

DESIGN AND TECHNOLOGY - GCSE SAMPLE PAPER 2

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/joints/ldpe1.html>

1. The photograph shows a 'plastic' chair. It can be manufactured from Low Density Polyethylene (LDPE).



1a. Explain the physical properties that make LDPE 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

HELPFUL LINK <http://www.technologystudent.com/joints/ldpe3.html>

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

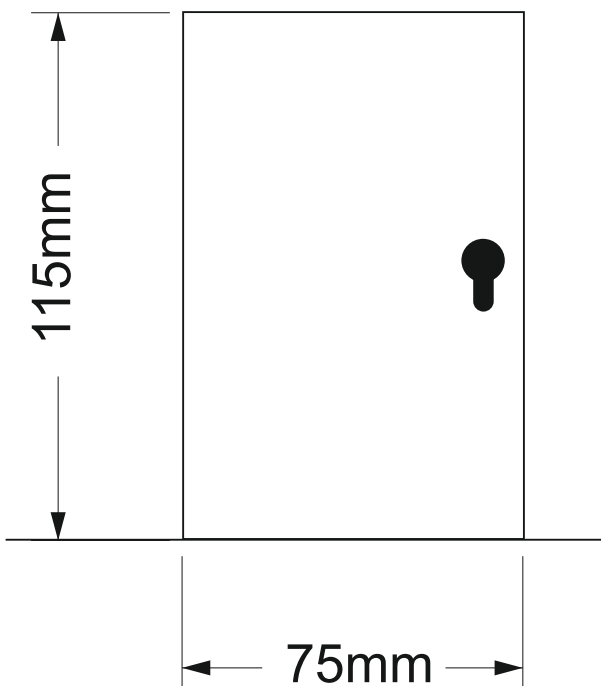
1c. In the space below, sketch the process you have described, adding labels.
4 marks

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 precision model of the chair is to be placed in a display case, at the entrance of an architects office. The display case has a lockable door. Calculate the area of the door **2 marks**



1 mark for formula and working out.

Additional mark for correct answer.

Follow the link for answer.

HELPFUL LINKS <http://www.technologystudent.com/prddes1/quality1.html>
<http://www.technologystudent.com/prddes1/qual2.html>

1e. The chair shown in question 1a, undergoes Quality Control, as it is manufactured. What is Quality Control? **4 marks**

Follow link for possible answer.

1 mark for simple / basic answer

2 marks for reasonable detail (at least two facts)

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HELPFUL LINKS <http://www.technologystudent.com/prddes1/quality1.html>
<http://www.technologystudent.com/prddes1/qual1.html>

1f. A Quality Assurance system, has been set up by the factory manufacturing the chair. What is Quality Assurance and how does it differ from Quality Control?
6 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.

2a. Part of a recipe to serve two people, requires 4 cups of flour and 1 cup of water.
3 marks



If the recipe is to be scaled up to serve 10 people, how many cups of flour and water will be required as part of the recipe.

	FLOUR	:	WATER
SERVES TWO PEOPLE =	4		1

To find the number by which the original ratio numbers are multiplied, divide the new number of people to be served (10) by the old number of people to be served (2).

$$\frac{10 \text{ PEOPLE}}{2 \text{ PEOPLE}} = 5$$

Then, multiply each number of the original ratio by the answer 5, to find the new amount of flour and water.

$$4 \times 5 : 1 \times 5$$

The new number of cups of flour and water are seen opposite

	FLOUR	:	WATER
	20		5

2b. If the recipe is to be scaled up to serve 12 people, how many cups of flour and water will be required as part of the recipe. **3 marks**

	FLOUR	:	WATER
SERVES TWO PEOPLE =	4		1

To find the number by which the original ratio numbers are multiplied, divide the new number of people to be served (12) by the old number of people to be served (2).

$$\frac{12 \text{ PEOPLE}}{2 \text{ PEOPLE}} = 6$$

Then, multiply each number of the original ratio by the answer 6, to find the new amount of flour and water.

$$4 \times 6 : 1 \times 6$$

The new number of cups of flour and water are seen opposite

	FLOUR	:	WATER
	24		6

2c. Round section (circular section material) is regularly used in workshops. The names / labels of parts of a circle are listed below. Using the diagram of the circle, write each of the names / labels in the correct positions. **5 marks**

