



Oxford Cambridge and RSA

Tuesday 10 June 2025 – Morning

**A Level in Design and Technology:
Product Design**

H406/02 Problem Solving in Product Design

Resource Booklet

Time allowed: 1 hour 45 minutes



INSTRUCTIONS

- Use this Resource Booklet to answer **all** the questions.
- You should spend **35 minutes** reading this Resource Booklet.
- Do **not** send this Resource Booklet for marking. Keep it in the centre or recycle it.

INFORMATION

- This document has **8** pages.

ADVICE

- Read this Resource Booklet carefully **before** you start your answers.

The stimulus in this booklet relates to issues and opportunities that may be encountered by designers and manufacturers of equipment who provide interactive play activities.

Attracting Families to Museums

Discovery Play Museum (DPM) is a museum that needs to increase profits. It is considering ways that visitor numbers can be increased. One solution is to have equipment that provides interactive play activities such as those shown in **Fig. 1** below.

Fig. 1

Interactive Play Activities:

Archimedes Screw:



Percussion Play:



Talking Tube:



Noughts and Crosses:



Water Channelling:



Sensory Play Panels:



Equipment that provides interactive play activities can benefit a museum financially in the following ways:

Benefit	Explanation
Increased ticket sales	Can attract more families with children to visit.
Membership growth	Families who visit frequently may be more inclined to purchase memberships for long-term access, fostering a sense of loyalty.
Increased catering and merchandise sales	Families may be encouraged to spend more time at the museum, increasing food, drink and gift shop sales.
Event and birthday party rentals	Museum may be more attractive for hosting events such as birthday parties, school outings and community gatherings.
Partnerships	Collaborating with local businesses, schools, and community organisations to promote education through interactive play can lead to mutually beneficial partnerships.
Grant funding	Some government grants and funding opportunities may prioritise projects that promote community engagement, education and healthy lifestyles.

Commercial Viability

DPM will undertake research to ensure that investment in any new equipment that provides interactive play activities is commercially viable and will increase profits.

5- to 10-Year-Old Children

DPM wants to attract families with children aged 5 to 10 years old. The aim of the museum is to promote creativity, imagination and problem-solving skills through hands-on learning and this age range is the most likely to be inspired by the museum. DPM is keen to attract primary school groups in order to increase revenue.

Design Inspiration and Sustainability

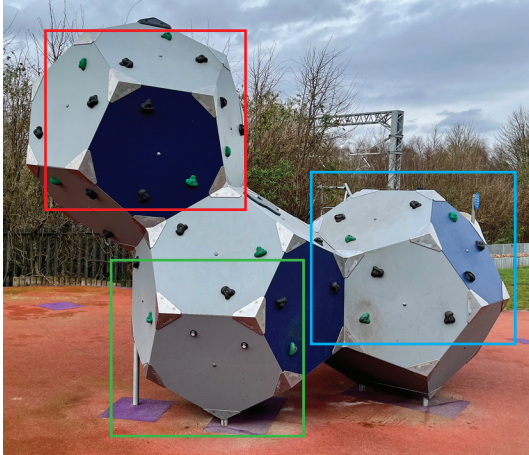
Researchers working for DPM have identified that popular museum outdoor areas have been designed to complement the themes and exhibits of a museum. These outdoor areas can provide hands-on learning experiences that reinforce educational concepts in a fun and interactive way.

Two pieces of existing equipment that could provide interactive play activities for DPM are inspired by geometric patterns and the iconic building in London known as the Gherkin. These pieces are shown in **Fig. 2** and **Fig. 3**.

Ethical Responsibility

DPM has a moral and ethical responsibility to consider the social and environmental consequences of any decisions/actions it takes. Minimising carbon emissions and adopting sustainable practices align with its principles of social responsibility and ethical design.

