

A Level in Design and Technology: Product Design (H406/02) Problem Solving in Product Design Sample Question Paper

Date – Morning/Afternoon

Version 2

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.
- 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.

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

1. * A range of existing products are used by festival goers to transport camping equipment.

A manufacturer has identified an opportunity to launch a new transportation product for use by festival goers at music festivals. The manufacturer wants to address problems associated with camping gear, clothing, and other equipment being left behind at the end of these events.

A wide range of stakeholders and users will have different needs and requirements from the new product being considered.

Critically examine the challenges a designer of the new transportation product will face when considering the needs of all stakeholders and users. Refer to the information on **Page 2** of the Resource Booklet.

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- (b) Following the market research a concept has been considered by the designer as outlined on **Page 4** of the Resource Booklet.

Use sketches and notes to outline suitable methods of manufacture and assembly for the features of the concept design that has already been produced in **Figures 4 to 7**.

In your response you must:

- provide annotations of technical information including; materials, manufacturing processes, finishes and standard components to be used.
- explain how the methods you have outlined meet the key attributes identified by the festival operators on **Page 3** of the Resource Booklet.

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- 3** Following the development of a design solution, the festival operator has teamed up with a charity to manage the 'stuff sack' process as part of the clear-up operation. Refer to the information on **Page 5** of the Resource Booklet.

Calculate the predicted total funds raised by the charity for their planned 'stuff-sack' recycling scheme in 2017.

In your calculations you should:

- use the data provided on **Page 5**
- assume that workers are paid for a full day's work
- use the estimate number of 2016 festival goers as being 155 000.

SPECIMEN

Predicted total funds raised = £..... [6]

- 4 When undertaking market research the festival organisers were introduced to a trolley hire company who are already supplying trolleys to festivals, but are looking to expand their range. They have already designed a new 'Camper Trolley' to replace their existing 'Wagon Trolley'. Refer to the information on **Pages 6 to 8** of the Resource Booklet.

- (a) The trolley hire company would like to order an initial batch of 50 'Camper Trolleys'.

Use sketches and notes to show how the body of the 'Camper Trolley' shown in **Fig. 12** could be manufactured.

In your response you must include:

- suggested materials
- technical details of methods of manufacture
- an explanation of how the methods and suggested materials consider the 'list of requirements' on **Page 8**.

Plywood is **not** a suitable material for the body of the 'Camper Trolley'.

A large empty rectangular box for drawing and notes, overlaid with a large diagonal watermark reading 'SPECIMEN'.

SPECIMEN

- 4 (b)* The trolley hire company is considering ways of generating additional revenue.

An early prototype of the 'Camper Trolley' that was used for market research attracted a lot of attention from general festival goers at the music festival where it was trialled. The hire company believes that the new trolleys present a potentially lucrative opportunity for musicians to promote their new albums. The Camper Trolley has been identified as an effective method of product placement to support this marketing opportunity.

Critically evaluate the effectiveness of this method of advertising in fulfilling the needs of stakeholders.

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END OF QUESTION PAPER

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...day June 20XX – Morning/Afternoon

A Level in Design and Technology: Product Design

H406/02 Problem Solving in Product Design

SAMPLE MARK SCHEME

Duration: 1 hour 45 minutes

MAXIMUM MARK 70



This document consists of 30 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 |
| x | 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 – <ul style="list-style-type: none"> • 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 – <ul style="list-style-type: none"> • 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 | <p>Indicative content:</p> <ul style="list-style-type: none"> • Discussion of the differing standpoints of stakeholders in the new transportation product, and that this can present the designer with complex problems to solve. The designer needs to involve stakeholders as early as possible in the design process to ensure all views are considered and incorporated as far as possible. • Recognition of primary stakeholders who have direct influence or are directly affected, and secondary stakeholders who have indirect influence or are indirectly affected. Primary are essential to the product's existence, and secondary are not. For the transportation product, primary stakeholders include the festival management and finance department. Secondary stakeholders would include the local town/city's Tourist Information Centre. • Stakeholders for the transportation product would include the following, with their potential interest: (Candidates would be expected to contrast and compare some of these in their critical discussion) <ul style="list-style-type: none"> ○ Event director – overall appearance, efficiency and viability of the event ○ Festival marketing / advertising / publicity – the style and image of the product, scope for advertising space, selling the idea to festival goers before they arrive, etc. ○ Festival finance department – understanding the financial implications, business modelling, whether to purchase or hire for each event, depreciation of assets if purchased. | <p>12</p> <p>AO3 3 x 2a</p> <p>AO4 2 x 1c</p> <p>AO4 7 x 2c</p> | <p>Content</p> <p>If a candidate demonstrates generic knowledge about stakeholder/user considerations without utilising the contextual information given in the Resource Booklet, candidates should be awarded 0 marks.</p> <p>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.</p> <p>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.</p> <p>Candidates can draw on practical experience of</p> | <p>Levels of response</p> <p>Level 4 (10–12 marks) The candidate provides a detailed and comprehensive critical analysis of the challenges a designer of the new transportation product will face when meeting multiple stakeholder and user needs. Analysis and synthesis of information is thorough which results in multiple challenges being explored in relation to a range of different stakeholders and their needs. The use of information on page 2 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.</p> <p>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</p> <p>Level 3 (7–9 marks) The candidate provides a</p> |