NAMES / LABELS

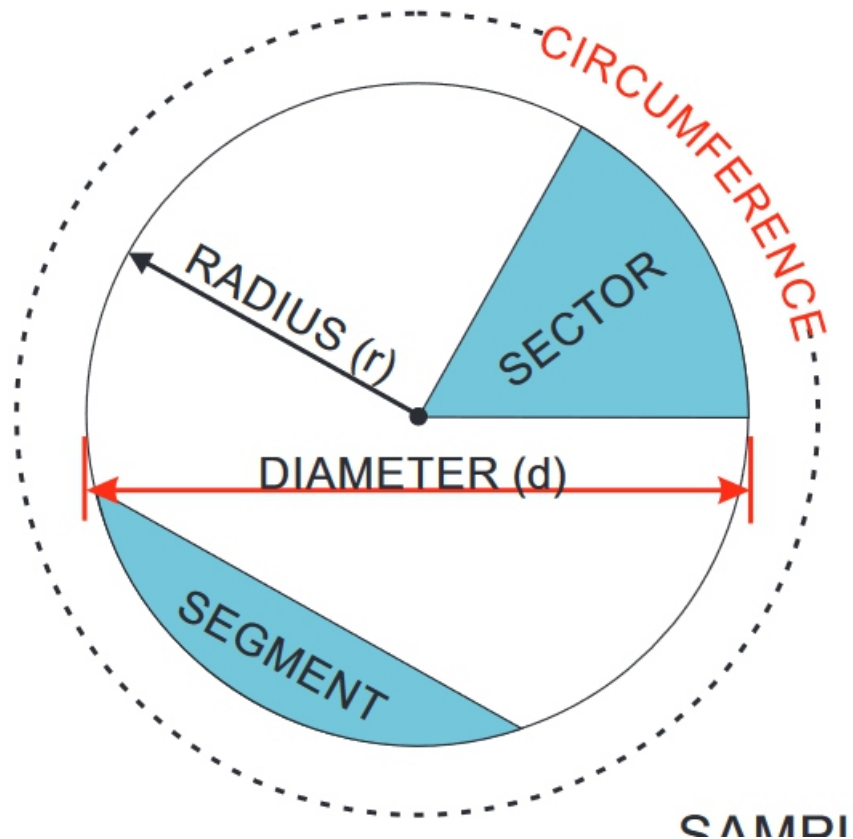
CIRCUMFERENCE

SECTOR

SEGMENT

RADIUS

DIAMETER



One mark per correct answer

2d. Tessellations are often applied to designs. What is a tessellation? **1 marks**

Follow link for possible answer.

1 mark for simple / basic answer

2 marks for reasonable detail (at least two facts)

2e. Tessellations are very useful when designing the nets (developments) for packaging. Why is this the case? Your answer should include brief notes and a diagram. **4 marks**

SKETCH

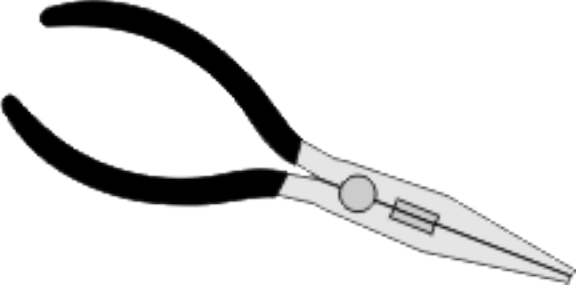
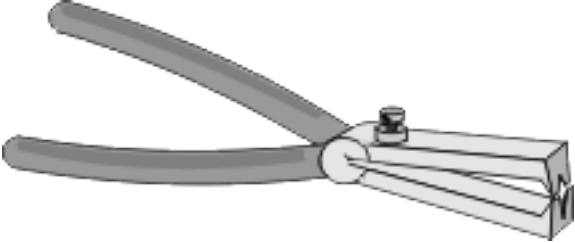

Follow link for possible answer.

Up to 2 marks for notes

Up to two marks for the sketch.

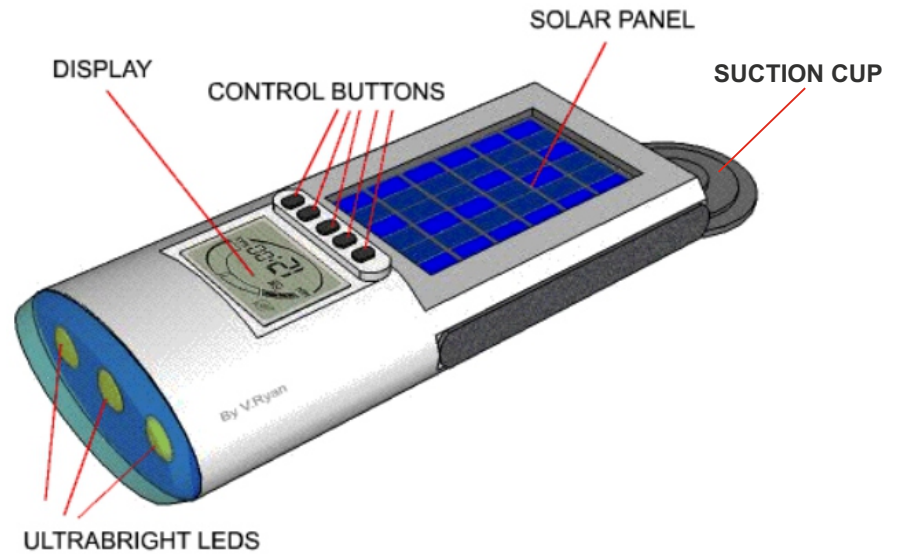
NOTES

3a. Three basic tools for electronics are shown below. Name each tool and briefly explain its function. **6 marks**

ELECTRONICS TOOL	
	<p>NAME:</p> <p>EXPLANATION:</p> <p><i>1 mark for the correct name. Additional mark for explanation</i></p> <p><i>Follow the link for the correct answers</i></p>
	<p>NAME:</p> <p>EXPLANATION:</p>
	<p>NAME:</p>

3b. A SolarBright Torch is seen opposite. It has a solar panel that enable the batteries to recharge, from sunlight.

What is the function of the suction cup? **2 marks**



Follow link for possible answer.

*1 mark for simple / basic answer (one fact)
2 marks for higher level of detail.*

Teacher discretion required.

This question is about alternative energy.

3c. The total amount of renewable energy produced in 2016 was 90 Terawatt hours (Twh). The ratio of hydroelectricity compared to other renewable energy forms was 1:12. What amount of energy was produced through hydroelectricity ? **3 marks**

HYDROELECTRICITY : OTHER RENEWABLE FORMS
1 : 12

Add both numbers (1 and 12)
together. This gives us 13

Then, divide the total amount of renewable energy (90 terawatt hours) by
13

$$\frac{90}{13} = 6.92 \text{ terawatt hours}$$

1 mark

2 marks

3d. Write two advantages of using Solar 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 Solar 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. What is an individuals carbon footprint? **2 marks**

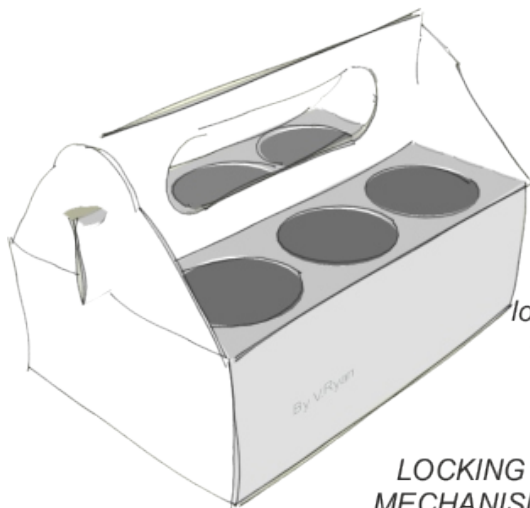
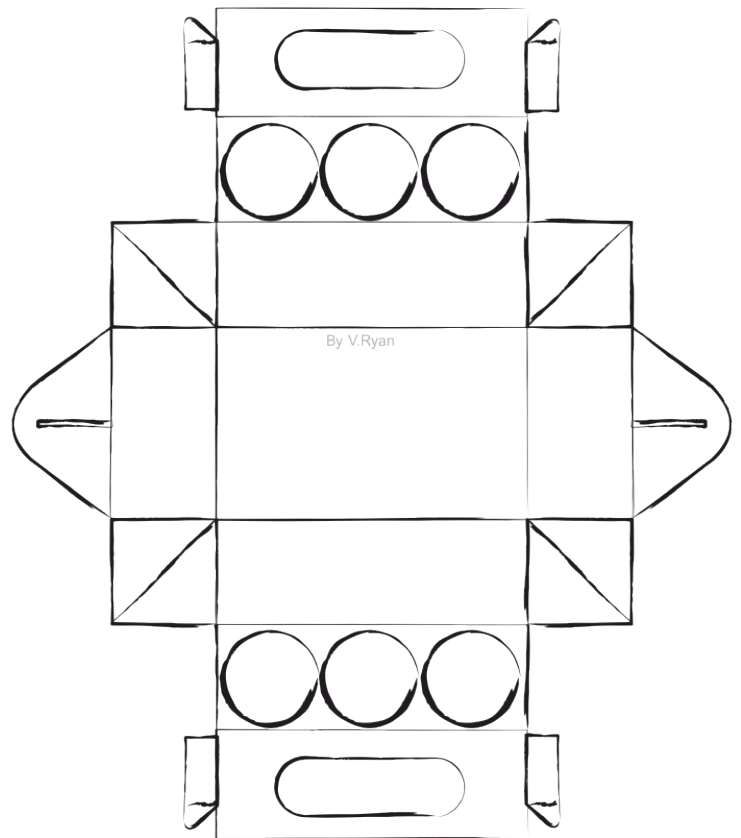
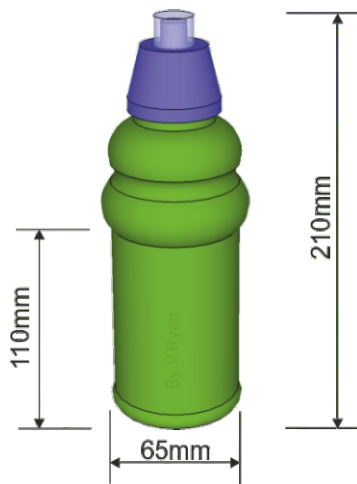
Follow link for possible answer.

1 mark for simple / basic answer

2 marks for reasonable detail (at least two facts)

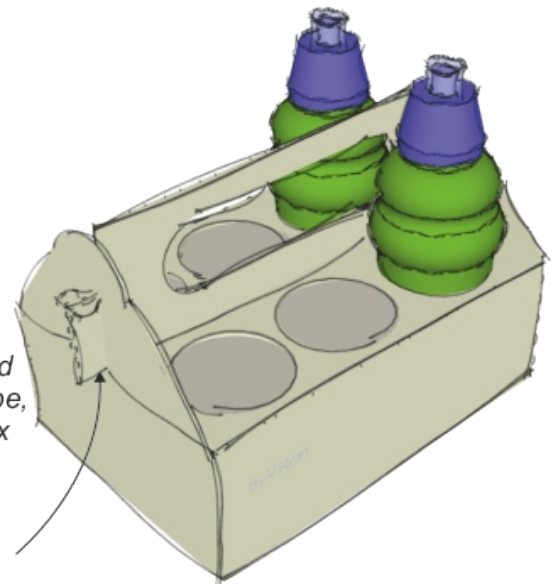
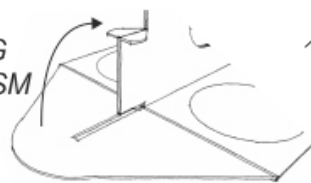
PRODUCT INSERTS

Product 1 - Promotional Packaging for Six Drinks Container (Paper and Boards)



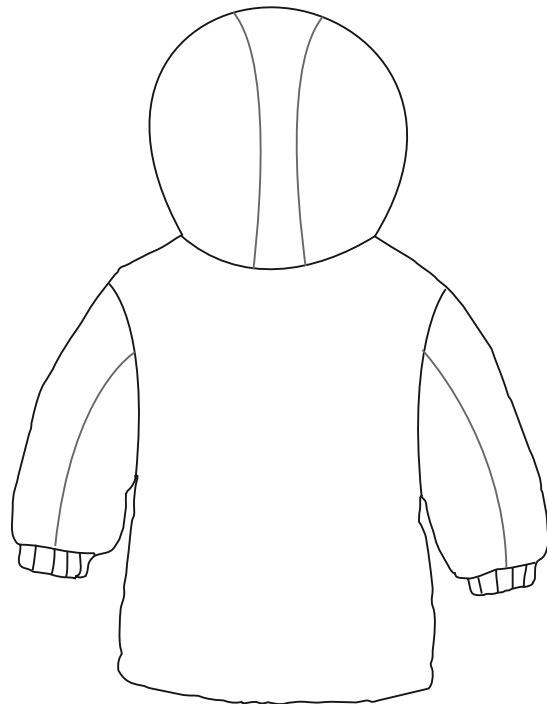
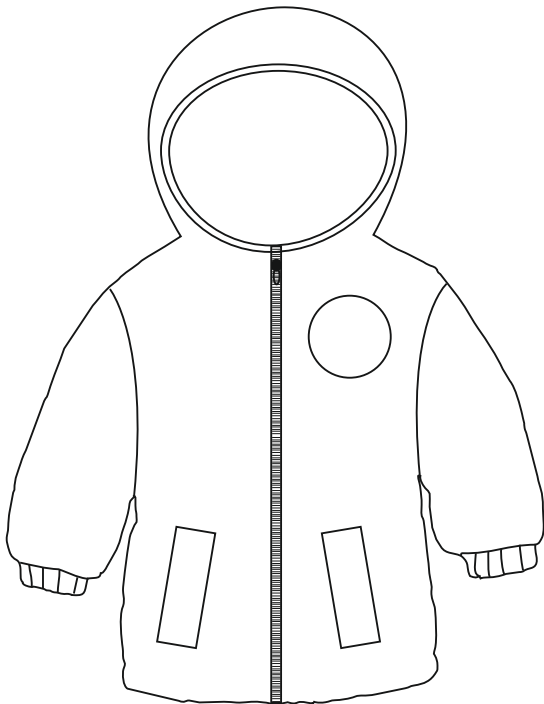
The package folds and locks into a sturdy shape, capable of carrying six drinks containers.

