

# DESIGN AND TECHNOLOGY - GCSE SAMPLE PAPER 1

## COMPONENT 1

Candidate Name	Centre Number					Candidate Number				

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**TIME ALLOWED - 2 HOURS**

**USE THE INSERT PROVIDED  
HALF WAY THROUGH THIS BOOKLET**

### **EQUIPMENT REQUIRED**

Drawing and writing equipment, coloured pencils and a calculator

# **MARK SCHEME**

### **INSTRUCTIONS**

Write in black ink not pencil.

Answer all the questions.

Use the insert for when answering questions from Section B

Include all working out

**TOTAL MARKS FOR THIS PAPER IS 100**

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# SECTION A

## Answer all the questions

HELPFUL LINK <http://www.technologystudent.com/rmflsh1/alevq2.html>

1. The photograph shows a modernist 'plastic' chair.



**1a.** Name a suitable material for the manufacture of this chair? In your answer explain the physical properties that make it suitable. **3 marks**

*Follow link for possible answer.*

*Material must be named for any mark.*

*1 mark for simple / basic answer*

*2 marks for reasonable detail ( at least two facts)*

*3 marks for detailed answer*

**1b.** Name and describe a manufacturing process that would be suitable for the industrial production of the chair. **3 mark**

*Follow link for possible answer.*

*Manufacturing process must be named for any mark.*

*1 mark for simple / basic answer*

*2 marks for reasonable detail ( at least two facts)*

*3 marks for detailed answer*

**1c.** In the space below, sketch the process you have described, adding labels.  
**4 marks**

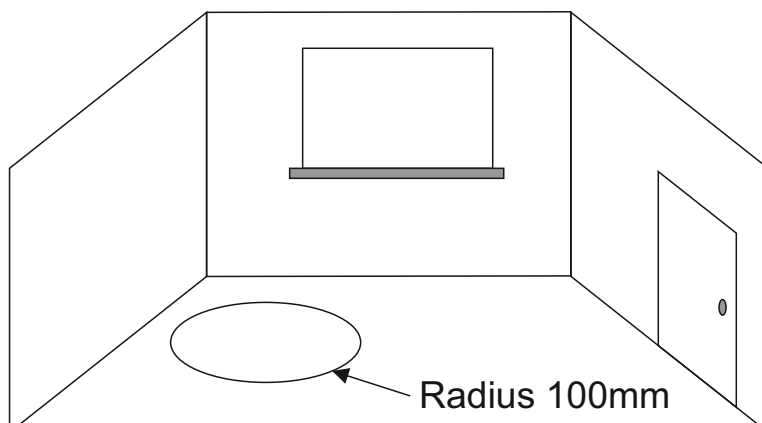
*1 mark for a basic diagram with no labels / marks.*

*2-3 marks for more detail including a sketch and labels*

*4 marks for a detailed answer.*

**1d.** A scaled model of the chair has been manufactured and placed in a 'model' room. It stands inside the circle shown below. Calculate the area of the circle. Include your working out and formula. **2 marks**

The circle has a radius of 100mm. What is the area of the circle?



*1 mark for formula and working out.*

*Additional mark for correct answer.*

*Follow the link for answer.*

HELPFUL LINK <http://www.technologystudent.com/prddes1/kite1.html>

**1e.** Designers must consider health and safety when designing a product, such as a chair. Health and Safety in the UK is monitored by the British Standards Institute. What is the Kite Mark? **2 marks**

*Follow link for possible answer.*

*1 mark for simple / basic answer*

*2 marks for reasonable detail ( at least two facts)*

HELPFUL LINK <http://www.technologystudent.com/prddes1/repair1.html>

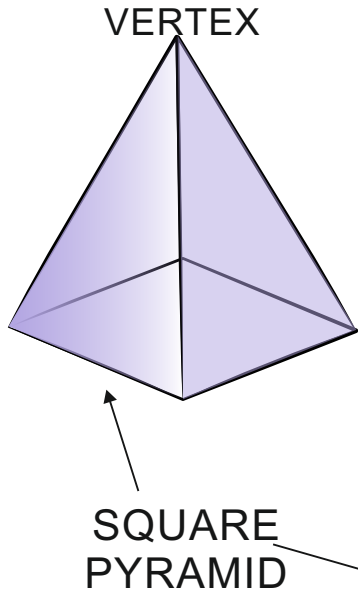
**1f.** The chair has been designed to be repairable. What are the advantages of a product that can be repaired? **8 marks**