| Question | Answer | Mark s | Guidance |
|----------|--|-----------|--|
| | <ul style="list-style-type: none"> ○ Festival marketing and publicity department – details of the product and the logistics for the website and event programme. ○ Festival storage managers – storage of products between events, transportation, stacking to save space, cleaning before storage... ○ Insurance advisers- reducing risk by clear instructions on the product for users, higher risk equals higher insurance costs. Possible excess payments by users if damage. Cost of the administration of extra payments. ○ Event sponsors – publicity can be counter-productive with the waste / clearing costs, but if the product is not successful that could equally have negative publicity. ○ Car parking supervisors, attendants – design of transport item to facilitate tidy but accessible storage at entrances and exits to the event. Appropriate signage. ○ Local neighbours to the event location will potentially will have to return discarded transport products to the event site. ○ Event security – preventing the product from being removed from the site. Mud being transferred to public roads if they are removed or wheeled out. Potential site security around perimeter of site and the costs. ○ Safety organisations / festival safety officers and policy-makers, first aid staff – input on safety aspects of the products and risk assessments. ○ Site clearance operatives / waste collection at end of event – the transport product could be used for this in some way if the designer can incorporate different functions. Could they be | | <p>iterative designing to support their response to this question.</p> <hr/> <p>–</p> <p>Candidate operating at Level 4 will access the majority of the AO4 (1c/2c) marks and at least two of the AO3 (2a) marks.</p> <p>Candidate operating at Level 3 will access at least half of the AO4 (1c/2c) marks and at least one of the AO3 (2a) marks.</p> <p>Candidate operating at Level 2 will access at least three of the AO4 (1c/2c) marks and at least one of the AO3 (2a) marks.</p> <p>Candidate operating at Level 1 will access some of the (1c/2c) marks.</p> <p>good level of detailed critical analysis of the challenges a designer of the new transportation product will face when meeting multiple stakeholder and user needs. Analysis and synthesis of information is for the most part detailed which results in multiple challenges being explored in relation to a range of different stakeholders and their needs although one or two opportunities are missed. The use of information on Page 2 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.</p> <p>There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</p> <p>Level 2 (4–6 marks) The candidate produces a sufficient critical analysis of the challenges a designer of the new transportation product</p> |

| Question | Answer | Mark s | Guidance |
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| | <p>linked in some way and then towed by a tractor – a challenge for the designer.</p> <ul style="list-style-type: none"> ○ Manufacturer – standard components (wheels, handles, fasteners, etc.) wherever possible to keep costs down, potential conflict with custom made components for increased usability – more feasible if higher quantities are produced. ● Potential conflicts between stakeholders that could be mentioned: <ul style="list-style-type: none"> ○ Additional security features on the transport product will increase costs and potential commercial viability ○ Storage costs for the devices would be high, between events. If the designer could design a multi-use, multi-functional product that could be used at other times, it would potentially become more viable. Similarly, a discussion whether the items are created with a wider hire-market in mind, negating the need for storage. ○ The design for the wheels of the product, for use over muddy ground, may be less useful in other applications. These are the sorts of challenges that the designer will face. ● The primary users of the product, the festival goers who will be transporting their camping gear, are key stakeholders and a product that meets their needs efficiently, cheaply, and safely is the focus of the designer. Users will include individuals, families with young children, teenagers, students, and organised groups from youth clubs, workplaces, etc. These different users will interact with the product in different ways, bringing challenges to the designer (e.g. the design of suitable handles and steering - a group | | <p>will face when meeting some stakeholders and/or user needs. Analysis and synthesis of information adequately results in a number of challenges being explored in relation to a narrow range of stakeholders and their needs. The use of information on Page 2 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.</p> <p>The information has some relevance and is presented with limited structure. The information is supported by limited evidence.</p> <p>Level 1 (1–3 marks) The candidate provides basic knowledge of the challenges a designer of the new transportation product will face and is limited in meeting the needs of stakeholders or users. Any understanding is basic, resulting in limited exploration of the challenges a designer will face when addressing stakeholder or</p> |

| Question | Answer | Mark s | Guidance |
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| | <p>would more easily 'move' a transport product than an individual. Children like to 'help' push such items)</p> <ul style="list-style-type: none"> • A user-centred approach to designing the transportation product will put the users at the heart of the designing - it focuses on the user interface, how the user interacts with and relates to the product, which will create a product with a high level of usability. The end result will be a product that gives a more efficient, satisfying, and user-friendly experience for the user at the festival event which through favourable reviews will translate into increase in numbers and favourable business and commercial returns. <p>Award credit for any other appropriate response</p> | | <p>user needs. The use of information of Page 2 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.</p> <p>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</p> <p>Level 0 (0 marks) No response or no response worthy of credit.</p> |