Fig. 2

Geometric Pattern Inspired Equipment:

corner plate



tube



climbing boards

Features:

- constructed from dodecahedra
- flexible configuration – dodecahedra can be joined to suit the playground

Materials:

- melamine laminate marine plywood climbing boards
- stainless steel tube supports
- stainless steel corner plates

Construction:

- nuts and bolts
- TIG welding

Configuration shown:

- maximum height: 2400 mm
- maximum width: 3800 mm
- overall width of one dodecahedron: 1500 mm

A dodecahedron has 12 faces:

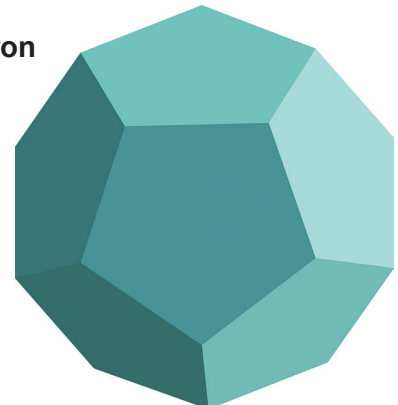


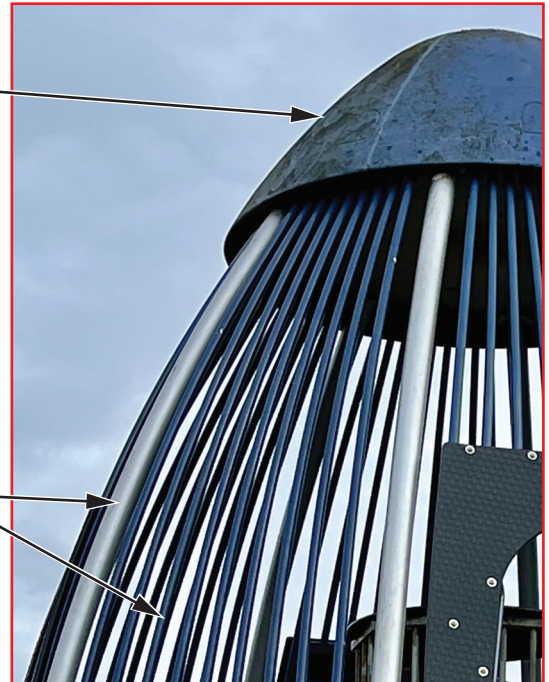
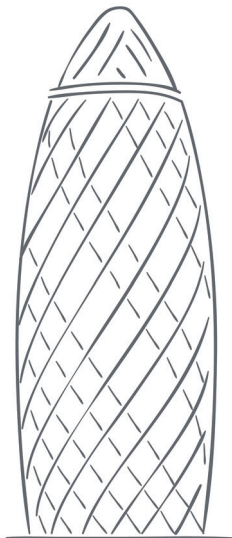
Fig. 3

The Gherkin Inspired Equipment:

climbing board

sheet

tubes

**The Gherkin:**

plate

climbing
rope**Features:**

- height: 3750 mm
- base diameter: 3000 mm

Materials:

- melamine laminate marine plywood climbing boards
- mild steel round tubes throughout
- mild steel sheet and plate
- nylon rope

Surface finishes:

- galvanising
- powder coating

Construction:

- MIG welding
- nuts and bolts

Design Requirements

DPM has chosen to work with PG Leisure, a manufacturer of outdoor equipment. PG Leisure has been asked by DPM to design and make equipment that could be used for interactive play activities using the inspiration of a geodesic dome. A geodesic dome is a dome constructed from polygons. An iconic geodesic dome is shown in **Fig. 4**.

Fig. 4

Montreal Biosphere, Canada:



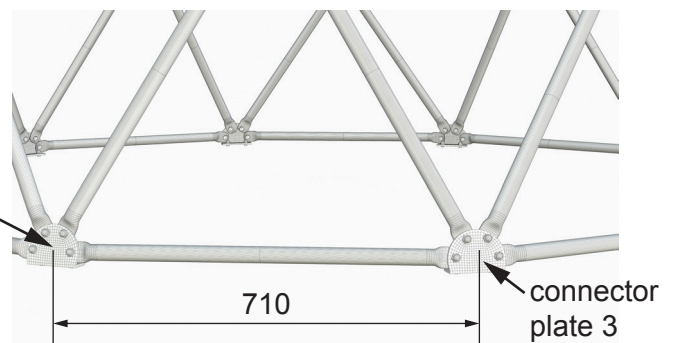
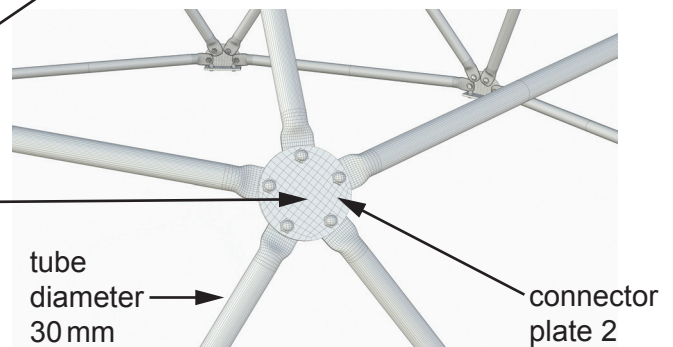
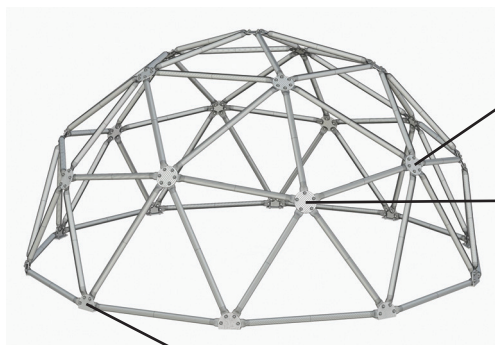
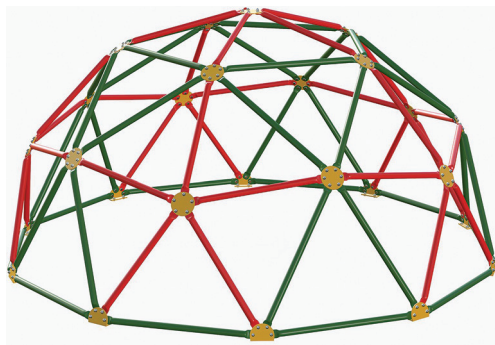
Design Concept

One proposal from the design team at PG Leisure is the geodesic climbing dome shown in **Fig. 5**.

The dome is made up of equilateral triangles.

Fig. 5

Geodesic Outdoor Climbing Dome:



Features:

- external diameter of base: 2300 mm
- height: 1100 mm
- made up of 38 equilateral triangles

Dimensions in mm (not to scale)

Design Development

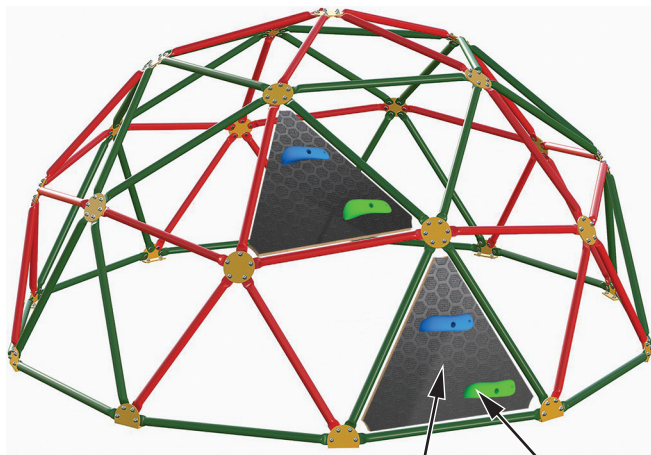
Analysis of existing outdoor play areas indicated that climbing features are very popular with children that can be used to provide a range of interactive play activities. Climbing boards, such as those shown in **Fig. 2** and **Fig. 3**, feature in most outdoor play areas. In order to take this concept further, DPM has asked PG Leisure to explore opportunities to integrate climbing boards into its design proposals.

A designer has developed the integrated climbing board design shown in **Fig. 6**.

Fig. 6

Climbing Board:

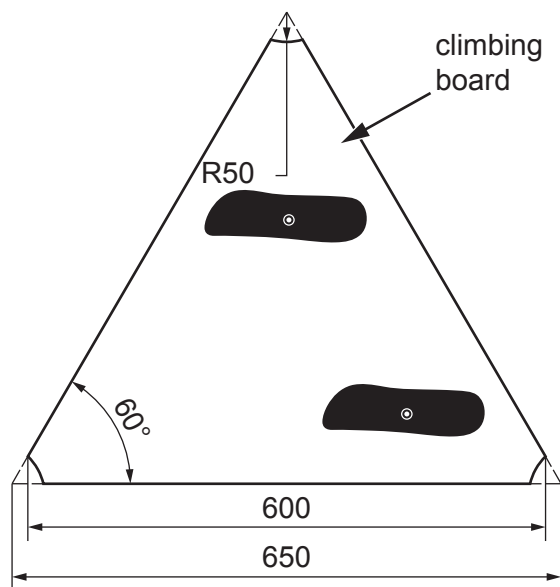
The climbing boards can be integrated within an equilateral triangle within the frame of the geodesic dome.