LOCKING MECHANISM



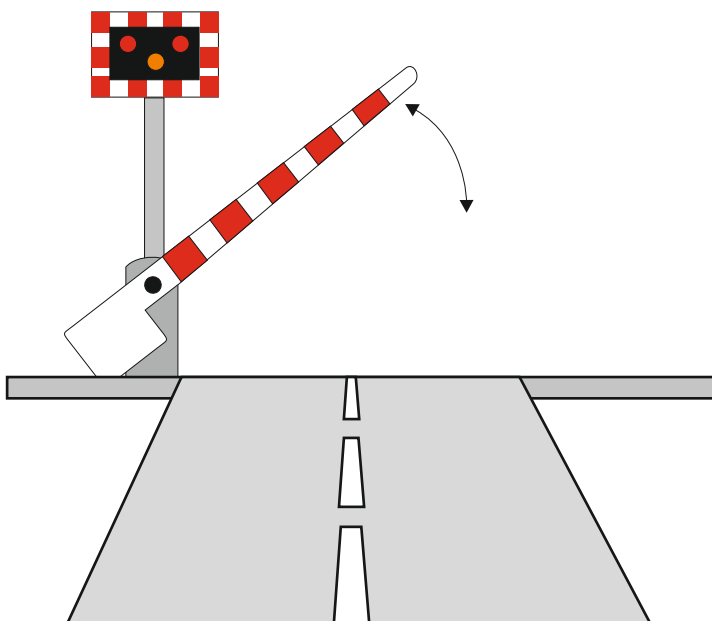
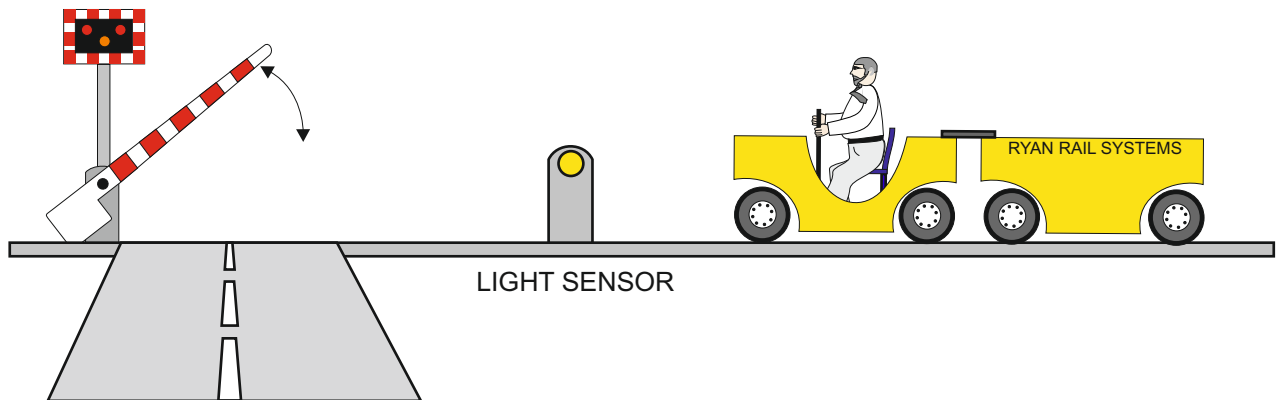
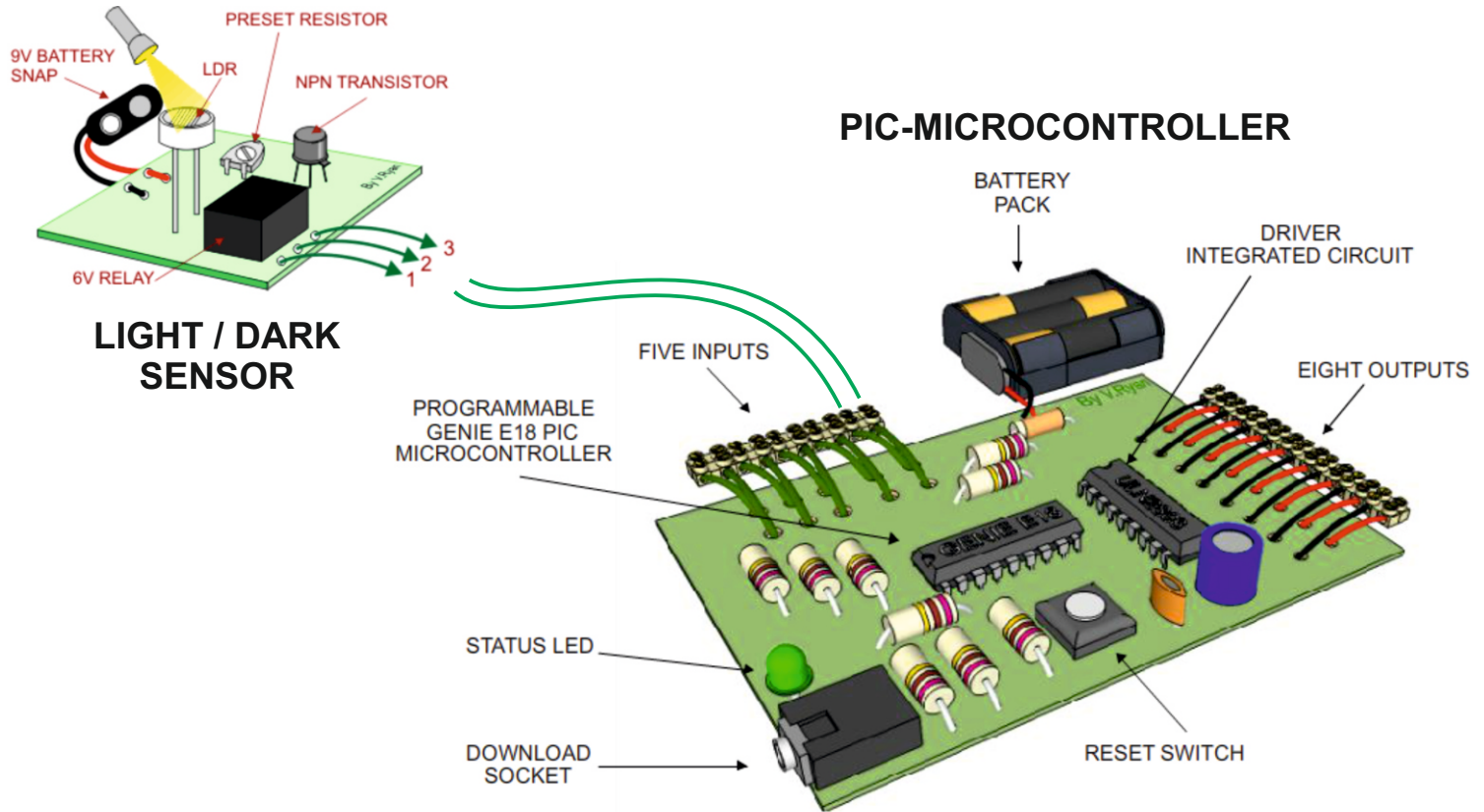
The promotional packaging is manufactured through mass production. It has been designed to be recycled and to be sturdy, capable of withstanding drops and knocks. It carries a maximum of six bottles.