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| 2 | a | <p>Indicative content:</p> <ul style="list-style-type: none"> The wheels and axle / swivel mechanisms need to be able to support the weight of the trolley plus the stuff sack and its contents, which will be greater than a normal supermarket load. The thickness of the material, the diameter of the axle and the swivel mechanism need to be increased to do this. As an indicator, the thickness of material should be at least 3mm, the diameter of the tyre should be a minimum of 150mm, the diameter of the axle a minimum of 8mm, and the diameter of the swivel mechanism a minimum 70mm. The diameter, width and profile of the wheels/tyres means that they will sink into soft ground or fall into uneven ground under the weight of the trolley alone, without the extra weight of the stuff sack and contents. with even a light load. The diameter and width of the wheel/tyre need to be increased to prevent this by increasing the surface are in contact with the ground. As an indicator, a minimum tyre width of 60mm, ideally 90 or 100mm, with a flat outer edge in cross section would be needed. The trolley will be difficult to manoeuvre with four swivelling castor-type wheels. The rear wheels need to be of a fixed type, so that the front swivel wheels are used for steering. The existing nylon wheels with a thin solid rubber tyre are designed for use mostly on hard and smooth surfaces in supermarkets, shopping centres and car parks. Although hard wearing they will sink into soft ground and will also create a very bumpy ride, making the trolley difficult to manoeuvre. Pneumatic tyres (approx. 250mm diameter and 80mm width) would be more suitable, giving a degree of cushioning and suspension for both hard and soft surfaces at the festival site. | 8 | Content | Levels of response |
| | | | <p>AO3 1 x 1a</p> <p>AO3 2 x 1b</p> <p>AO4 3 x 1c</p> <p>AO4 2 x 2c</p> | <p>If a candidate demonstrates delivers a list of technical requirements that are not justified and/or do not show any consideration of the problems outlined in the Resource Booklet, candidates should not be awarded higher Level 1.</p> <p>Candidates can draw on practical experience of iterative designing and product analysis to support their response to this question.</p> <hr/> <p>Candidate operating at Level 3 should be accessing all AO4 (1c/2c) marks, the AO3 (1a) mark and at least one of the AO3 (2b) marks.</p> <p>Candidate operating at Level 2 will be accessing at least two of the AO4 (1c/2c) marks, the AO3 (1a) mark and at least one of the AO3 (1b) marks.</p> <p>Candidate operating at Level 1 will access AO4 (1c/2c) marks.</p> | <p>Level 3 (7–8 marks) The candidate will produce a list of detailed and effective modifications for the wheels of the trolley. Any technical requirements will be well-considered and will be highly appropriate to the context provided. These technical requirements will be thoroughly justified and will provide evidence of a clear and relevant solution to the problems being encountered in the question.</p> <p>Level 2 (4–6 marks) The candidate will produce a list of reasonable and for the most part effective modifications for the wheels of the trolley. Any technical requirements will be sound and will go some way to meeting the context provided. These technical requirements will be reasonably justified although one or two opportunities will be missed, resulting in an adequate solution to the problems being encountered in the question.</p> <p>Level 1 (1–3 marks) The candidate will produce only a basic list of</p> |

