

# Design and Manufacture

OLHS Technical Department



## N5

# Homework

# N4/N5 Design and Manufacture

## Homework Record Sheet

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## Department of Design, Engineering & Technology



### Policy on expectation for homework returns:

#### Overview:

Homework is an integral part of departmental course work and will help your son/daughter consolidate their understanding outwith the classroom as they reflect on what has been learnt. Completion of the homework set will ensure your son/daughter is fully prepared for class tests prelims, course assignments and exams. Furthermore homework provides the class teacher with accurate data on your son/daughters progress allowing the department to provide effective feedback and targeted support to fully develop your child's learning.

#### Responsibilities of pupils and parent/carers:

To support your son/daughter in developing their learning effectively, the department has produced this homework booklet. This is also available online via the D.E.T. departmental section of the school website.

It is the responsibility of your son/daughter to ensure homework is completed to the required standard within the timeframes set. When specific pieces of homework are given, it is the pupil's responsibility to note down all the relevant details and to produce the work on time. Pupils must inform you of what has been set and we request that all homework is signed by the parent/carer where indicated on the homework being completed.

#### Non-Return of Homework:

It is the pupil's responsibility to raise any matter requiring clarification of homework with their class teacher at the earliest opportunity. Failure to produce homework on time without adequate reason will not only impede pupil progress in the subject but will also result in referral to the Principal Teacher and parental contact. Homework texts will be sent to alert you in the first instance, with a letter to follow for repeated non-returns. The principal teacher will also contact you by telephone if the problem persists.

Pupils who have been absent for a relatively short period of time are required to bring their work up to date by working at home as quickly as can reasonably be expected. Pupils who have been absent for longer periods of time will require special arrangements to be made. Such pupils should contact their class teacher as soon as they return to school.

#### Lost Books:

All pupils will be issued with a homework book at the start of the year. Pupils must look after this book and ensure it is returned when requested.

If the **homework book is lost** pupils will only be issued with a new one where a replacement fee of **£2** is paid.

Mr S. Atkins  
Principal Teacher of Design, Engineering and Technology  
Duncanrig Secondary School

Date to be returned:

Parental Signature:

# Homework 1

1. iPod docking stations are shown below.



Before producing a specification for an iPod docking station the designer would have researched various issues.

With reference to iPod docking stations:

(a) State the name of **four** design issues which would have been researched before deigning the product. (4)

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(b) Explain what would be considered for each of the design issues you have selected. (4)

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Total (8)

# Homework 2

1. Designers will have considered ergonomics when designing the kettle shown below



(a) Describe 3 areas where the designer would consider anthropometric data when designing this kettle. (3)

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(b) We must also consider the ergonomic aspect Physiology.

**Describe** two examples where the designer would have considered physiology when designing this kettle, and **explain** the considerations for each example. (4)

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(c) The third aspect of ergonomics is Psychology. (2)

**Describe** two examples where the designer would have considered psychology when designing this kettle.

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Date to be returned:

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# Homework 3

1. A tin opener is shown below.



(1) The designer wishes to carry out a detailed evaluation on the tin opener.

(a) Describe a suitable technique that could be used to evaluate :

(i) the function of the tin opener .

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2)

(ii) the aesthetics of the tin opener.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2)

(b) Prior to final manufacturing, the tin opener was rapid prototyped on a 3D printer.

Describe **two** benefits to the manufacturer of rapid prototyping the tin opener before manufacture

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (4)

Total (8)

# Homework 4

1. A lawn more is shown.



(1) Describe **two** ways in which the design of the lawn more has been influenced by each of the following ergonomic aspects:

(i) anthropometrics (2)

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(ii) physiology (2)

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(iii) psychology (2)

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(2) Describe **two** safety considerations when designing the lawnmower. (2)

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Date to be returned:

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# Homework 5



(1) (a) Idea generation techniques were used during the design of the dish brush.

(i) State the name of two idea generation techniques that could have been used. (2)

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(ii) Describe how one of your idea generation techniques would be carried out. (2)

(sketches may be used to illustrate your answer)

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(2) During the design of the dish brush modelling techniques were used. (4)

Suggest two modelling techniques and describe the appropriate stages of the design process in which they would be used.

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# Homework 5 continued

(3) A mood board is shown below.



(a) The following open design brief was given to the designer:

*“Design lighting inspired by the art deco design movement.”*

Describe two benefits of an open design brief. (2)

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(b) Designers use a range of graphics techniques throughout the design process.