Product 2 - TEXTILES - Children's Coat



A classic insulated unisex children's coat, for winter. The waist and cuffs are elasticated. An easy to use zip allows closing of the coat. Available in a range of sizes and colours. Suitable for everyday wear and ideal for the journey to school. An individual badge can be added, representing clubs and schools.

Product 3 – Model Railway Barrier (Design Engineering)

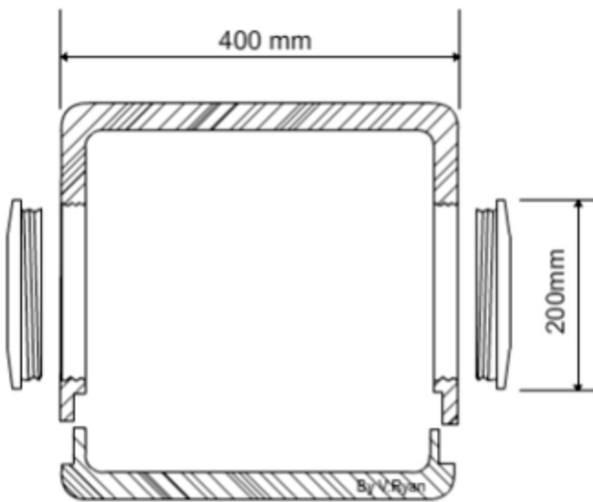
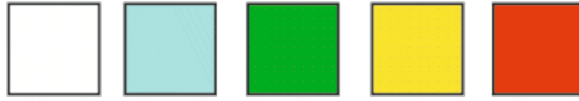


The model barrier is connected to a microcontroller, which has been programmed to monitor a light / dark sensor. It lowers the barrier when it detects a 'train' and lifts it when there is no train.

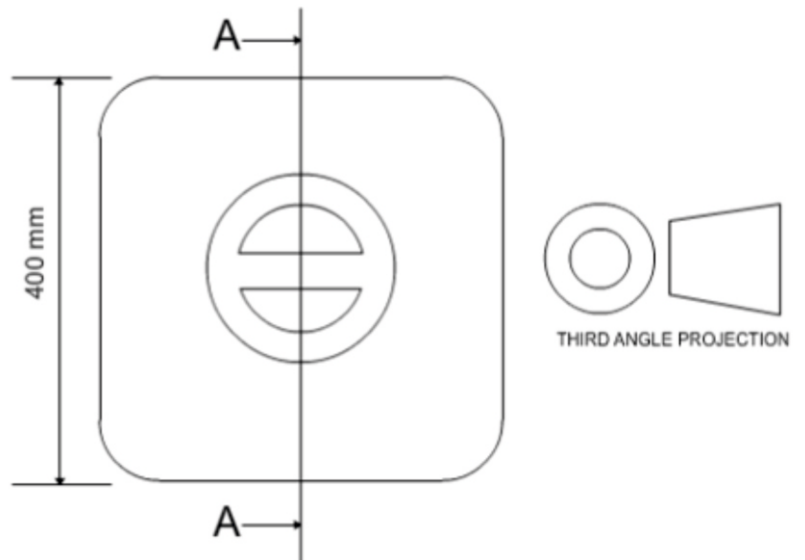
The barrier is manufactured from sheet aluminium.