*Follow link for possible answer.*

*1 - 2 marks for simple / basic answer*

*3 -5 marks for reasonable detail ( 3 to 5 facts)*

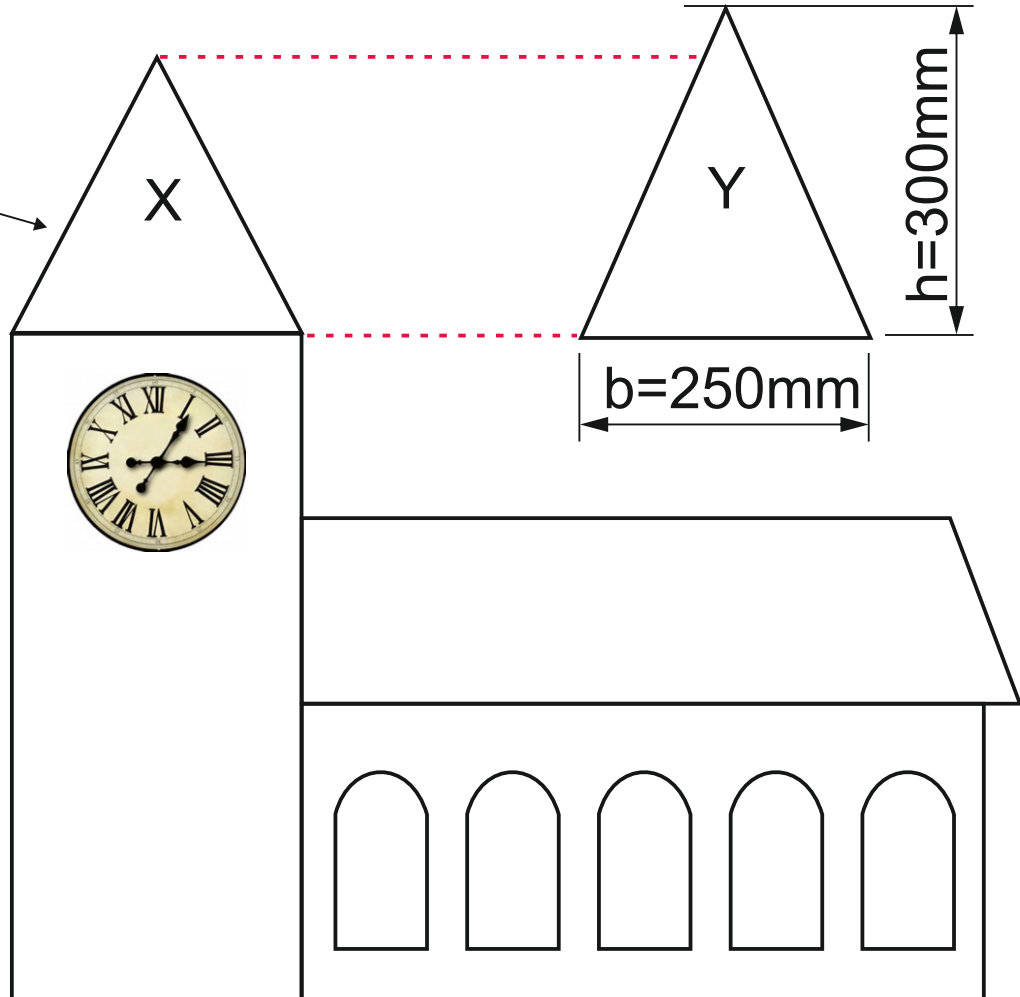
*6 - 8 marks for detailed answer.*



Below is a model a typical village church.

The roof of the tower is a square pyramid.

2a. What is the area of one side of the square pyramid?  
4 marks



AREA = 1/2 X BASE X HEIGHT

AREA = 1/2 X BASE X HEIGHT

$$\text{AREA} = \frac{250 \times 300}{2}$$

$$\text{AREA} = \frac{75000}{2}$$

$$\text{AREA} = 37500\text{mm}^2$$

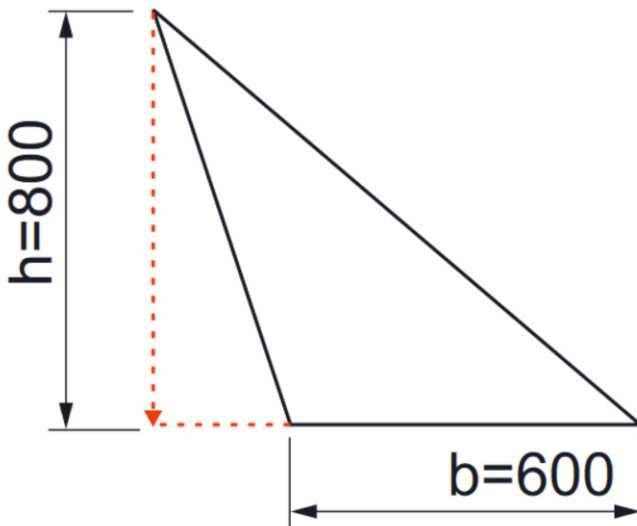
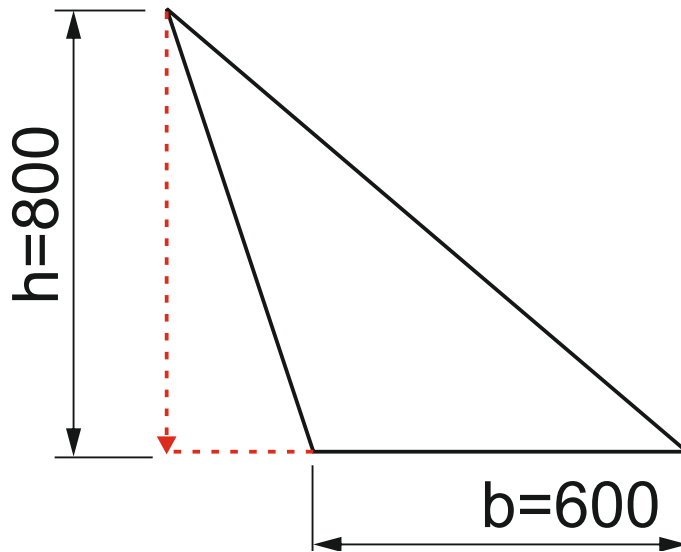
2b. The labels X and Y represent the same part, one side of the square pyramid. Why does Y appear taller than X ? 2 marks

2. The labels X and Y represent the same part, one side of the square pyramid. Why does Y appear taller than X ?

*'Y' appears taller than 'X', because each side of the square pyramid is tilted towards the pyramid's VERTEX, giving the appearance of it being shorter than it actually is.*

*'Y' is the side of the pyramid held perfectly straight upwards, not inclined / tilted towards the vertex. This gives us the actual 'true' shape of the triangle.*

**2c.** A piece of waste material is left over, from making the model. What is the area of the waste? **4 marks**



$$\text{AREA} = 1/2 \times \text{BASE} \times \text{HEIGHT}$$

$$\text{AREA} = \frac{600 \times 800}{2}$$

$$\text{AREA} = \frac{480000}{2}$$

$$\text{AREA} = 240000\text{mm}^2$$

**2d.** Standard components are often used in the manufacture of products. What is a standard component? **2 marks**

*Follow link for possible answer.*

*1 mark for simple / basic answer*

*2 marks for reasonable detail ( at least two facts)*

**2e.** What are the advantages of using standard components, when manufacturing a product. Include an example of a product that includes standard components.

