



*Rewarding Learning*

**General Certificate of Secondary Education**

**2021**

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## **Engineering and Manufacturing**

Unit 1

### **Controlled Assessment Task**

Design

**[GEM11]**

**VALID FROM SEPTEMBER 2021**

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#### **INSTRUCTIONS FOR THE CONTROLLED ASSESSMENT TASK**

You have approximately **20 hours** to complete the task.

The design portfolio should be a maximum of **twelve A3 pages on one side** only or equivalent. All text should be **font size 12**. Titles should not exceed **font size 16**. Candidates may present the portfolio in hard copy or electronic format.

Centres select the task that is best suited to their needs.

#### **INFORMATION FOR CANDIDATES**

The Controlled Assessment Task is **marked out of 100** and carries a **weighting of 25%**.

Quality of written communication will be assessed throughout the design portfolio.

**Candidates' work to be submitted May 2022**

Controlled Assessment Tasks must comply with the requirements as detailed in the Subject Specification.

NB: Some Controlled Assessment Tasks may constitute more than 1 page.

Please check you have all the information you need to complete the task if printing from a computer.

## Unit 1: Design

### Instructions for teachers and candidates

This unit is **compulsory** for all candidates.

The design portfolio should be a maximum of **twelve A3 pages on one side** only or equivalent. All text should be font **size 12**. Titles should not exceed font **size 16**.

Candidates may present the portfolio in hard copy or electronic format.

Candidates should understand that the design process is non-linear and creativity should be evident throughout the process.

Candidates are expected to:

- analyse a given design brief and research similar products;
- produce a detailed product specification;
- generate a range of concept sketches;
- evaluate and justify the design concept for development;
- develop a final solution to meet the requirements of the specification;
- produce engineering drawings of the final solution; and
- present a final solution with proposals for manufacture on an industrial scale.

**Quality of written communication will be assessed throughout the design portfolio.**

Candidates must choose **one** of the following design tasks:

**Task 1: Snowboard transport & security rack**

**Design Opportunity:**

Snowboarding is an increasingly popular recreational activity that is enjoyed by many winter sports enthusiasts in ski resorts across the world.

You have been approached by a leading winter sports brand to design a transportation and security rack for snowboarders to transport their boards and equipment safely and efficiently. The product must also have the dual function of being able to be used to store the equipment securely when not in use. The company plan to manufacture a batch of 200 for product testing at popular resorts across Europe before moving the design into mass production.

Your design must:

- be able to store two snowboards on a domestic vehicle whilst being transported;
- incorporate a locking mechanism that will prevent theft of the boards whilst being stored/ transported;
- use materials that will be durable in extreme climates and resistant to moisture, frost and salt;
- incorporate a method of attaching and removing the snowboard rack that could be used on a range of domestic vehicles;
- include handles or another appropriate method that considers ergonomic factors when lifting the rack;
- consider issues of aerodynamics/drag, caused by the rack, when a domestic vehicle is travelling within a speed limit of 130 km/h. This should include an appropriate Factor of Safety;
- have an appropriate aesthetic finish that will blend well with the sub-culture of the snowboarding market; and
- be less than 10 kgs in weight to allow users to safely lift it onto/off a domestic vehicle.

## **Task 2: Humanitarian aid – Water Purifier**

### **Design Opportunity:**

Conservative estimates outline that 844 million people do not have access to clean water across the world (*WHO & UNICEF Joint Monitoring Programme (JMP) report 2017*).

You have been approached by a global charity to design a simple water purification system that will be used to spearhead a humanitarian aid initiative in the developing world. The primary aim of the initiative is to directly assist deprived rural/semi-rural communities, where people have no access to clean drinking water. It is the intention that a batch of 200 will be produced for the next planned aid intervention, before moving the design into mass production.

Your design must:

- be able to hold 5 litres of water;
- incorporate a suitable filtration system that is capable of removing all solids of 0.5 mm and above;
- use natural resources such as fire, sunlight or another appropriate method as an energy source to assist in the purification process;
- not exceed £10 per unit for materials and manufacture;
- be compact and collapsible to support transport to rural locations;
- be robust in form and be easily repaired;
- have a method through which purified water can be syphoned off for use; and
- weigh no more than 3 kg, when empty, for ease of transportation.