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| | <ul style="list-style-type: none"> • Suspension is needed to ensure the trolley is usable over hard or uneven ground, and to give user comfort when handling and manoeuvring the trolley. For fixed wheels this could be achieved by pivoting the axle and inserting a spring, as in high end pushchairs / baby buggies. Alternatively, and for the swivel wheels, a similar mechanism and spring could be inserted in the frame of the trolley or between the swivel bearing and the frame of the trolley. • Sealed swivel and axle bearings would prevent soil / grit / mud / moisture ingress and damage to the bearings themselves. The cleaner lines of the bearing covers would also avoid dirt traps which would retain moisture and potentially cause corrosion over time. • Larger solid rubber tyres of a similar profile to the pneumatic tyres would avoid punctures and repairs, would still provide a degree of cushioning and suspension, and be suitable for hard and soft ground at the festival. • The inclusion of a brake or locking mechanism on the rear wheels would be an important safety feature to give stability and security when loading and unloading the trolley, especially on sloping ground. • Steering is needed to enable the trolley to be manoeuvred over fairly long distances from the parking to the campsite. Particularly so given the heavy weight of stuff sacks and contents. Either the two front or two rear wheels would be mounted on an axle which in turn would be mounted onto a central pivot. A handle would be attached to act as a steering aid, and the steering system would provide stability to the trolley when turning corners. <p>Award credit for any other appropriate response</p> | | <p>modifications for the wheels of the trolley. Any technical requirements will be limited and underdeveloped and will be dislocated from the context provided. These technical requirements may be described but will remain unjustified and will provide only a basic solution to the problems being encountered in the question. There will be no analysis of evaluation.</p> <p>Level 0 (0 marks) No response or no response worthy of credit.</p> |
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| 2 | (b) | <p>Indicative content:</p> <p>Mild steel frame</p> <ul style="list-style-type: none"> The tubing would be cut to the correct lengths by machine hacksaw, bandsaw or cross cut saw. Adjustable fences, guides and stops on the machine would be used to ensure consistency and accuracy, particularly with the angled cuts. The tubing would be joined by MIG or TIG welding. The two side frames would be made first. A jig would be used to hold the tubing in position to ensure all side frames are identical. Depending on the quantity being manufactured, the clamps could be pneumatic for larger quantities, with over-centre locking clamps or threaded cramps suitable for small numbers. The four front and back cross pieces would be welded to join the two side frames, using a similar welding jig. The completed frame would be zinc plated or hot-dip galvanised to give maximum protection against the elements. This completely covers the base material and welded joints with zinc. Open ends of tubing would need to be closed by plates of mild steel welded over the ends during the process. Mitre-cut joints would remove the need for plates to seal the ends of the tubing. Rubber or nylon tube inserts fitted into open ends are likely to be removed by users and this would cause additional maintenance costs. All sealed ends would mean easy cleaning with no potential dirt traps. Alternatives include brazed joints instead of welding. <p>Plywood panels</p> <ul style="list-style-type: none"> Plywood panels would be cut out using a CNC router, edges sanded, then all surfaces sealed with preservative. Preservative penetrates into the surface of the plywood making it impermeable to moisture, | <p>16</p> <p>AO3 2 x 1a</p> <p>AO3 3 x 1b</p> <p>AO4 9 x 1c</p> <p>AO4 2 x 2c</p> | <p>Content</p> <p>All processes demonstrated in the candidate’s response must be in relation to the concept trolley design that has already be produced in Figures 4 to 7 and offer industrial manufacturing processes appropriate to fabricate this product.</p> <p>This question assesses applied knowledge of technical principles to the existing design, so responses that focus on redesigning the existing solution should not be rewarded.</p> <p>Candidates can draw on practical experience of iterative designing and product analysis to support their response to this question.</p> <hr/> <p>Candidate operating at Level 4 will access the majority of the AO4 (1c/2c) marks, at least one of the AO3 2a marks and at least two of the AO3 2b marks.</p> <p>Candidate operating at Level 3 will access at least seven of the AO4 (1c/2c) marks, at</p> | <p>Levels of response</p> <p>Level 4 (13–16 marks) The candidate produces a detailed and comprehensive analysis of the methods of manufacture and assembly needed for the features of the concept design shown in Figs 4-7. Wide ranging and appropriate consideration is given to important technical information that needs to be taken into account with all key areas in the question (i.e. materials, manufacturing processes, finishes and standard components to be used) covered. The use of the Resource Booklet to support the response is wholly effective and fully substantiates the points being made through clear and detailed notes and sketches. The candidate is able to effectively explain how the methods they have outlined meet the key attributes identified by the festival operators and there is evidence of logical and coherent points being made.</p> <p>Level 3 (9–12 marks) The candidate produces a good level of analysis of the methods of manufacture and</p> |
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| | <p>giving protection against the elements. This would be applied after all holes are drilled to ensure the plywood is fully protected against the elements.</p> <ul style="list-style-type: none"> • All panels (except panel B) would be fitted to the tubing using standard components. A barrel nut (length 12mm) would require holes (5mm) to be drilled (minimum 2 along each edge joint) to receive the barrel nut, then holes in from the edge of the plywood to receive the long screw through the tubing. • All components would be zinc plated to protect against the elements. Socket Cap screws (Cheese or Pan headed) screws with hexagon socket. Allen key operation would assist in easy maintenance while making the joints relatively tamper-proof. A rubber washer under the head of the screw would prevent egress of moisture which could enter the tube over time and cause corrosion. • The panels could also be connected to the frame using simple brackets. These would be fastened to the plywood and the steel tubing by Pop rivets, wood / self-tapping screws, or screws and nuts. Pan-head or round-head screws would provide safety and easy cleaning, as would dome nuts or 'connector nuts'. Holes would need to be made in the tubing and panels prior to them being finished and assembled. All brackets and fasteners would be stainless steel or zinc plated mild steel to protect against the elements. <p>Pivoting Panel B</p> <ul style="list-style-type: none"> • Use of standard butt hinge – two hinges fitted along the top edge of Panel B. Hinges would be made from mild steel and zinc plated, or stainless steel, to prevent corrosion, and would be fastened to the plywood and the steel tubing by pop rivets, wood / self-tapping screws, or screws and nuts. Countersunk head screws would provide level fixings. Pilot holes would need to | <p>least one of the AO3 1a marks and at least one of the AO3 1b marks.