Product 4 - MP3 Docking Station (polymers)

high density polythene casing, supplied in a variety of colours

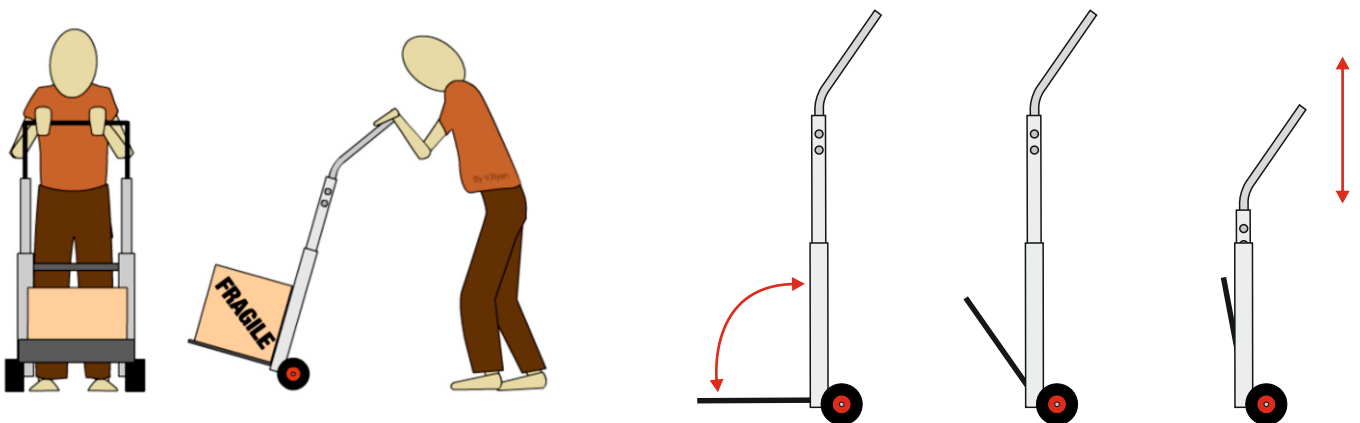
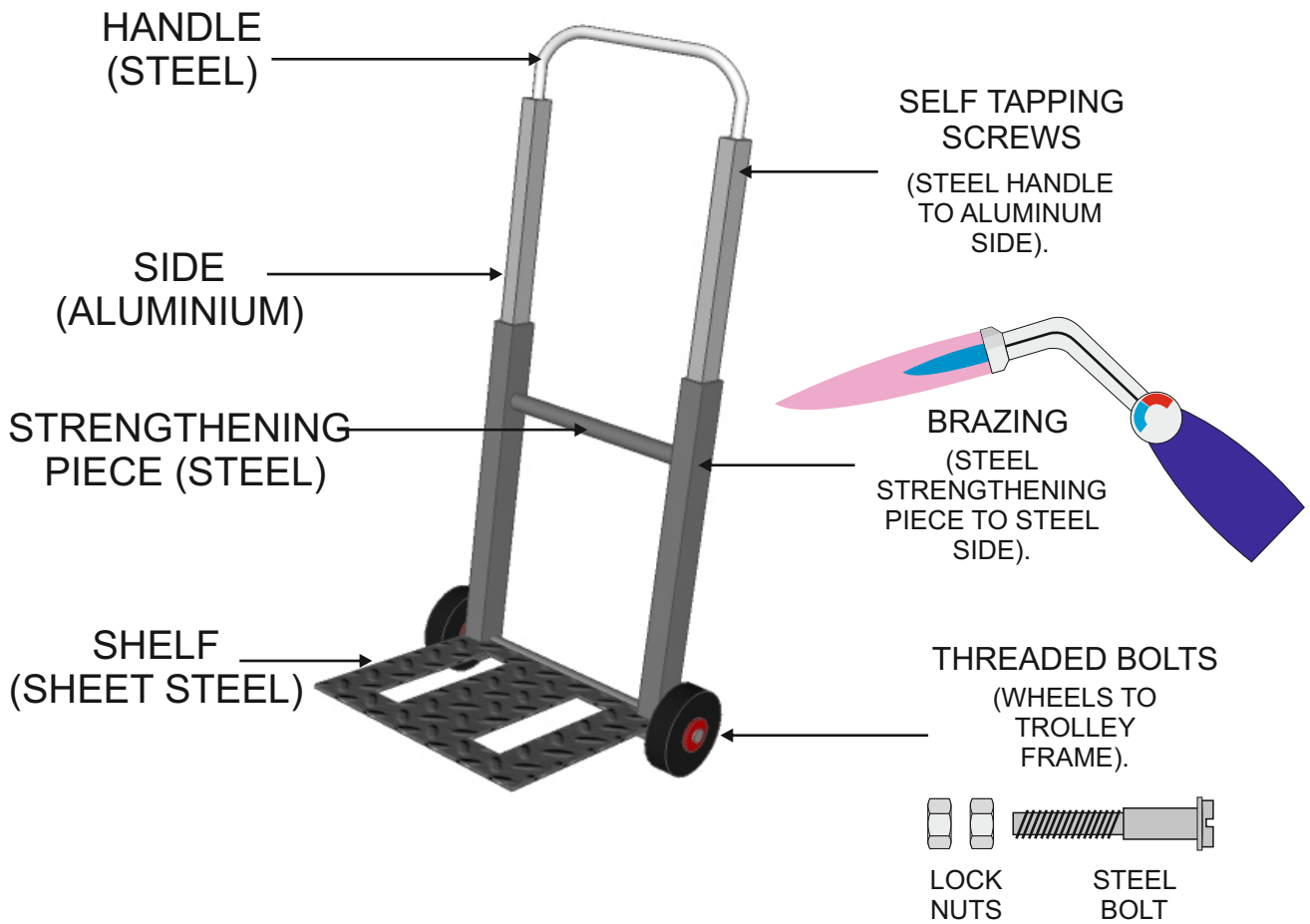


