides with an understanding of procedural steps to follow so that the product is constructed correctly and in sequence.

Identify: A detailed work plan

Explain: You need know what equipment you need and an understanding what steps the product needs to be shaped, made and constructed.

Question 8

Marks	0	1	2	3	Average
%	54	16	12	19	1

To answer this question correctly, students needed to understand the different types of drawing and their roles. They needed to demonstrate an understanding of the detail a manufacturer requires.

The following is an example of a high-scoring response.

The design option only provides the manufacturer what the product will look like and does not provide information about sizes of materials, types of materials and the way they should be cut. The manufacturer has no idea on the internal construction of the product and what needs to be incorporated into the making of the product.

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Question 9a.

Marks	0	1	Average
%	15	85	0.9

The following are acceptable examples of modifications that may occur during production.

- change to an invisible zip
- changing the stain of the timber
- changing the fastening technique
- altering the welding points
- changing the main material

It was important that the modification occurred during the production of the product.

Question 9b.

Marks	0	1	Average
%	33	67	0.7

The following are examples of acceptable communication techniques: phone message, email, modifiability drawings and discussions with a client.

Question 9c.

Marks	0	1	2	3	Average
%	22	24	28	25	1.6

For students to gain full marks, they needed to explain clearly why the modification would have occurred.

The following are examples of high-scoring responses.

The normal zipper made the design look too industrial with the metal standing out. The design of the pattern was organic and therefore this was in conflict with the original design. An invisible zip allowed the pattern to seem continuous and the metal was hidden behind the fabric.

The stain had streaks going through on the timber product. This was not shown on the sample that was tested prior to applying the stain to the product. The quality of the stain product was not up to standard therefore it was decided to change the stain used.

The fastening techniques that had been suggested was not easily able to be used when the product came to be constructed. Even though the technique was sound the position created difficulties and therefore another technique was required. The technique was modified to make the joint strong and effective.

The original welding points on the design were too obvious and distracted from the look of the product. Changes to the welding points were needed so the focus not on the welding but the design. The welding points had to stay for safety therefore an angle was altered so the welding points were hidden.

Question 10

Marks	0	1	2	3	4	Average
%	48	10	15	13	13	1.3

Students needed to understand that the quality measure was in place during the production process and describe how this quality measure could be maintained throughout production, not just at the end.

The following are examples of high-scoring responses.

Identify: Check the sewing is straight.

Describe: By continual checking that the sewing straight it would continual make sure that I have not gone off line. If I did this regularly I would not have to remove the stitches. If they were incorrect and if they were only a small amount would be removed and therefore reduce time and cost of the product increasing.

Identify: Create clean weld joints.

Describe: Welding can stand out if it is not correctly done or filed before any form of paint or sealant is put on. If checking of joints occurs prior to painting then if there are any errors they can be easily fixed. This will therefore reduce time (having to remove the paint prior to repairing the joint) and cost (labour, and use of more materials) of the product increasing.

Identify: Wipe excess glue

Describe: Glue is used to join fasteners onto the clip. If the glue is not removed prior to the glue setting it becomes a complex

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task to remove and creates difficulties. If done prior then a small wipe and clean will do quickly what could take hours to do and therefore reduce time and cost of the product increasing.

Identify: Router bit sharp.

Describe: If the router bit is not sharp then the router maybe difficult to router correctly or straight. This could create a range of issues from incorrect holes or too difficult to control the router. There maybe increase to repeat the process or need to replace the material because the material has been severely damaged.

Question 11

Marks	0	1	2	3	Average
%	48	16	19	17	1.1

Students could use a range of ways to evaluate their quality measure. Examples include the following.

- using visual observation – looking at joints, sewing lines, glue lines
- by handling the product – running hand over joints or fabric for smoothness, texture, etc.
- checking the product after a period of time – wear and tear, deterioration, rusting, tears, etc.

The following are examples of high-scoring responses.

Identify: Visual observation of sewing lines.

Describe: This allows me to assess the jacket and to see how effectively I have sewn straight. This allows me to see whether the technique of stopping and checking worked overall.

Identify: Running my hand over the smooth wood

Describe: The physical act of running my hand over the table allowed me to check whether the quality measure of using fine sand paper has made the table top feel smooth.

Identify: Coming back after 3 months

Describe: By checking whether the fabric has ripped along the sewing edges because the right stitch was not used.