</p> <p>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.</p> <p>Candidate operating at Level 1 will access some of the AO4 (1c/2c) marks.</p> | <p>assembly needed for the features of the concept design shown in Figs 4-7. Wide ranging and for the most part appropriate consideration is given to important technical information that needs to be taken into account (i.e. materials, manufacturing processes, finishes and standard components to be used) although one or two areas could be further developed. The use of the Resource Booklet to support the response is for the most part effective and substantiates the points being made through clear and detailed notes and sketches. The candidate is able to explain how the methods they have outlined meet the key attributes identified by the festival operators. There is evidence of logical points being made which occasionally lack coherence.</p> <p>Level 2 (5–8 marks) The candidate produces a sound analysis of the methods of manufacture and assembly needed for the features of the concept design shown in Figs 4-7. Reasonable consideration is given to important technical</p> |
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| | | <p>be made in the tubing and panels prior to them being finished and assembled.</p> <ul style="list-style-type: none"> • Use of piano / continuous hinge – cut to the length of the top edge and fitted along the top edge of Panel B. These would be fastened to the plywood and the steel tubing by pop rivets, wood / self-tapping screws, or screws and nuts. Pan head or round-head screws would provide safety and easy cleaning, as would dome nuts or ‘connector nuts’. Countersunk head screws would provide level fixings. Pilot holes would need to be made in the tubing and panels prior to them being finished and assembled. • Use of pivot hinge – fitted near the top of the vertical sides of Panel B. These would be fastened to the plywood and the steel tubing by pop rivets, wood / self-tapping screws, or screws and nuts. Pan head or round-head screws would provide safety and easy cleaning, as would dome nuts or ‘connector nuts’. Countersunk head screws would provide level fixings. Pilot holes would need to be made in the tubing and panels prior to them being finished and assembled. Images of possible pivot hinges below: <p>Tarpaulin</p> <ul style="list-style-type: none"> • Manufacture of the tarpaulin. Double seams with close stitching around the edges to prevent tearing and to reduce wear. Eyelets (nickel or brass plated to protect from elements) are inserted at corners and at approx. 150mm intervals along each edge, using a press tool which ‘rivets’ them in position. See image below. • Fastening the tarpaulin. A stranded nylon or polypropylene 6mm rope is threaded through the eyelets and tied to cleats screwed, bolted or riveted to the plywood (fixings as mentioned earlier). As per images below. The ends of the ropes would need to be heat sealed to avoid fraying over time. | | <p>information that needs to be taken into account (i.e. materials, manufacturing processes, finishes and standard components to be used) although evidence at times is patchy and could be developed much further. The use of the Resource Booklet to support the response goes some way to substantiate the points being made through for the most part clear and detailed notes and/or sketches. The candidate is able to adequately explain how the methods they have outlined meet the key attributes identified by the festival operators although one or two connections are clearly missed. There is evidence of points being made which can at times appear illogical and lack coherence.</p> <p>Level 1 (1–4 marks) The candidate produces only a basic explanation of the methods of manufacture and assembly needed for the features of the concept design shown in Figs 4-7. Limited consideration is given to important technical information that needs to be taken into account (i.e.</p> |
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| | | <ul style="list-style-type: none"> An alternative to using eyelets and cleats would be press-button / snap fasteners. The base would be screwed, riveted or bolted to the plywood (see details earlier) and the cap would be riveted through the tarpaulin using a press tool. This would be marginally easier for cleaning/ See images below: <p>Award credit for any other appropriate response</p> | | | <p>materials, manufacturing processes, finishes and standard components to be used) with some of these areas being omitted entirely from the candidate's response. The use of information in the Resource Booklet is limited and adds little value to the points being made with sketches or notes at times being misleading. Any explanations made to the methods they have outlined will be largely superficial and incoherent. There will be no analysis or evaluation.</p> <p>Level 0 (0 marks) No response or no response worthy of credit.</p> |
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| <p>3</p> | <p>2017 attendance: 2016 attendance (155 000) + 5% increase = 162 750(✓)</p> <p>Distribution cost of stuff sacks: 10% of attendance = 16 275* True Cost: 16 275 x £2 = £32 550 (✓)</p> <p>No. of stuff sacks filled: = 40% of 16 275* = 6 510 (✓)</p> <p>Collection costs for 6510 stuff sacks: Time = 6 510* ÷ 255 = 25.53 = 26 whole truck journeys = 26 x 2 = 52 hrs</p> <p>52hours ÷ 8 = 6.5 days = 7 full days pay for workers</p> <p>Cost = labour + fuel + truck hire = (26 x £15) + (7 x £380) = 390 + 2660 = £3 050 (✓)</p> <p>Sales: Sleeping bags: 6 510* x 60% x 65% x £5 = £12 694.50 Tents: 6 510* x 30% x 60% x £25 = £29 295 Airbeds: 6 510* x 50% x 50% x £7.50 = £12 206.25 Rolled mats: 6 510* x 40% x 95% x £5 = £12 369 Total Sales = £66 564.75 (✓)</p> <p>Profit: = sales – costs = 66 564.75* – (32 550* + 3 050*) = £30 964.75(✓)</p> <p>Award credit for any other appropriate method and response.</p> | <p>6</p> <p>AO3 2 x 2a</p> <p>AO4 4 x 1c</p> | <p>1 mark for calculating the 2017 attendance.</p> <p>1 mark for calculating the true cost for distributing the stuff sacks.</p> <p>1 mark for analysing the data given to calculate the number of stuff sacks filled.</p> <p>1 mark for analysing the data given to calculate the collection cost for the stuffed sacks.</p> <p>1 mark for calculating the total number of sales.</p> <p>1 mark for calculating the profit raised to support the charity.</p> <p>*Allow error carried forward (ECF) where correct working out is shown.</p> <p>Correct answer scores full marks</p> |