climbing board climbing hold

Features:

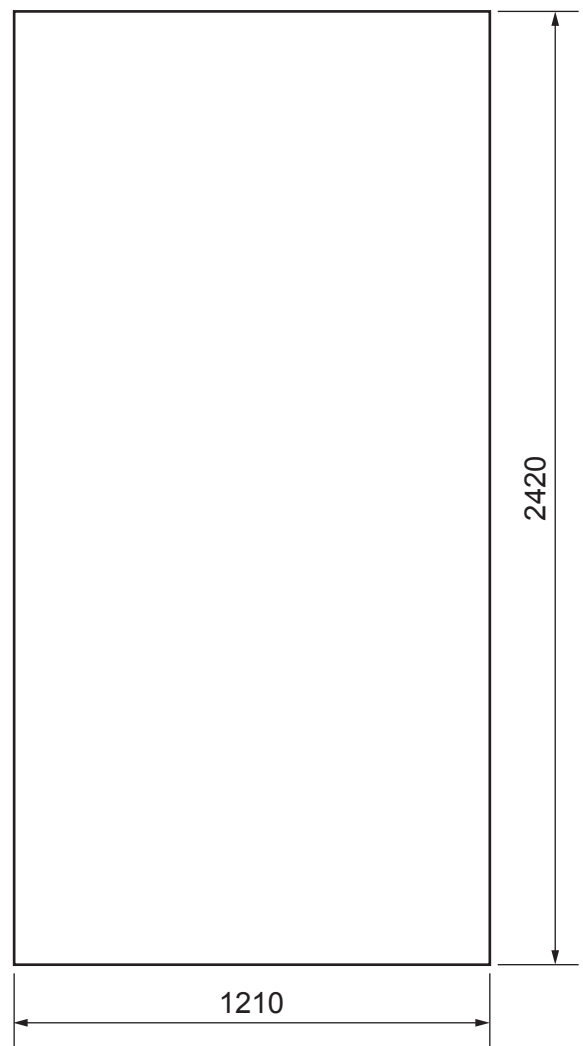
- Melamine laminate marine plywood
- Up to two climbing holds can be attached
- Climbing board fits within the equilateral triangle shaped gaps in the frame



Dimensions in mm (not to scale)

The climbing boards will be cut from sheets of melamine laminate marine plywood using a CNC router that has a vacuum bed.

The CNC router will be cutting with an 8 mm diameter cutting tool.

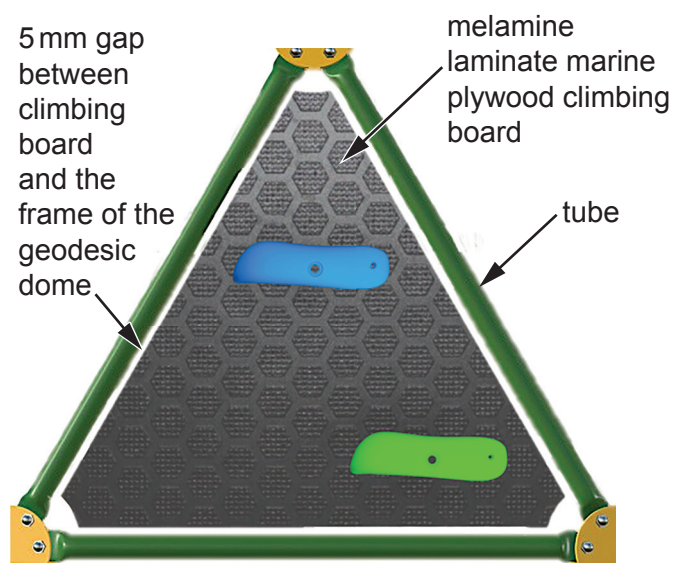


DPM would like the designer to proceed with the addition of climbing boards to the geodesic dome. A close up of one of the climbing boards is shown in **Fig. 7**.

Fig. 7

Method of Attaching the Climbing Board:

The climbing boards need a method of attachment to the geodesic frame.



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