SECTIONAL SIDE ELEVATION



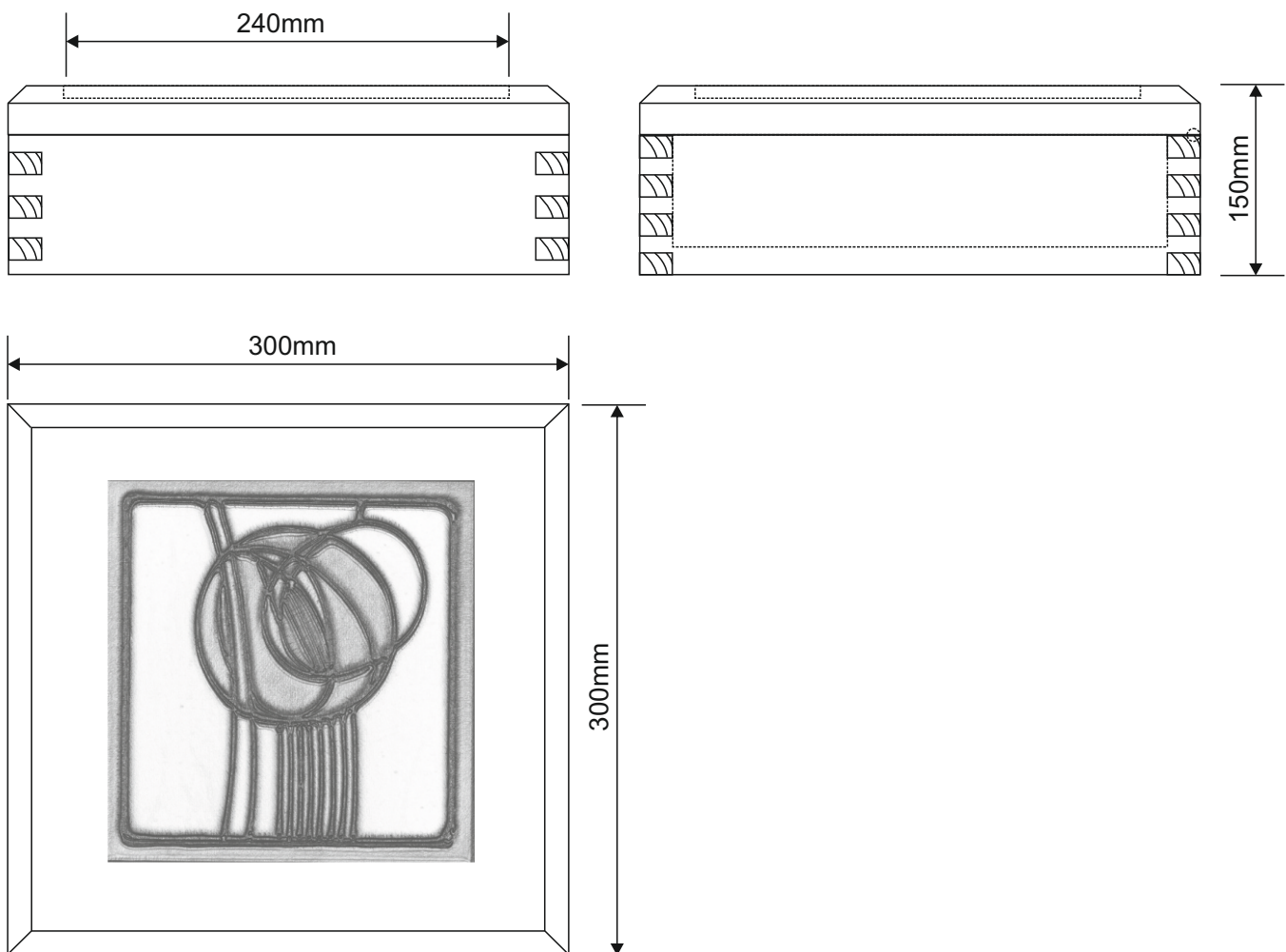
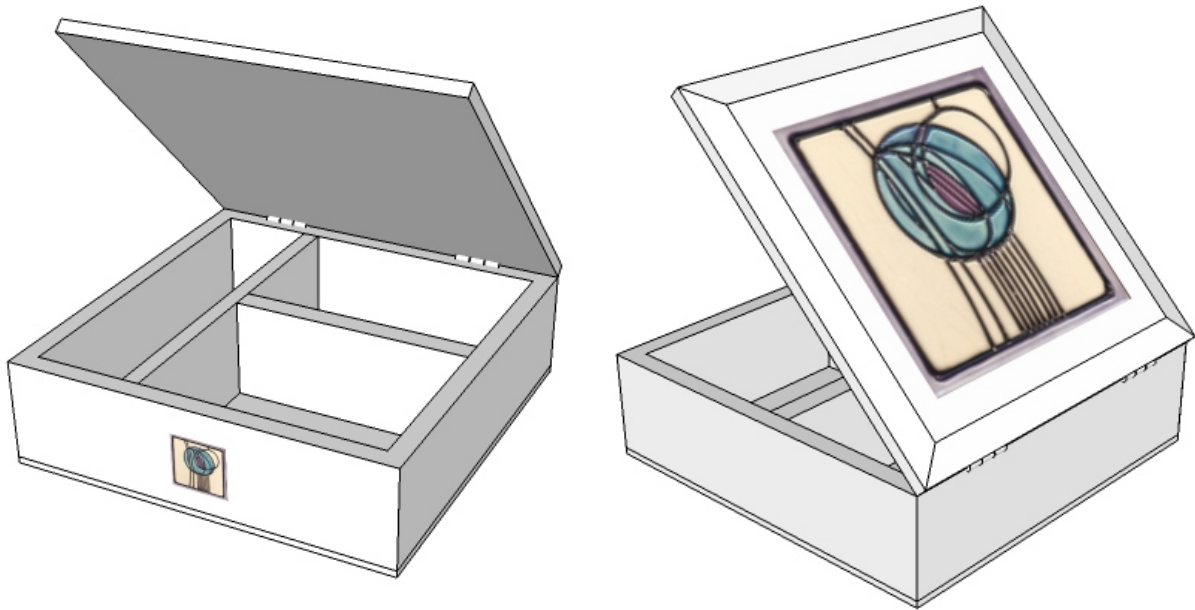
The MP3 player is manufactured from high density polythene. It is supplied in a range of colours and can be plugged into the mains or powered by batteries. It has high quality speakers and is supplied with a remote control.