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| 4 | a | <p>Indicative content:</p> <ul style="list-style-type: none"> • Glass Reinforced Plastic (GRP) manufacture would be ideal for the relatively small quantity involved, and would provide the structural and functional requirements listed for the camper trolley bodies. • A structure for the camper trolley body fabricated from panels of plywood, aluminium, steel or polymer on a frame may be suggested, but the requirements for waterproof materials, water-tightness, and low weight could not economically or realistically be met within the quantity of 50 required. • The GRP lamination process uses liquid polyester resin reinforced by layers of glass fibres which hardens to provide a tough and durable component with a high strength to weight ratio. The 'lay-up' process is carried out on a mould in the shape of the final camper trolley body. • The GRP lamination process is a hazardous process. Polyester resins contain styrene which is very hazardous to health and should never come into contact with the skin. The GRP catalyst Methyl Ethyl Ketone Peroxide (MEKP) is very hazardous to humans and should never come into contact with the skin. PPE is essential in the form of respiratory equipment, eye, hand and ear protection. • A former is produced, from which a mould is produced, from which the camper bodies are produced. • A hand-lay-up GRP process would be used for a quantity of 50 camper trolley bodies: <p>Producing the former</p> <ul style="list-style-type: none"> • A 'male' former of the overall size and shape of the camper trolley body (ignoring the windows and other cut outs) would be constructed from birch plywood on | <p>16</p> <p>AO3 2 x 1a</p> <p>AO3 2 x 1b</p> <p>AO4 10 x 1c</p> <p>AO4 2 x 2c</p> | <p>All processes demonstrated in the candidate's response must be in relation to the 'Camper Trolley' design already provided and offer industrial manufacturing processes appropriate to batch production of this product.</p> <p>This question assesses applied knowledge of technical principles to the existing design, so responses that focus on redesigning the existing solution should not be rewarded.</p> <p>Candidates can draw on practical experience of iterative designing and product analysis to support their response to this question.</p> <hr/> <p>Candidate operating at Level 4 will access the majority of the AO4 (1c/2c) marks, at least one of the AO3 2a marks and at least one of the AO3 2b marks.</p> <p>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</p> | <p>Level 4 (13–16 marks) The candidate produces a detailed and comprehensive analysis of how the body of the 'Camper Trolley' could be manufactured. Wide ranging and appropriate consideration is given to important technical information that needs to be taken into account with all key areas in the question (i.e. materials and methods of manufacture) covered. The use of the Resource Booklet to support the response is wholly effective and fully substantiates the points being made through clear and detailed notes and sketches. The candidate is able to effectively explain how the methods and suggested materials consider the 'list of requirements' on Page 8 and there is evidence of logical and coherent points being made.</p> <p>Level 3 (9–12 marks) The candidate produces a good level of analysis of how the body of the 'Camper Trolley' could be manufactured. Wide ranging and for the most part appropriate consideration is given to important technical</p> |
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| | <p>a softwood timber frame. The plywood former would need a 5-degree draft angle so that the final GRP body could be removed, or alternatively would be made in two halves which would be assembled together. The plywood structure should be constructed in a way that it can be removed from the GRP mould that will be produced on the outside of the former. All corners should be rounded and the surface of the plywood should have surface imperfections filled and sanded to a smooth finish.</p> <p>Producing the mould</p> <ul style="list-style-type: none"> • Several layers of wax release polish would be applied to the surface of the former (front, back, sides and roof) and polished, then sealed with PVA liquid release agent. The wax and the release agent will prevent the GRP mould from sticking to the mould. • A layer of gel coat polyester resin with 5% catalyst added is applied by brush all over the outside of the former. This first layer is known as a gel coat. This will give a hard and tough surface to the mould. • When the gel-coat resin has cured to a 'tacky stage', about 30 minutes, a layer of the glass fibre reinforcing material called 'chopped strand matting' (a 'mat' of chopped strands of glass) is laid on top of the 'tacky' surface of the gel coat resin on the former, and a different type of polyester resin (called 'Lay-up' resin) with 5% catalyst added is stippled by brush and rolled into the reinforcing layer. The glass fibres must be fully saturated and air bubbles removed to give a consistent strength to the GRP mould. As this is the mould from which the camper trolley bodies will be produced, additional layers of 'chopped strand matting' are added to give a mould thickness of 4mm - 5mm of the mould. Alternatively, the lay-up resin with glass fibre strands | <p>marks.</p> <p>Candidate operating at Level 2 will access at least four of the AO4 (1c/2c) marks and at least one of the AO3 1a marks.</p> <p>Candidate operating at Level 1 will access some of the AO4 (1c/2c) marks.</p> | <p>information that needs to be taken into account (i.e. materials and methods of manufacture) although one or two areas could be further developed. The use of the Resource Booklet to support the response is for the most part effective and substantiates the points being made through clear and detailed notes and sketches. The candidate has a good level explanation of how the methods and suggested materials consider the 'list of requirements' on Page 8. There is evidence of logical points being made which occasionally lack coherence.</p> <p>Level 2 (5–8 marks) The candidate produces a sound analysis of how the body of the 'Camper Trolley' could be manufactured. Reasonable consideration is given to important technical information that needs to be taken into account (i.e. materials and methods of production) although evidence at times is patchy and could be developed much further. The use of the Resource Booklet to support the response goes some way to</p> |
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| | <p>can be applied using a compressed-air spray gun in which a fibreglass chopper is mounted on the spray gun. The mixture of catalyst, resin and fibreglass is sprayed evenly in a fan-like pattern to assure even coverage. A roller is used for compaction after each layer has been applied to remove trapped air.</p> <ul style="list-style-type: none"> • During the lay-up process, reinforcing structure such as lengths of softwood timber would be added into the layers of glass fibre and resin, to give structural strength to the mould which will be used to produce the camper trolley bodies in the initial quantity required. • When the mould has partially cured, about 20-30 minutes, the edges of the laminations can be trimmed easily with a knife. It is preferred to do the trimming at this stage so that the edges are true to the former edge which represents the shape and size of the camper body, and while the former supports the GRP mould. • When the mould has fully cured, around 2 hours, the plywood structure would be removed. The inside surface of the mould, where the GRP camper bodies will be produced would be checked, cleaned, and any imperfections filled / sanded, otherwise these would be transferred to the final camper bodies. <p>Producing the GRP camper bodies (similar but <u>not the same</u> as above)</p> <ul style="list-style-type: none"> • Several layers of wax release polish would be applied to the surface of the mould and polished, then sealed with PVA liquid release agent. The wax and release agent prevent the GRP mould from sticking to the mould. • Colour pigment is added to the gel coat polyester resin and 5% catalyst added. This is applied by brush to the inside of the mould. Using masking tape to give | | <p>substantiate the points being made through, for the most part, clear and detailed notes and/or sketches. The candidate is able to adequately explain how the methods and suggested materials consider the 'list of requirements' on Page 8 although connections are clearly missed. There is evidence of points being made which can at times appear illogical and lack coherence.</p> <p>Level 1 (1–4 marks) The candidate produces only a basic explanation of how the body of the 'Camper Trolley' could be manufactured. Limited consideration is given to important technical information that needs to be taken into account (i.e. materials and methods of manufacture) with some of these areas being omitted entirely from the candidate's response. The use of information in the Resource Booklet is limited and adds little value to the points being made with sketches or notes at times being misleading. Any explanations relating to methods and suggested materials will be largely</p> |