**4 marks**

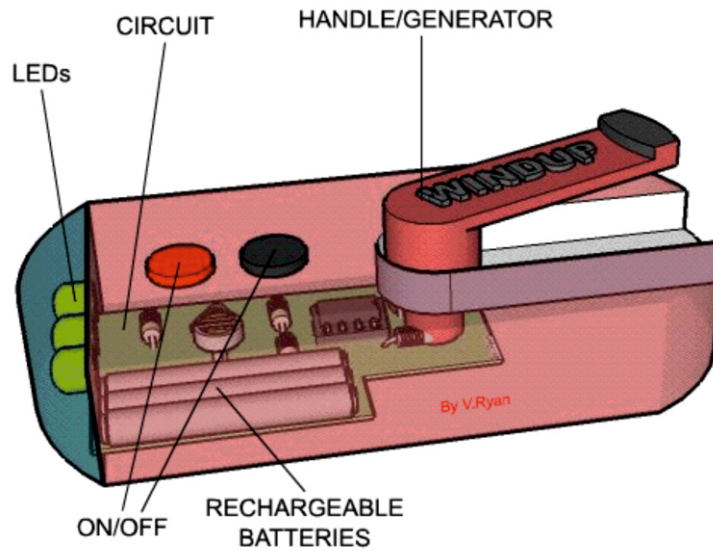
*Follow link for possible answer.*

*1 mark for simple / basic answer*





*2 marks for reasonable detail ( at least two facts)*

*3 - 4 marks for detailed answer ( 4 or more facts )*

3. A 'wind-up' torch is shown below. The casing holds a circuit, that includes a range of electronic components, such as those displayed in the table on this sheet.



3a. Using a tick or a cross, identify each of the components, as either an 'input' or an 'output'. **4 marks**

COMPONENT	INPUT	OUTPUT
TOGGLE SWITCH 	✓	
SPEAKER 		✓
MICRO-SWITCH 	✓	
THERMISTOR 	✓	

1 mark per correct answer



**3b.** Compared to conventional torches (those that need batteries), what are the advantages of the 'wind-up' version? **4 marks**

*Follow link for possible answer.*

*1 mark for simple / basic answer*

*2 marks for reasonable detail ( at least two facts)*

*3 - 4 marks for detailed answer ( 4 or more facts )*

The question is about alternative energy.

**3c.** A local wind farm produces 4 terawatt hours of electricity over a year. At the same time, a solar farm produced 0.5 terawatt hours of electrical power. What is the ratio Wind farm : Solar Power ? **3 marks**

$$\begin{array}{ccc} \text{WIND FARM} & : & \text{SOLAR POWER} \\ 4 & : & 0.5 \end{array}$$

To ensure that final ratio is in whole numbers, divide the wind power total by the solar power total.

$$\frac{\text{WIND FARM}}{\text{SOLAR POWER}} = \frac{4}{0.5} = 8$$

Then take the answer and place it on the wind power side of the ratio and the 1 on the solar power side.

$$\begin{array}{ccc} \text{WIND FARM} & : & \text{SOLAR POWER} \\ 8 & : & 1 \end{array}$$

**3d.** Write two **advantages** of using wind power to produce electricity. **2 marks**

*Follow link for possible answer.*

*1 mark for simple / basic answer*

*2 marks for reasonable detail ( at least two facts)*

**3e.** Write two **disadvantages** of using wind power to produce electricity. **2 marks**

*Follow link for possible answer.*

*1 mark for simple / basic answer*

*2 marks for reasonable detail ( at least two facts)*

**3f.** Some car manufacturers regard the use of **carbon neutral** energy sources (alternative energy) as being important. Describe an example of this approach. **2 marks**

*Follow link for possible answer.*

*1 mark for simple / basic answer*

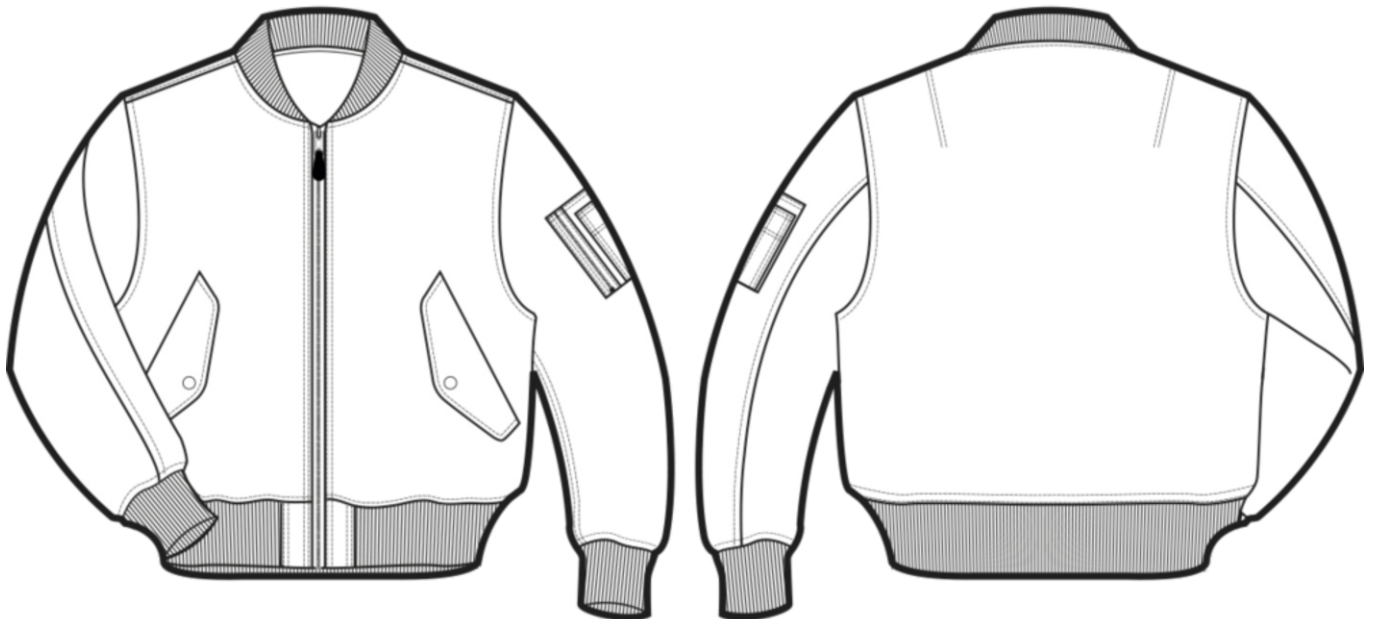
*2 marks for reasonable detail ( at least two facts)*

# PRODUCT INSERTS

Page 1



## Product 2 - TEXTILES - Classic Insulated Unisex Jacket

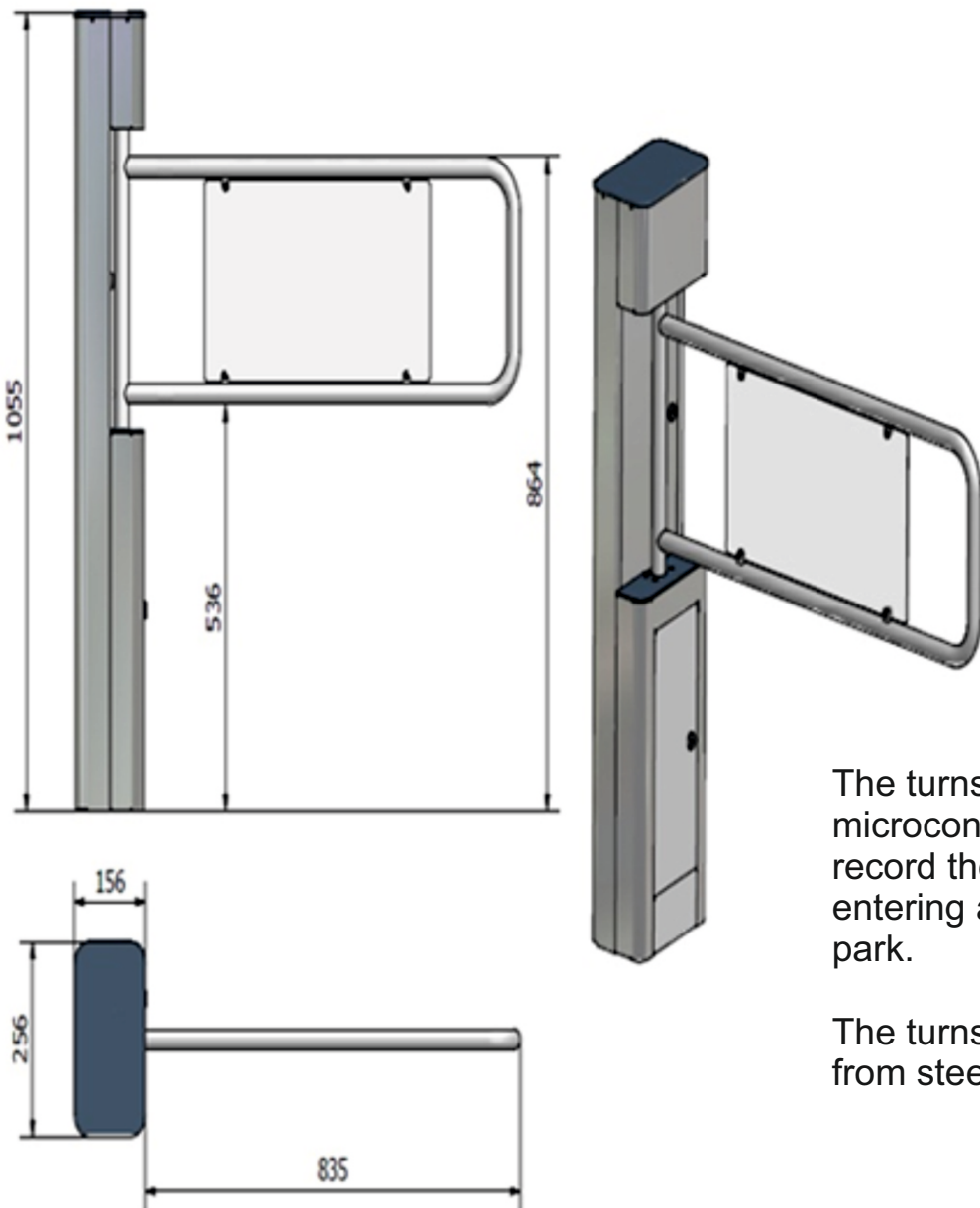
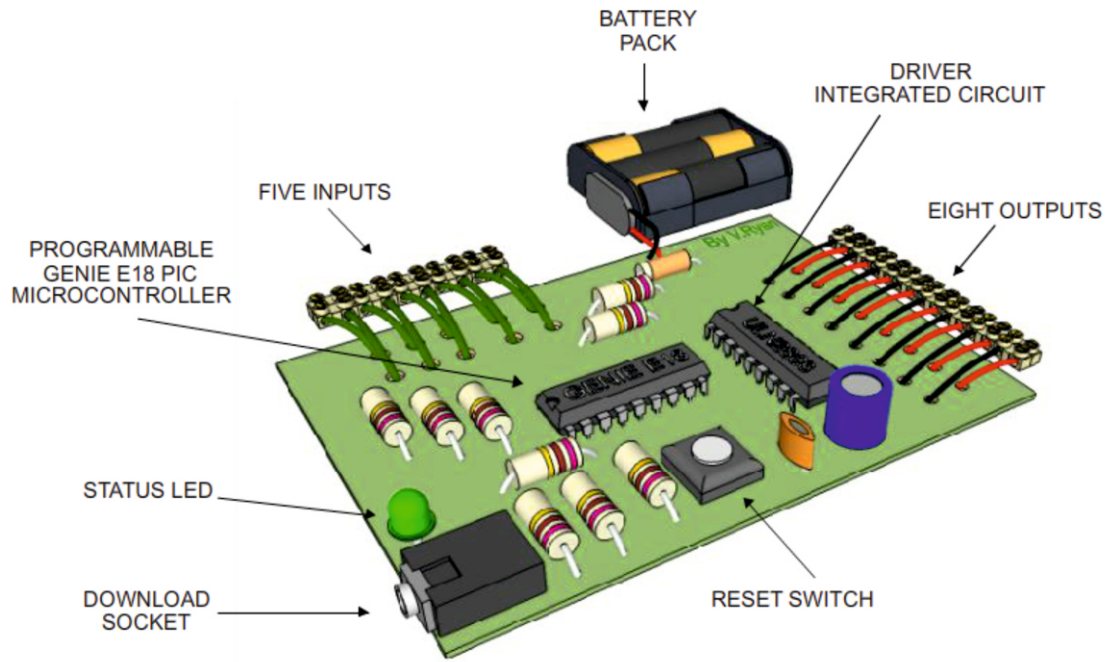


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A classic insulated unisex jacket, for winter. The waist and cuffs are to be elasticated. Available in a range of sizes and colours. Suitable for everyday wear.

# Page 4

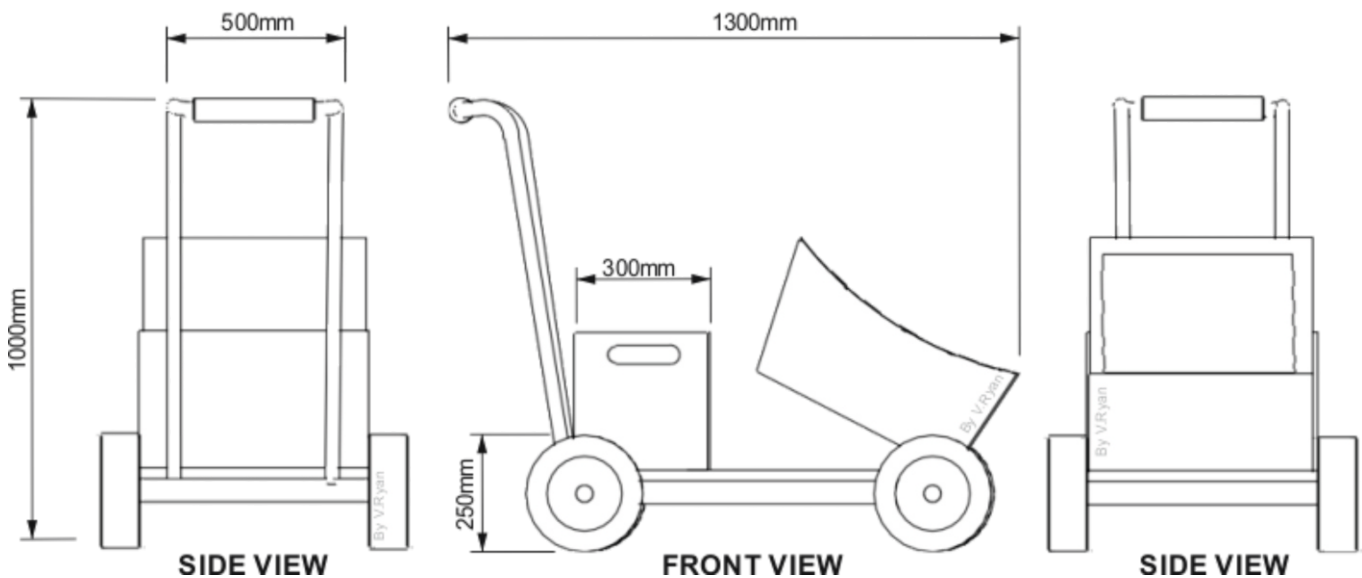
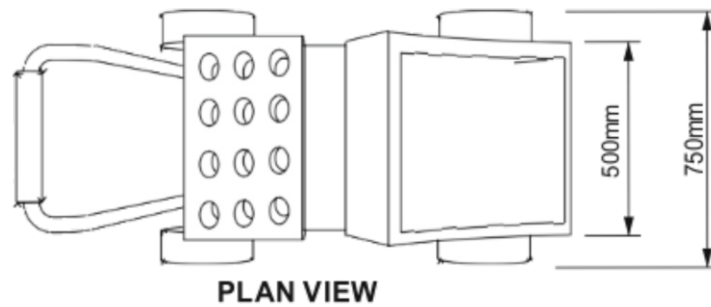
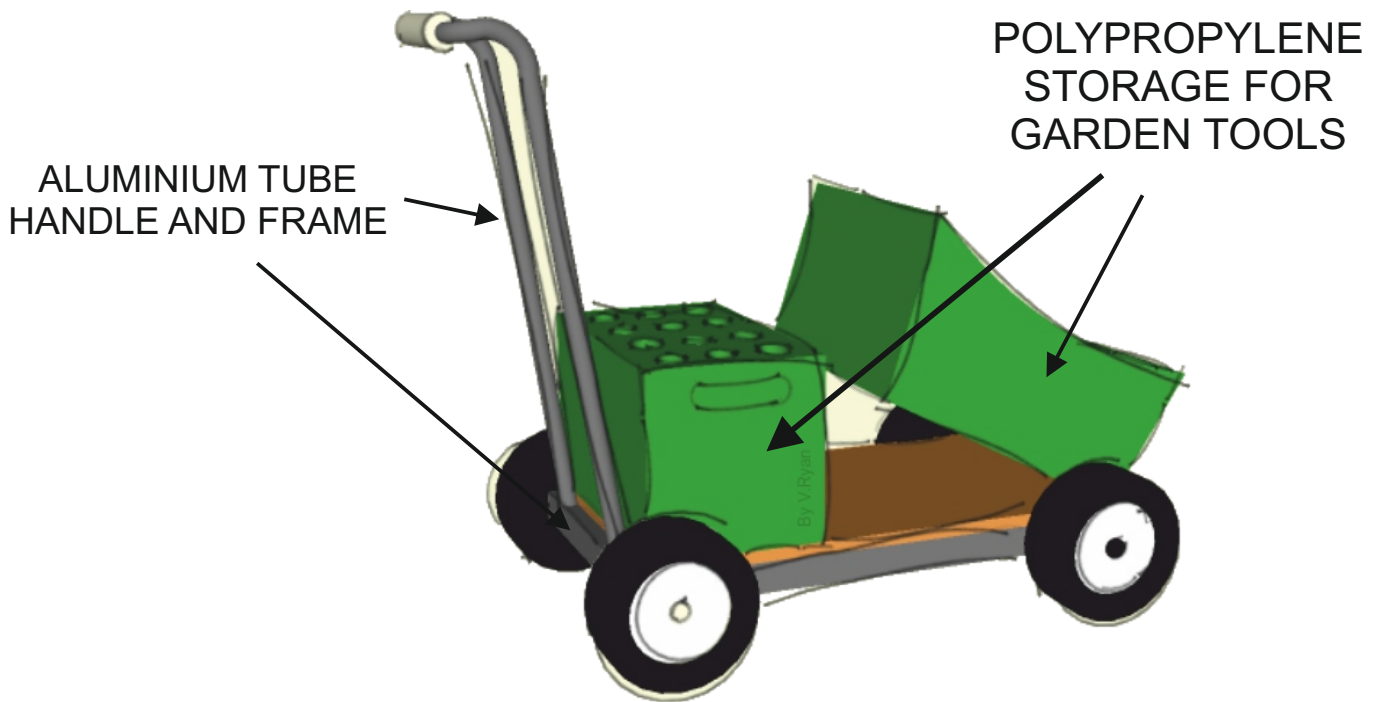
## Product 3 – Turnstile (design engineering)