State one technique that a designer would use at each of the following stages of the design process and explain why it would be suitable.

*(A different graphic technique and explanation must be used for each stage.)*

(i) Initial ideas (2)

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(ii) Planning for manufacture (2)

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Date to be returned:

Parental Signature:

# Homework 6

1. New designs for wireless headphones are shown below.



(a) Describe the aesthetic qualities of the headphones (3)

(you may refer to one, two or all of the headphones shown above)

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(b) Anthropometrics is important in the design of the headphones. (2)

Describe two ways in which the design of the headphones have been influenced by anthropometrics.

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(2) State **two** functional benefits of wireless headphones. (2)

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# Homework 7

Designers used research to improve the design of products such as the coffee pot shown below.



Designers often use research techniques such as user trips and questionnaires to gather different information:

- (a) Outline one piece of information that could be gained about the coffee pot from the research techniques below.

(A different piece of information must be outlined for each technique.)

- (i) a user trip (1)

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- (ii) a questionnaire (1)

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- (b) Describe key stages for how one of the research techniques listed above would have been carried out (3).

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Designers often use a specification when developing a design proposal.

- (c) Describe how a specification could be used during the exploration and refinement stages of the design process.

Exploration: (1)

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Refinement: (1)

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Date to be returned:

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# Homework 7 continued

Models are often used to support generating ideas and developing, exploring and refining ideas.

(i) State the name of two suitable modelling techniques that could be used during the development of the coffee pot. (2)

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(ii) For each modelling technique listed above, explain why a designer would use this technique and how it will support the design of the coffee pot (4)

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2 During the latter stages a prototype was made

Describe why a prototype would be used in the latter stages of the coffee pot (2)

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Total (15)

Date to be returned:

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# Homework 8

A pair of running shoes is shown below.



Engin Sezer/shutterstock.com

(a) The manufacturer wants to carry out an evaluation of the running shoes. Describe how the following aspects of the running shoes could be evaluated.

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

(i) Function.

2

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(ii) Value for money.

2

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## Homework 8 continued

- (b) There is a wide variety of running shoes available to consumers. Designers need to find ways of marketing their running shoes in order to make them stand out from the competition.

Describe two marketing techniques that a design team may use to promote their running shoes. 2

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- (c) A range of graphic techniques was used during the development of the running shoes.

State two types of graphic technique that could have been used during the development of the running shoes. 2

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- (d) During the development of the running shoes a model of the sole was rapid prototyped using a 3D printer.

Describe two benefits to the manufacturer of rapid prototyping. 2

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# Homework 8 continued

(e) Manufacturers often choose to mass produce their products in developing countries.

(i) Describe one benefit to manufacturers of choosing to operate in developing countries. 1

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(ii) Describe two “*social expectations*” that consumers would have of a manufacturer operating in a developing country. 2

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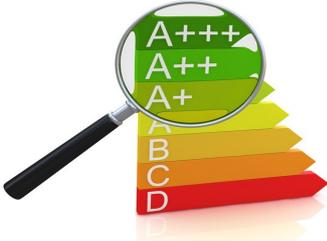
Total (13)

Date to be returned:

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# Homework 9

(1) The environmental impact of a product can often influence our buying decisions.



(a) Designers now have to consider various ways to reduce the environmental impact of their product. Recycling is the most common way to achieve this. Explain what is meant by recycling (1)

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(b) Another method is upcycling. Explain what is meant by upcycling. (1)

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(c) Explain what is meant by the term “material sustainability”. (1)

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(d) State the two advantages of recycling. (2)

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(e) It is important for the environment that everyday objects are both sustainable and recyclable.

Describe how the manufacturers can ensure products are easily sustainable and recyclable. (4)

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## Homework 10

There are a number of members in a design team. Each person will carry out different jobs as required during the design process. For example, the designer designs and develops the solution.

a) With this in mind, describe the role of:

(i) The Engineer

\_\_\_\_\_ 1

(ii) The Accountant

\_\_\_\_\_ 1

(iii) The Client

\_\_\_\_\_ 1

(iv) The Marketing Team

\_\_\_\_\_ 1

(v) The Manufacturer

\_\_\_\_\_ 1

(vi) The Ergonomist

\_\_\_\_\_ 1

When designing a solution the design team will always aim to produce a solution that satisfies the Target market.

b) Describe the term Target Market

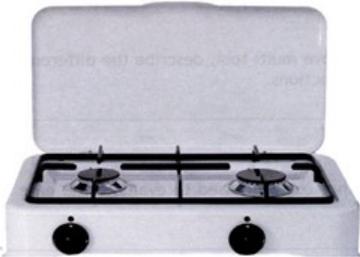
1

\_\_\_\_\_  
\_\_\_\_\_

**Total Mark (7)**

# Homework 11

A portable gas camping stove is shown below.