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| | | <p>neat edges, different coloured mixes of gel-coat resin would be applied to different parts of the mould to create the different colours and designs required on the camper trolley body (e.g. the dark red lower half) This gel coat layer gives a hard and impact resistant surface to the camper body.</p> <ul style="list-style-type: none"> • When the gel-coat resin has cured to a 'tacky stage', about 30 minutes, a layer of the glass fibre reinforcing material is laid on top of the 'tacky' surface of the gel coat resin on the mould. Lay-up polyester resin with an appropriate coloured pigment, possibly a white or cream pigment for the inside of the camper trolley body, with 5% catalyst added, is stippled by brush and rolled into the glass fibres. The glass fibres must be fully saturated and air bubbles removed to give a consistent strength to the GRP camper trolley body. Additional layers of 'chopped strand matting' are added to give a final thickness for the camper trolley body of 3mm to 4mm. • Alternatively, the pigmented lay-up resin and glass fibre strands can be applied using a compressed-air spray gun in which a fibreglass chopper is mounted on the spray gun. The mixture of catalyst, resin and fibreglass from separate sources come together in the spray gun and are sprayed evenly in a fan-like pattern to assure even coverage. A roller is used for compaction after each layer has been applied to remove trapped air. • When the GRP camper trolley body has partially cured, about 20-30 minutes, the edges of the laminations can be trimmed easily with a knife. It is preferred to do the trimming at this stage so that the edges are true to the mould edge which represents the shape and size of the camper body, and while the mould is supporting the GRP camper trolley body. | | | <p>superficial and incoherent. There will be no analysis or evaluation.</p> <p>Level 0 (0 marks) No response or no response worthy of credit.</p> |
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| | | <ul style="list-style-type: none"> When the GRP camper trolley body has fully cured, around 2 hours, it is carefully removed from the mould. The 5-degree release angle of the mould will enable this, although some careful initial flexing of the mould and body components to 'break the seal' is required. The surface of the camper trolley body will be smooth and polished, obtained from the high quality mould surface. Light cleaning will be required to remove the water-based PVA release agent, and further polishing will achieve the required finish that will "complement the original design of the VW camper". <p>Adding the windows</p> <ul style="list-style-type: none"> The window openings in the body would be cut using a powered hand router with a plunge and side cutting bit, and follower guide on the base plate. A plywood jig would be used with a cut out slightly larger than the required size of window (to allow for the follower guide on the router, also allowing for the window fitting profile). The jig would be located in position (part of the jig will reference to the datum edge of the camper body) and the router used to cut out the window shape in the GRP. Responses may suggest the window openings would be marked out with a permanent marker using templates that locate against the edge of the GRP camper trolley body and cut out using a power jig saw. This is a slightly lower response than the use of a router and jig. A variety of methods of fixed-window fitting are possible. A water-tight seal is required. A single length of standard rubber profile will fit around the opening and a locking strip / key clips into the rubber profile to hold the glazing material in place. Rigid window-fixing profiles in anodised aluminium alloy are also available, | | | |
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| | | <p>where alternative fittings are possible – e.g. riveted to the camper trolley body. (see diagrams / images below) All components incorporate rubber seals to the camper body and the glazing material.</p> <ul style="list-style-type: none"> • Clear polycarbonate (PC) or acrylic (PMMA) sheet, 3mm or 4mm thickness would be used for safety reasons, PC being the most suitable with very high toughness / impact resistance. • The sliding opening windows need a double channel profile (see diagram above) where one window slides on front of or behind the other. • Fixed and sliding window units can be ‘bought in’ as standard size ready-glazed assemblies, ready to fit to the GRP camper trailer body using rivets or clip-in locking strips (with rubber seals) integrated into the aluminium alloy profile. See image below. <p>Fixing the body to the trailer</p> <ul style="list-style-type: none"> • Nut connectors could be used to provide temporary fixing of the body to the trailer. These would need large heads or washers to spread the fixing area. These would be safe having a small head, and would be relatively tamperproof, needing an allen key to operate. Allen key hexagonal bits are available, enabling the operator to use a portable power tool for speed and convenience when attaching / detaching the camper bodies. <p>The tailgate – for children to get in and out of the trolley</p> <ul style="list-style-type: none"> • The opening for the tailgate would be formed in the same way as the window openings in the GRP. • The tailgate itself would be a roll-up tarpaulin sheet, mounted above the opening, fitted on the outside of the camper body so that water would run off. Operating in the same way as a window blind, this | | | |
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| | | <p>would allow free and unrestricted access for children when rolled up. When lowered down and clipped in position would provide a seal against bad weather.</p> <ul style="list-style-type: none"> • Manufacture of the tarpaulin. PVC material. Double seams with close stitching around the edges to prevent tearing and to reduce wear. Press-button / snap fasteners would be fitted. The bases of the fastener would be pop-riveted to the GRP body, and the caps would be riveted through the tarpaulin using a press tool. • The tailgate, alternatively, could be a lift up top half, and lower down bottom half. Material would be PVC sheet with rubber sealing strips around the edges, and standard hinges or piano hinges could be used, fastened by pop rivets. Latches or cabin-hooks would be used to hold closed. Support arms would be needed to hold the top opening tailgate lid open. The lower half of the tailgate would drop down to the ground to give easy access for children. A single lift up tailgate is a possibility, which may be more of a safety hazard because of the protrusion from the back of the camper trolley. <p>Other items</p> <ul style="list-style-type: none"> • The VW badge would be thermoformed in polystyrene (PS), poly vinyl chloride (PVC), or high density polyethylene (HDPE). The mould would be made from MDF using a CNC router with a round-over cutter to give the profile required. Edges of the badge would need to be trimmed using a rotary trimmer following moulding. No finish would be required as the material would be water proof. • This would be fastened to the body using pop rivets or plastic click-rivets. <p>Award credit for any other appropriate response</p> | | | |
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| 4 | b | <p>Indicative content:</p> <p>Hire company issues</p> <ul style="list-style-type: none"> • Inter-changeability of advertising material on the trolleys – standardised mountings, sizes and positions would need to be agreed. • impact on hire, could make the product more desirable, but may also make it less desirable due to consumer specific interests in music • security of the trolley may become an issue with increased desirability • theft of parts from the trolley connected to the advertising e.g. Beastie Boys associated with VW sign, fans stole VW badges from campervans in the 80's. Secure fixings of advertisements is needed to avoid them being removed as 'souvenirs' • vandalism of advertisements or the camper trolley themselves could be an issue – unwanted attention / political bands • advertisements would need to be printed on appropriate materials to minimise damage over a period of time • costs associated with the administration of the advertising, changing advertisements at agreed dates • advertising contracts and contact with bands and agents could lead to opportunities for expanding the camper trolley business • opportunities for sponsorship and advertising by well know national brands outside music may present themselves. <p>Consumer issues</p> <ul style="list-style-type: none"> • it is a children's trailer; this may limit the type of product that can be advertised on it and be socially acceptable e.g. parental advisory | <p>12</p> <p>AO3 1 x 2a</p> <p>AO3 3 x 2b</p> <p>AO4 8 x 2c</p> | <p>If a candidate demonstrates generic knowledge about stakeholder/user considerations related to marketing without utilising the contextual information given in the Resource Booklet, or aligning it to the promotion of music albums, candidates should not be awarded higher Level 1.</p> <p>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.</p> <p>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.</p> <p>Candidates can draw on practical experience of iterative designing to support their response to this question.</p> | <p>Level 4 (10–12 marks)</p> <p>The candidate produces a detailed and comprehensive critical evaluation of the effectiveness of using the 'Camper Trolley' as a method of advertising. The narrative is well-considered and bolstered by sustained lines of argument which consider how the advertising method will fulfil the needs of a diverse range of stakeholders. Evidence will be prioritised effectively 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.</p> <p>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.</p> <p>Level 3 (7–9 marks)</p> <p>The candidate produces a good level of detailed critical evaluation of the effectiveness of using the 'Camper Trolley' as a method of advertising. The narrative is for the most part well-considered and</p> |
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| | <ul style="list-style-type: none"> interaction between fans may disrupt and upset the children liability if the trolley was vandalised or damaged unwanted attention / too much attention / fans taking selfies with the trailer the hire cost may be lower due to the additional income to the hire company from selling the advertising space. The majority of consumers are ready to accept a product with advertising for a free or more cost-effective service immediate access to details of upcoming albums from bands performing at the festival. <p>Record label</p> <ul style="list-style-type: none"> it is a low cost / effective method of advertising good product placement – prolonged and immediate access to target market the advertising is in the same location as the place where albums and band merchandise can be purchased, and in a place where people are most likely to make a purchase, being ‘away on holiday’ and in ‘relaxed mode self-promotion – photographs of trolleys / video footage including trolleys will appear widely – e.g. photo collections, social media no cost labour – the trolleys are moved around the festival sites by the parents association with a children’s product could have a negative social impact. <p>Give credit for other appropriate relevant responses.</p> | <p>Candidate operating at Level 4 will access the majority of the AO4 (2c) marks, the AO3 mark and at least two of the AO3 (2b) marks.</p> <p>Candidate operating at Level 3 will access at least five of the AO4 (2c) marks, the AO3 (2a) mark and at least one of the AO3 (2b) marks.</p> <p>Candidate operating at Level 2 will access at least two of the AO4 (2c) marks, the AO3 (2a) mark and at least one of the AO3 (2b) marks.</p> <p>Candidate operating at Level 1 will access some of the AO4 (2c) marks.</p> | <p>bolstered by sustained lines of argument which consider how the advertising method will fulfil the needs of a diverse range of stakeholders although one or two opportunities for stakeholder analysis are missed. Evidence will for the most part be prioritised effectively 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 and is largely appropriate to the context being addressed.</p> <p>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.</p> <p>Level 2 (4–6 marks) The candidate produces a sound critical evaluation of the effectiveness of using the Camper Trolley as a method of advertising. The narrative is reasonable and bolstered by lines of argument which consider how the advertising method will fulfil the needs of a narrow range of</p> |
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| | | | | | | <p>stakeholders. 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 adequately meets the context being addressed.</p> <p>There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</p> <p>Level 1 (1–3 marks) The candidate produces a basic explanation of how the ‘Camper Trolley’ could be used as a method of advertising. Any understanding is basic, resulting in limited exploration of how the advertising method will address stakeholder needs. There will little evidence of evidence being prioritized 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.</p> |
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| | | | | | | <p>The information has some relevance and is presented with limited structure or detail. The information is supported by limited evidence.</p> <p>Level 0 (0 marks) No response or no response worthy of credit.</p> |
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Assessment Objectives (AO) grid

| Question | AO3 | AO4 |
|----------------|-----------|-----------|
| 1 | 3 | 9 |
| 2a | 3 | 5 |
| 2b | 5 | 11 |
| 3 | 2 | 4 |
| 4a | 4 | 12 |
| 4b | 4 | 8 |
| Total | 21 | 49 |
| Overall | | 70 |

Summary of Updates

| Date | Version | Change |
|---------------|---------|---|
| February 2019 | 2 | Mark scheme, Q3, page 17 amended to include 'Airbeds: $6510^* \times 50\% \times 50\% \times £7.50 = £12206.25$ ' |

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