The turnstile is connected to a microcontroller, which helps record the number of people entering and exiting the theme park.

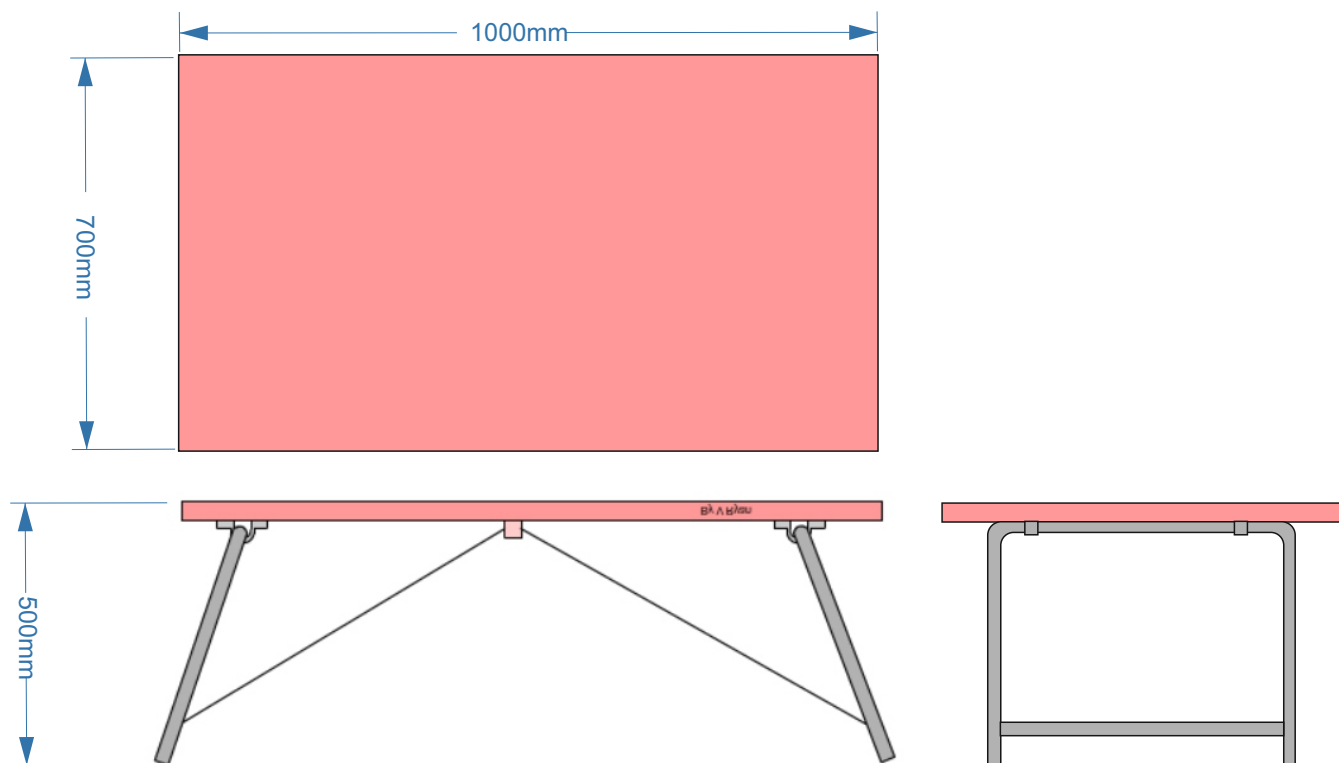
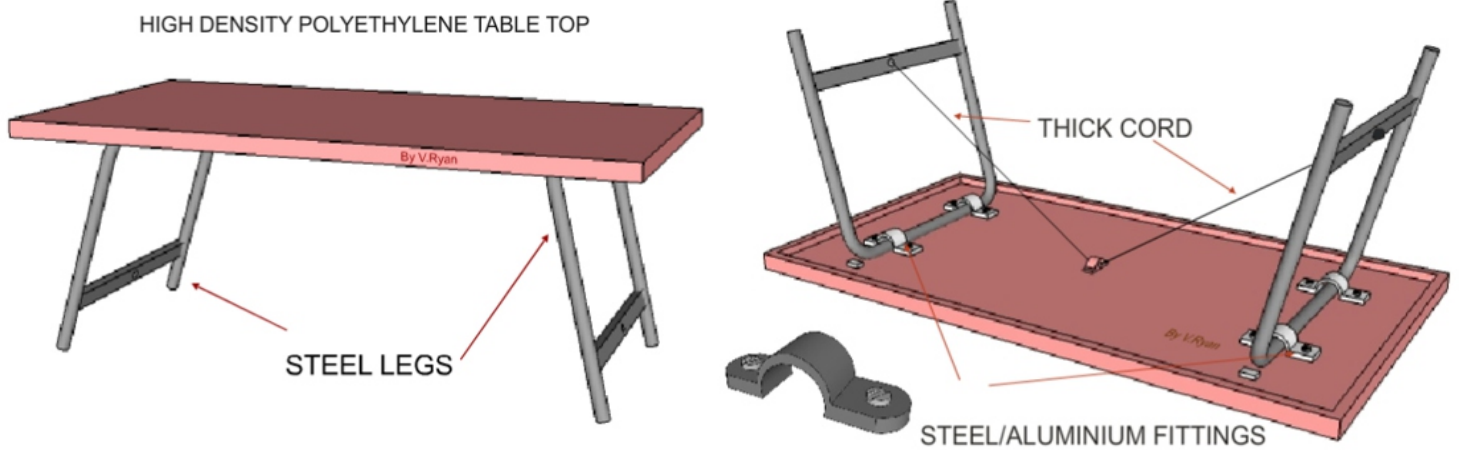
The turnstile is manufactured from steel tube.

## Product 4 - Transportable Storage for Garden Tools (polymers)



The mobile storage unit is used to transport tools around a garden. The frame is aluminium tube and the storage units / boxes are manufactured from a polymer. The wheels are supplied ready made, as a standard component.

## Product 5 – Folding Table with tubular legs (metals)

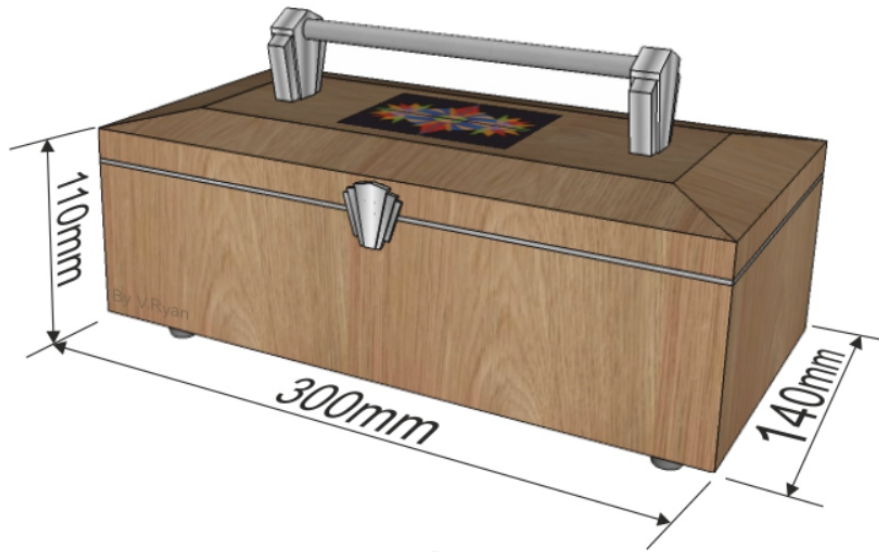


The picnic table is lightweight and foldable. It can be transported and also stored. The legs are aluminium tube, although a version with steel legs is also available.

The product is designed to be completely recyclable, at the end of its life cycle.



## Product 6 – Jewellery Storage (timbers)



**THIRD ANGLE ORTHOGRAPHIC PROJECTION**

A 3D drawing of an Art Deco container is seen below.

Draw the front, side and plan view, in third angle orthographic projection.

Add six dimensions, estimate measurements.

SCALE 1:1

THIRD ANGLE PROJECTION

NAME: \_\_\_\_\_

ART DECO CONTAINER

DATE: \_\_\_\_\_

By V.Ryan

This storage box is available in a variety of natural woods. Traditional jointing methods have been used during its manufacture. It has a quality finish and can be locked for security. It is designed in an Art Deco style.

Information on this page is required to answer Questions 4 and 5 (c).

IMAGE A



IMAGE B



IMAGE C

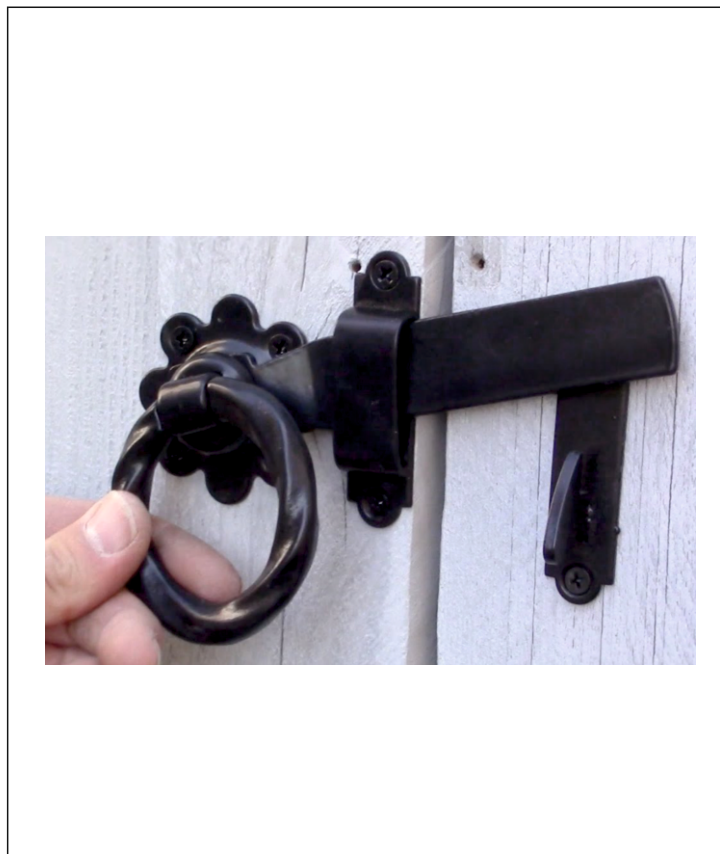


IMAGE D



# SECTION B

Answer all the questions in this section

The inserts must be used to help you answer all the questions in Section B. These are products that you would find in a department store, as a fixture or as a product for sale.

4. Study page 8 of the insert Booklet.

HELPFUL LINK <http://www.technologystudent.com/despro2/prneff2.htm>

4a. The magazines shown in Image A, are composed of paper that has been UV Varnished.

Give two reasons why this printing process is suitable for this product. **2 marks**

(i)

*Follow link for possible answer.*

*1 mark per correct answer*

(ii)

4b. List one disadvantage of UV Varnishing, as a printing process. **1 mark**

*Follow link for possible answer.*

*1 mark for one disadvantage.*

HELPFUL LINK [http://www.technologystudent.com/joints\\_fish/nylon1.html](http://www.technologystudent.com/joints_fish/nylon1.html)

4c. Image B shows a popular T Shirt manufactured from a synthetic material. Name a suitable synthetic material. **1 mark**

(i)

*Follow link for possible answer. 1 mark for one disadvantage.*

Give two reasons why the material you have named is suitable. **2 marks**

(ii)

*Follow link for possible answer.*

*1 mark per correct reason ( max of 2 marks)*

(iii)

**4d.** Image C shows a typical latch for a garden gate.

HELPFUL LINK <http://www.technologystudent.com/forcmom/lever1.htm>

Name the type of mechanism that is represented by the latch. **1 mark**

(I) *Follow link for possible answer. 1 mark for LEVER*

Why is the mechanism you have named, suitable for this product? **1 mark**

(ii) *One mark for a description of a 'lever' being used as a simple mechanism. Quick lock and release. Fail safe.*

HELPFUL LINK <http://www.technologystudent.com/rmflsh1/teak1.html>

**4e.** Image D shows a garden bench manufactured from teak. Explain why teak is a suitable natural wood for this product. **2 marks**

*Follow link for possible answer.*

*1 mark per correct reason / material property.*

You will need to answer both questions 5 and 6, in relation to ONE product selected from below. Keep in mind that you have been studying a specialist area in detail, throughout the course.

It is important that you read questions 5 and 6 before selected the product.

- Product 1 - Disposable Food Carrier (papers and boards)
- Product 2 - Classic Insulated Unisex Jacket (Textiles)
- Product 3 – Turnstile (design engineering)
- Product 4 - Transportable Storage for Garden Tools (polymers)
- Product 5 – Folding Table with tubular legs (metals)
- Product 6 – Jewellery Storage (timbers)

## USEFUL LINKS FOR QUESTIONS 5 AND 6

### Joining Materials

[http://www.technologystudent.com/despro\\_flesh/mats\\_join1.html](http://www.technologystudent.com/despro_flesh/mats_join1.html)

### Wood Based Product

[http://www.technologystudent.com/despro\\_3/trolmanf.html](http://www.technologystudent.com/despro_3/trolmanf.html)

### Metal Based Product

[http://www.technologystudent.com/despro\\_3/alrolley1.html](http://www.technologystudent.com/despro_3/alrolley1.html)

### Polymer Based Product

<http://www.technologystudent.com/rmprep09/reman1.html>

### Design Engineering / Microcontrollers

<http://www.technologystudent.com/pics/picdex1.htm>

### Finishes for Woods and Metals

[http://www.technologystudent.com/despro\\_flesh/mats\\_finish1.html](http://www.technologystudent.com/despro_flesh/mats_finish1.html)

### Manufacturing a Card Product by Hand

<http://www.technologystudent.com/despro2/develp4.htm>

### Manufacturing a Card Product - Small Scale Production

<http://www.technologystudent.com/despro2/devman1.htm>

### Manufacturing a Card Product - Die Cutting

<http://www.technologystudent.com/despro2/devman2.htm>

## Spend no more than 20 minutes on this question

**5a.** After a detailed design process, a final product / design is manufactured. In the space below and on the next page, explain / describe how your chosen product is manufactured. Use sketches, labels and notes. **12 marks**

Include the following details:

The manufacturing processes.

Tools and equipment required.

Quality and safety checks.

Finish(s) applied to the completed product.

*Follow links on page 21 for information and guidance..*

*1 - 2 marks for basic answer with only a sketch or basic notes.*

*3 - 5 marks for more detail with a number of stages included.#*

*6 - 8 marks for reasonable detail ad more accurate sketches.*

*9 - 12 marks for detailed accurate sketches and detailed notes.*

***Teacher discretion required.***



**5b.** Designers need to consider environmental issues when designing products. Consequently, many products are designed to be recycled, as part of a 'Closed Loop System'.

6f. What is Closed Loop Recycling? Include reference to how a product of your choice, could be recycled through this system. **5 marks**

*Follow links for possible answer.*

*1 mark for simple / basic answer*

*2 marks for reasonable detail ( at least two facts)*

*3 - 5 marks for increased detail with an equivalent number of facts.*



**5c.** The design and manufacture of a product is sometimes financed through Crowd Funding. What is Crowd Funding? **6 marks**

*Follow links for possible answer.*

*1 mark for simple / basic answer*

*2 marks for reasonable detail ( at least two facts)*

*3 - 6 marks for increased detail with an equivalent number of facts.*

## HELPFUL LINKS

<http://www.technologystudent.com/joints/htest1.html>  
<http://www.technologystudent.com/joints/tensile1.html>  
<http://www.technologystudent.com/joints/conduct1.html>  
<http://www.technologystudent.com/joints/toughness1.html>

6. Considering the product you selected for question 5:

(a) Before and during manufacture, materials need testing.

Select just ONE material, followed by how the material could be tested to ensure quality. Include sketches if required. **4 marks**

**Material:** \_\_\_\_\_

*Follow links for possible answer.*

*1 mark for simple / basic answer - including only one testing method.*

*2 marks for reasonable detail ( at least 2 tests)*

*3 - 4 marks for increased detail in both text and sketches (an increased number of relevant tests included)*

*Teacher discretion required.*

**6b.** Composite materials are in wide use, in the modern world around us.

Name a composite material, explain why it is regarded as a composite material and give practical examples of its use.

**8 marks**

*Follow links for possible answer.*

*For any marks the composite material must be named.*

*1 - 2 marks for simple / basic answer - including only 1 / two facts.*

*3 - 4 marks for increased detail in both text and sketches (an increased number of relevant facts included)*

*5 - 8 marks for very good detail, with a genuine understanding of the composite material displayed.*

*Teacher discretion required.*