Product 5 – Mobile Trolley System (metals)



The trolley is lightweight and foldable. It can be transported and also stored. The is manufactured from steel and aluminium tube. The product is designed to be completely recyclable, at the end of its life cycle. It is ideal for use in shops and distribution / storage centres, as well as personal use at home.

Product 6 – Bits and Bobs Storage (timbers)



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 a Charles Rennie Mackintosh style.

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

IMAGE A



IMAGE C



IMAGE C

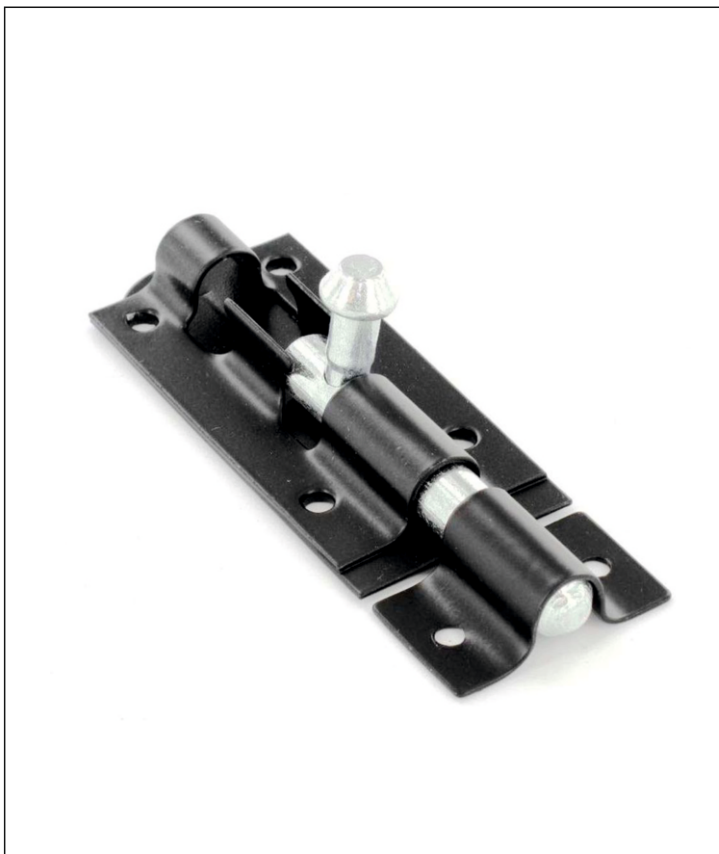


IMAGE D



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/grp08/prnt1.html>

4a. The books shown in Image A, are composed of pages printed through the process called 'Direct Printing'.

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 Direct Printing, as a printing process for small print runs. **1 mark**

Follow link for possible answer.

1 mark for one disadvantage.

HELPFUL LINK <http://www.technologystudent.com/joints/pet1.html>

4c. Image B shows a luminous jacket 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 bolt / latch for a garden gate.

HELPFUL LINK <http://www.technologystudent.com/forcmom/motion2.html>

Name the type of movement (motion) that is represented by the latch / bolt. **1 mark**

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

Describe the movement / motion you have named. **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/rmf1sh1/pine2.html>

4e. Image D shows a stool manufactured from scots pine. Explain why pine 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 - Promotional Packaging for Six Drinks Container (Paper and Boards)
- Product 2 - Children's Coat (TEXTILES)
- Product 3 – Model Railway Barrier (Design Engineering)
- Product 4 - MP3 Docking Station (polymers)
- Product 5 – Mobile Trolley System (metals)
- Product 6 – Bits and Bobs Storage (timbers)

USEFUL LINKS FOR QUESTIONS 5 AND 6

Joining Materials

http://www.technologystudent.com/despro_flsh/mats_join1.html

Wood Based Product

http://www.technologystudent.com/despro_3/trolmanf.html

Metal Based Product

http://www.technologystudent.com/despro_flsh/mats_proj13.html

Polymer Based Product

http://www.technologystudent.com/despro_flsh/mats_proj7.html

Design Engineering / Microcontrollers

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

Finishes for Woods and Metals

http://www.technologystudent.com/despro_flsh/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>

Printing Processes for Paper and Card

http://www.technologystudent.com/despro_flsh/graphics_print1.html

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. One environmental solution, to a product that reaches the end of its useful working life, is 'Upcycling'

What is Upcycling? Include reference to how a product of your choice, could be upcycled 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.

HELPFUL LINKS http://www.technologystudent.com/prddes_2/crowd1.html
http://www.technologystudent.com/prddes_2/rev_crowd1.html

5c. Some Product Design businesses are 'cooperatives'. What is Cooperative?
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/prddes1/advert1.html>

<http://www.technologystudent.com/prddes1/advert2.html>

http://www.technologystudent.com/despro_flsh/revise13.html

<http://www.technologystudent.com/prddes1/ict1.html>

6. Considering the product you chose for question 5:

(a) Product promoting / advertising / marketing, a product can take many forms. Explain / describe one form of 'advertising' that you consider to be ideal, for promoting your selected product. Justify your chosen form of advertising / marketing / product promotion. **4 marks**

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. Smart materials are in wide use, in the modern world around us.

Name a smart material, explain its properties and give practical examples of its use. Include sketches if required.

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.