1. Describe how each of the following issues has influenced the design of the camping stove.

(i) Environment (2)

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(ii) Safety (2)

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(iii) The camping stove could be described as being attractive to a niche market. Explain the term niche market. (3)

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2. The design of products such as the camping stove has evolved over the years because of technology push. Describe what is meant by the term technology push (2)

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# Homework 11 continued

3. Consumer demand may have played a role in the development of the wrap stove.



A) Describe the term consumer demand (2)

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4. To ensure the product meets its market needs it is important that the product performs well. (2)

A) Describe the issues related to performance the designer would have had to have considered when designing the wrap stove.

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Total (13)

# Homework 12



1 (a) State the name of two common hardwoods and list common uses for each. (2)

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(b) State the name of two common softwoods and list common uses for each. (2)

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(c) Describe two benefits of using hardwood instead of softwood. (2)

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(d) Give two benefits of using softwood instead of hardwood. (2)

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(e) Hardboard is a type of manufactured board, state the name of 2 other types of manufactured board. (2)

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(f) Describe 2 benefits of manufactured board over solid wood. (2)

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Date to be returned:

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# Homework 13

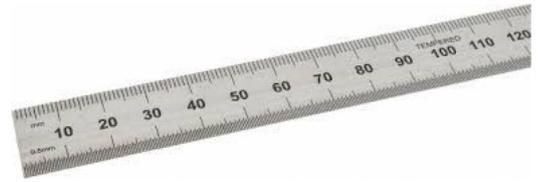
A number of woodworking tools are shown below:



A



B



C

1(a) State the name of the three 'marking out' tools shown in the pictures above (3)

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

(b) Describe the purpose of each of the above tools (3)

A \_\_\_\_\_

\_\_\_\_\_

B \_\_\_\_\_

\_\_\_\_\_

C \_\_\_\_\_

\_\_\_\_\_



A



B



C

2a) State the name of the three 'cutting' tools shown in the pictures above.

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_ (3)

(b) Describe why tool A is better for cutting joints rather than tool B.

\_\_\_\_\_

\_\_\_\_\_ (1)

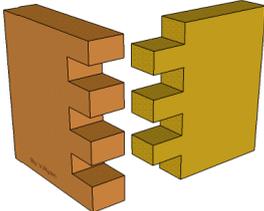
(c) Describe the advantages of using tool C when removing waste from joints.

\_\_\_\_\_

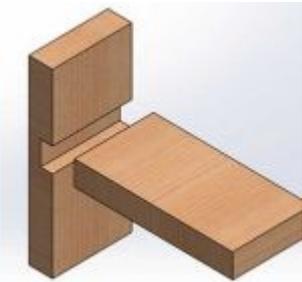
\_\_\_\_\_ (1)

# Homework 14

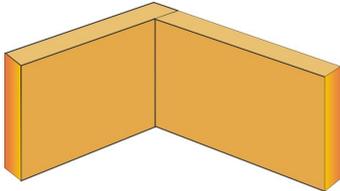
A storage cabinet is shown below



A



B



C

1(a) Various carcass joints could be used to join the top and the side of the cabinet.

State the name of the three woodworking joints shown in the pictures above that could be used in the manufacture of the storage cabinet .

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_ (3)

(b) Describe (**with reference to workshop tools**) how you would make joint B.

*You may include sketches to support your answer. (3)*

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Date to be returned:

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# Homework 14 continued

(c) Describe with reference to workshop tools how you would make joint A.

*You may include sketches to support your answer. (3)*

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(d) Describe why joint C would no be suitable in the corners of the bedside cabinet. (2)

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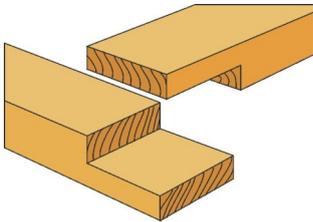
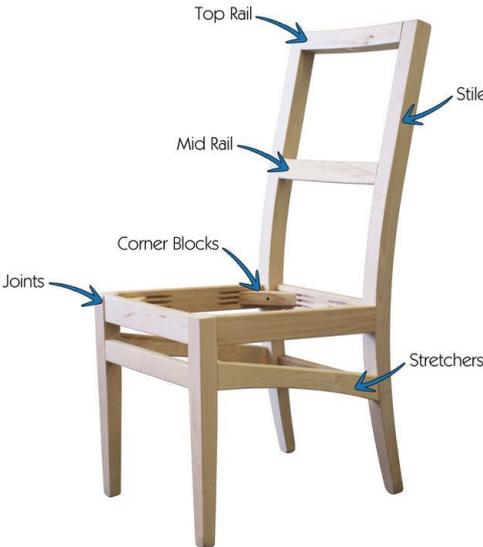
Total (11)

Date to be returned:

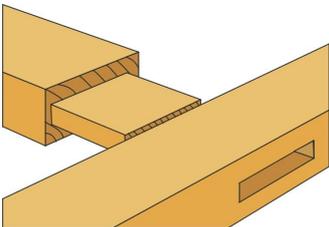
Parental Signature:

# Homework 15

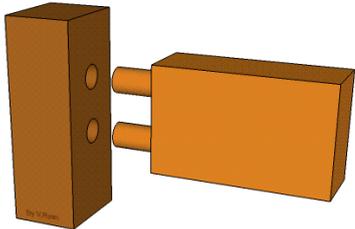
A chair frame is shown below.



A



B



C

2(a) Various frame joints could be used to join the top rail and stile of the chair.

State the name of the three woodworking joints shown in the pictures above.

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_ (3)

(b) Describe **with reference to workshop tools** how you would make joint A.

*You may include sketches to support your answer. (3)*

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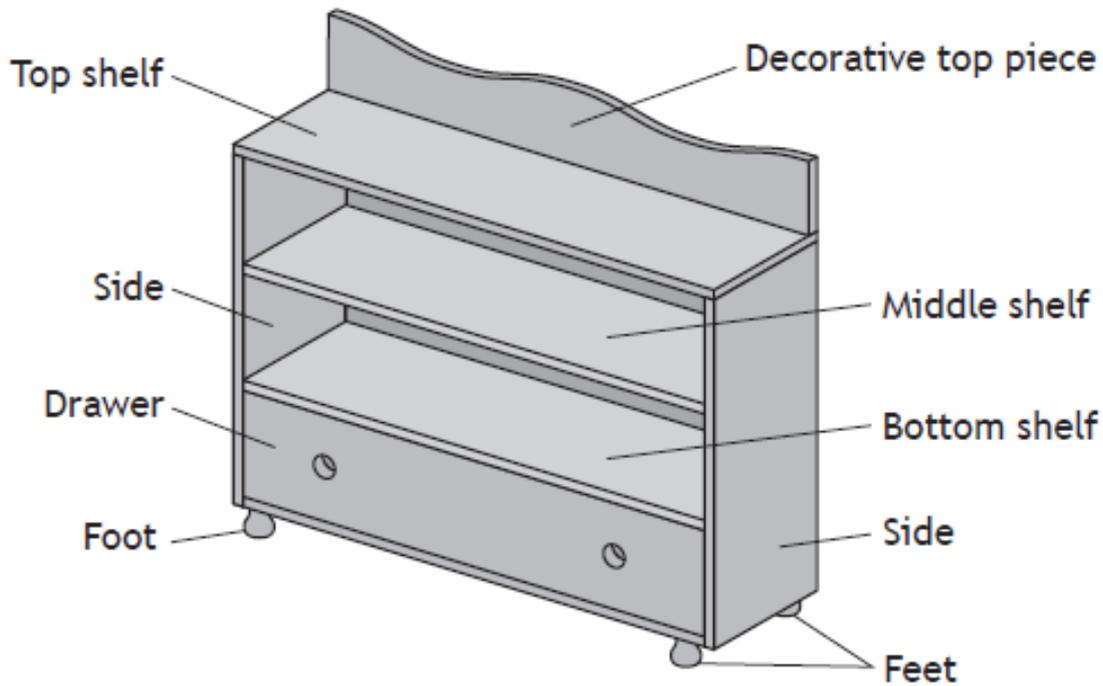


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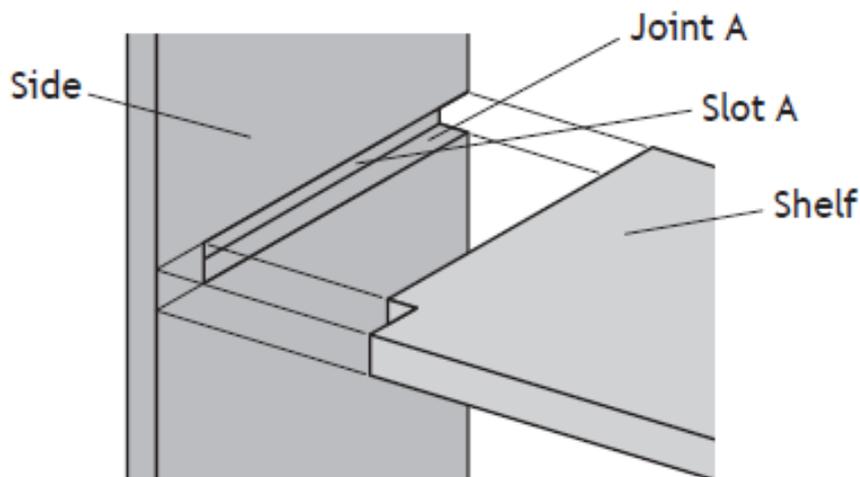


# Homework 16

A shelving unit is shown.



The middle and bottom shelves are attached to the sides of the shelving unit using the joint shown in the diagram below.



(a) Name joint A.

(1)

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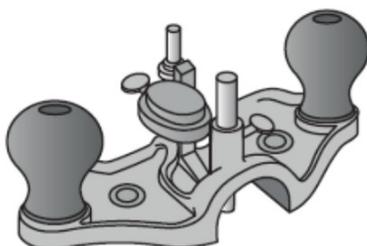
# Homework 16 Continued

Slot A, shown above, is cut using hand tools. The first stage is to mark out the slot. The last stage is to accurately level off the bottom of the slot.

- (b) (i) Describe the three intermediate stages in the table below. The stages must be in the correct order. (3)

1	mark out the slot
2	
3	
4	
5	accurately level off the bottom of the slot

The tool shown below is used to level off the bottom of the slot accurately.



- (ii) Name this tool. (1)

\_\_\_\_\_

The diagram below shows the decorative top piece of the shelving unit. This has to be reproduced many times.



- (c) Name the marking out aid that is used to ensure all the decorative top pieces are marked out identically. (1)

\_\_\_\_\_

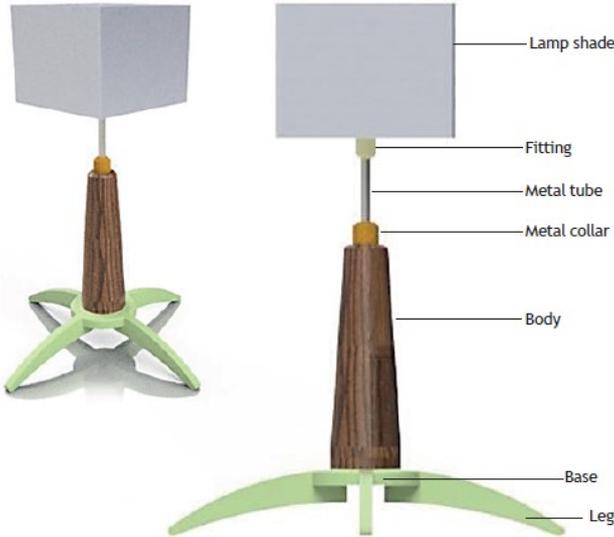
- (d) State the name of the workshop tool that could be used to cut the curve (1)

- (e) Describe why this tool would be suitable for cutting the decorative pattern. (1)

\_\_\_\_\_  
\_\_\_\_\_

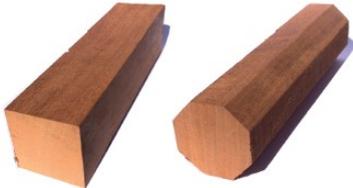
# Homework 17

1. A design proposal for a lamp is shown below.



(a) The body of the lamp was made on the wood turning lathe.

Outline two safety checks that should be carried out on the wood turning lathe prior before the body is manufactured.



1 \_\_\_\_\_

2 \_\_\_\_\_ (2)

(b) Describe the four stages to prepare the blank in preparation for turning. You must refer to workshop tools in your answer. (Sketches may be used to illustrate your answer). (4).

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# Homework 18



1(a) State the name of two common thermoplastics and list common uses for each. (2)

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(b) State the name of two common thermosetting plastics and list common uses for each (2).

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2. A handheld vacuum is shown below



a) State two reasons why polypropylene is a suitable material for the manufacture of the outer casing(2)

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(b) