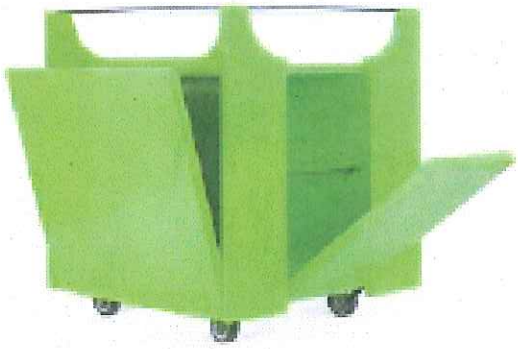
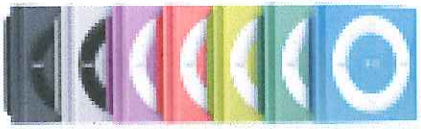
LESMAHAGOW HIGH SCHOOL

NATIONAL 4/5
HOMEWORK

DESIGN AND MANUFACTURE

MATERIALS AND MANUFACTURING





Pupils should use Homework jotter to answer questions .

Pupils should ensure they read the question and observe the marks available, prior to answering questions i.e 4 marks at least 4 points noted.

Pupils must ensure they number questions properly.

1. A selection of plastic trays from the inside of chocolate boxes is shown below.

(*a*) The plastic trays have been manufactured by vacuum forming.

Explain **why** the following features are found on the pattern: **3**

(i) rounded corners;

(ii) tapered edges;

(iii) no internal slopes/curves.

(*Sketches may be used to illustrate your answers.*)

(*b*) The plastic trays are made from a thermoplastic.

Describe the main differences between thermoplastics and thermosetting plastics. **2**

(5)

2. A traditional garden trowel is shown below.

The garden trowel blade is made from stainless steel with the handle made out of wood.

(*a*) (i) State a functional reason for the stainless steel blade **1**

(ii) State two possible methods of joining the handle to the blade i.e. look closely at joint. **2**

(iii) State 1 benefit for the manufacturer of making the product out of a Thermoplastic. **1**

(*b*) State **three** advantages for the consumer of using thermoplastics for this type of product. **3**

(7)

3. The computer desk shown below was supplied as a flat-pack.

(*a*) State **two advantages** to the **consumer** of flat-packed furniture. **2**

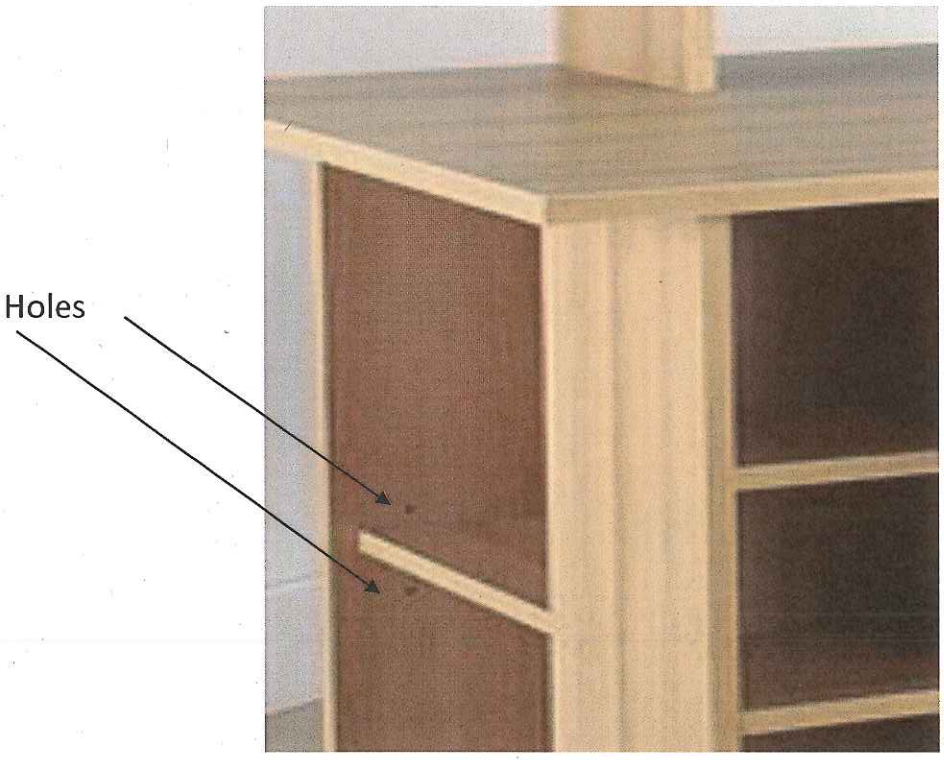
(*b*) State the purpose of the holes identified in the picture below. **1**

(*c*) Knock down fittings are often used in the construction of flat-packed furniture.

Explain the term "knock down fittings". **1**

(d) Explain 2 reasons why manufactured boards are more suitable for the construction of the furniture. **2**

(6)

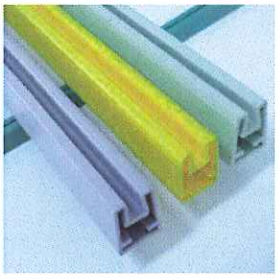


4. Six products are shown below with a list of manufacturing processes.

Match each product or part of product with the most suitable manufacturing process from the list.

Manufacturing Processes

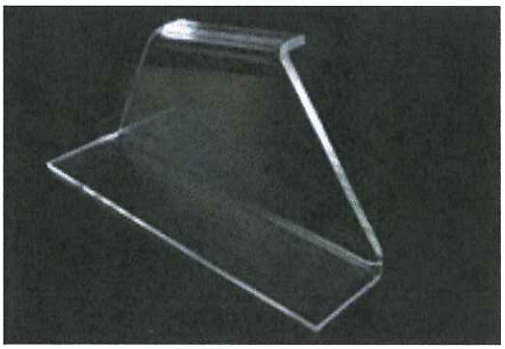
- Soldering
- Wood Turning
- Press-forming
- Extrusion
- Metal turning
- Injection moulding
- Sand casting
- Laminating
- Turning
- Line Bending



A Curtain Rail

B Pine table leg

C. Free weights



D .Thermoplastic book stand

E Metal shafts

F Plastic Cannon (6)

5. I phone 5 , mobile phone.

a) With reference to the above phone, describe the *primary* and *a secondary function*. **2**

(*b*) Describe a technique that could be used to evaluate the *ease of use* of the phone. **2**

(*c*) Describe some *aesthetic* qualities of the phone. **2**

(6)

6.

(a) Explain how to secure a twist drill into this machine . (2)

(b) If the twist drill will not reach work piece explain how to adjust the table on the pillar drill (2)

(c) Name 4 safety precautions which should be followed when using this machine (4)

(d) Explain how to drill 20 mm into a piece of 40mm thick pine. (2)

(10)

7. Children's cutlery is shown below.

During the design of children's cutlery, the designer would consider the following areas:

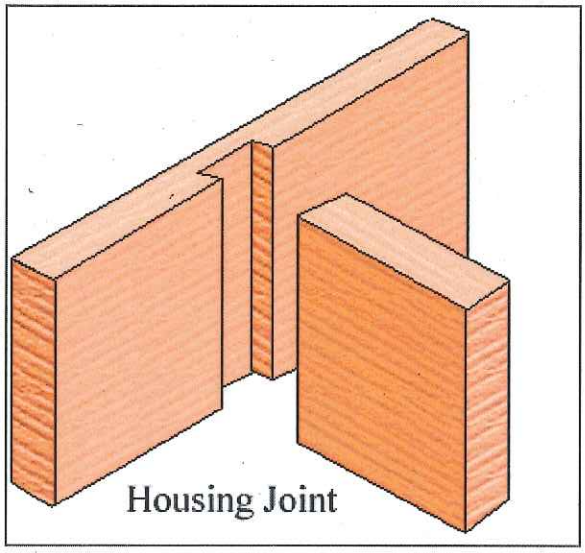
Ergonomics Safety Aesthetics Materials.

Explain why **each** of these areas is important in the design of children's cutlery.

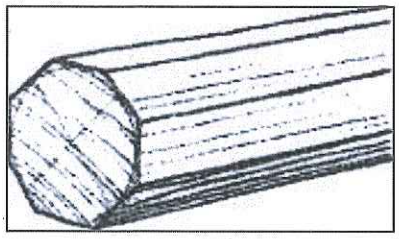
(4)

8. (a) Explain how to mark out and cut a housing joint, you must attempt to include tool names and process steps required . You must attempt to record these in the correct order

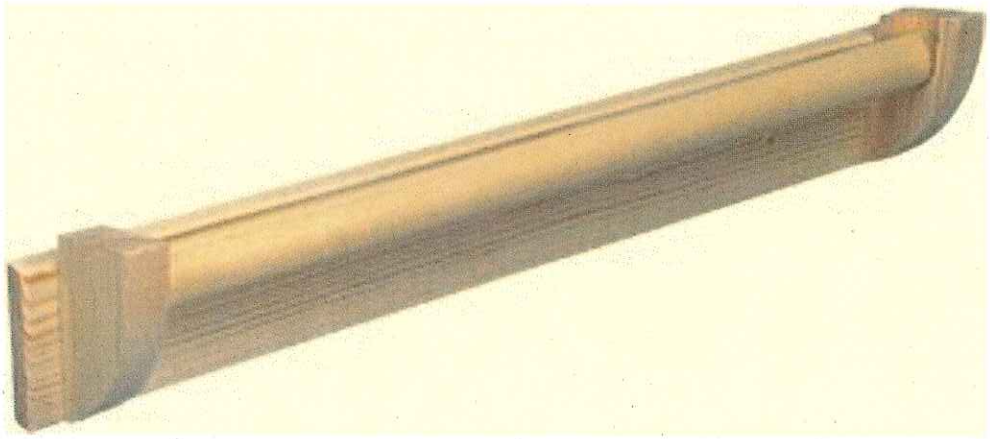
(4)



(b) Explain how to prepare a piece of wood for turning between centres. (4)

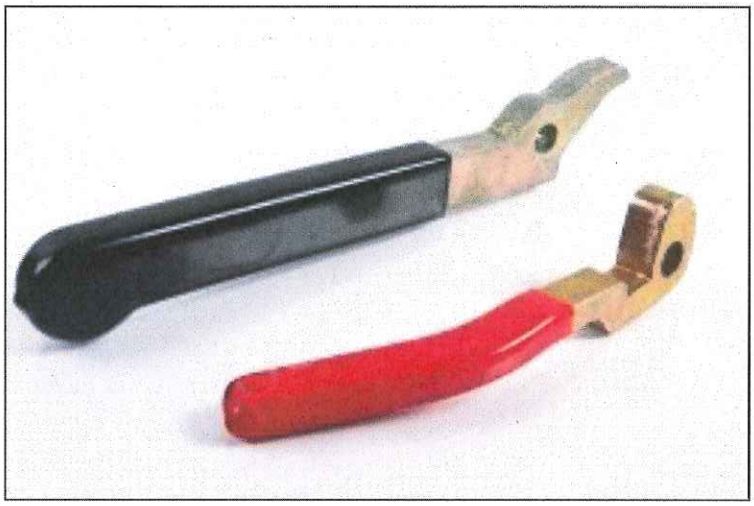


Towel Rail manufactured with housing joints and a piece of turned wood



(8)

9. (a) Explain how to prepare and dip coat the handles for the spanners shown . (4)



(b) If the finish on the plastic after dip coating is dull and gritty explain the cause and how to rework product. (2)

(c) Explain 2 reasons why the handle of the spanner is dip coated (2)

(d) Explain 2 pieces of Anthropometric data the designer may need to consider when designing the handle of the spanner. (2)

(e) Explain functional reasons why the materials chosen to make the spanner is important (2)

(12)

10. A typical classroom chair is shown in the photo below.

(a) (i) State the name of a suitable material for the seat of the chair. (1)

(ii) Give **two** reasons why the material you have stated would be suitable for use in this type of product. (2)

(iii) Explain 2 reasons why tubular steel is suitable for the frame of the chair (2)

(b) State a suitable manufacturing process that could be used to manufacture the seat of the chair. (1)

(c) State 2 functions of the horizontal bars on the chair. (2)

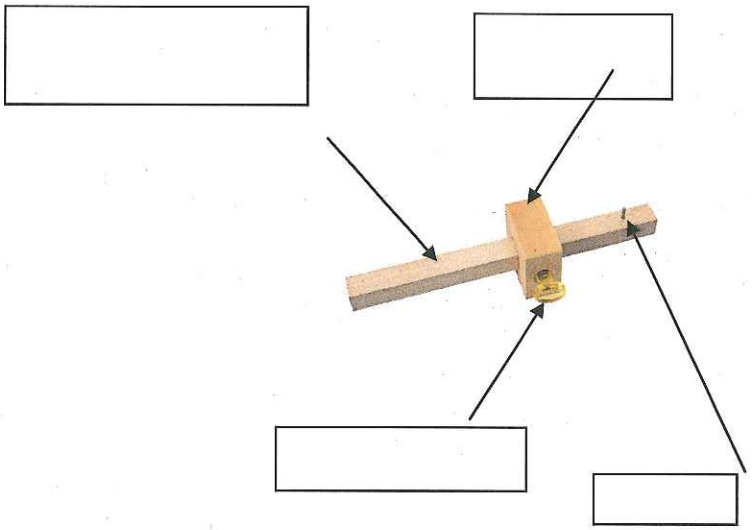
(d) State 4 pieces of Anthropometric data that the designer would need to consider when designing the chair. (4)

(12)

11. Setting Woodworking Tools

(a) Tool Name..... **(1)**

(b) Sketch the tool and name the 4 main parts of this tool **(4)**



(c) Explain how to set up this tool to 16mm. **(3)**

(d) Tool Name ..... **(1)**

(e) Explain how to check this tool is set correctly and how to adjust the angle and depth of blade. **(3)**

(12)

12.

Pupils should write a step by step guide, on how to mark-out and cut the following wood joints.

Pupil can use sketches /text to help .

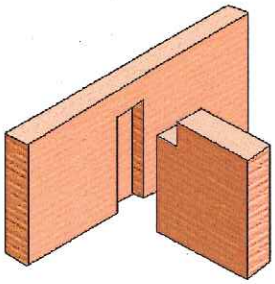
The description must include **tool names** used to mark out and cut the joints

(a) Joint Name..... (1)

(b) Marking out- (2)

(c) Cutting- (3)

(d) Joint Name..... (1)



(e) Marking out- (2)

(f) Cutting- (3)

(12)

13.

A claw hammer is shown below.

(a) State two reasons why the designer has chosen forged alloy steel for the head of the claw hammer. (2)

(b) State two reasons why the designer has chosen GRP for the shaft of the claw hammer. (2)

(c) Describe the appeal of the claw hammer to the consumer. (2)

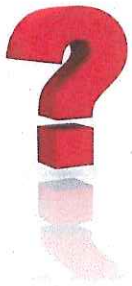
(6)

14. The ability to generate ideas is an important aspect of a designer's work.

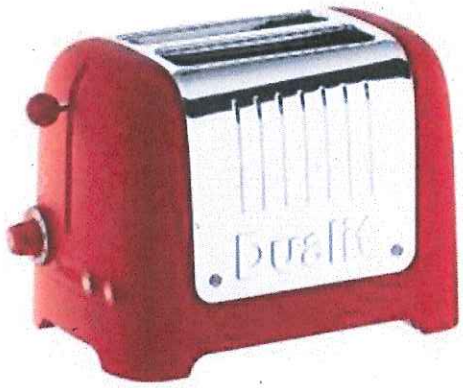
(a) State **two** idea generation techniques. (2)

(*b*) Describe **one** of these techniques. (3)

(5)



15. A toaster is shown below.



The manufacturer wishes to carry out an evaluation of the toaster.

Describe an evaluation technique that could be used for each of the following aspects of the toaster.

(*Note: a different technique must be used for each aspect*.)

(a) Ease of use (1)

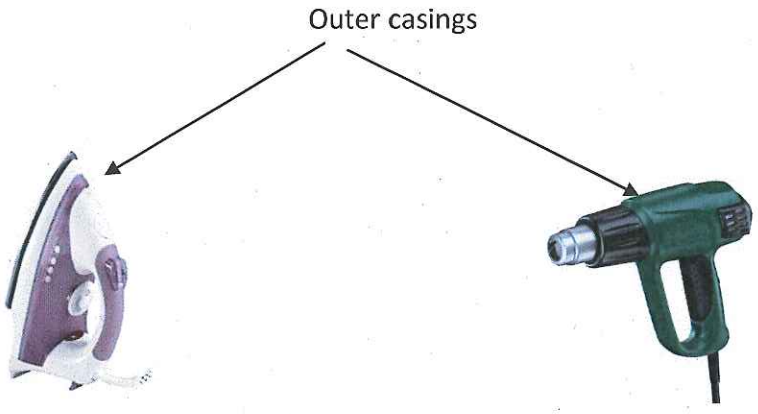
(*b*) Aesthetics (1)

(*c*) Value for money (1)

(*d*) Speed of toasting (1)

(4)

16. The outer casings of the two products show below have been injection moulded.



Domestic iron

Hot air gun

(*a*) (i) State **three** features which would confirm that injection moulding is the manufacturing process used for the outer casings. (3)

(ii) State **two** advantages to the manufacturer of using injection moulding to produce the outer casings. (2)

(*b*) State how the designer could find out the correct sizes for the handles of the two products **without** referring to anthropometric data tables. (1)

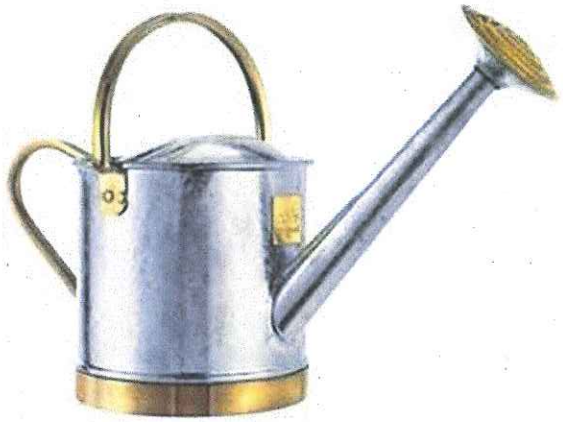
Both products were designed with *planned obsolescence*.

(*c*) (i) State an advantage of planned obsolescence to the manufacturer. (1)

(ii) State **two** reasons why planned obsolescence is harmful to the environment. (2)

(9)

17. A traditional watering can is shown below.



The watering can is made from galvanised mild steel and brass.

(*a*) (i) State a functional reason for galvanising the mild steel. (1)

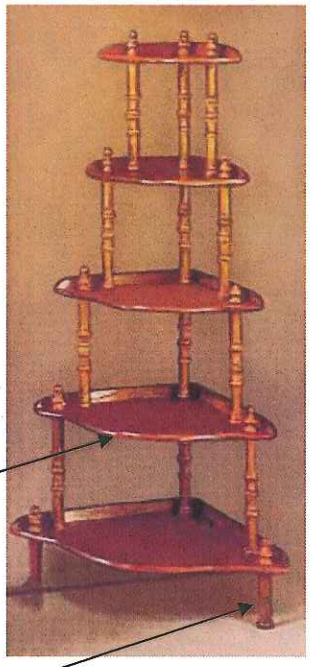
(ii) State **two** suitable methods of joining the handles to the body of the watering can. (2)

Modern styles of watering can are usually manufactured from thermoplastics.

(*b*) State **three** advantages for the consumer of using thermoplastics for this type of product. (3)

(6)

18. The corner-shelving unit shown below is constructed from hardwood and is sold as a flat-pack.



Plan of shelf showing curved shape

(*a*) (i) State the name of a suitable manufacturing process for the spindles. (1)

(ii) Describe a method of joining the spindles to the shelves.

(*Sketches may be used to illustrate your answer.*) (2)

(iii) State the name of a power tool which could have been used to produce the curved shape of the shelves. (1)

(*b*) State **two disadvantages** to the **consumer** of flat-packed furniture. (2)

(*c*) State **two** reasons why using a softwood would be more environmentally friendly than using a hardwood. (2)

(*d*) State the name of **two** suitable finishes that could be applied to the hardwood. (2)

(10)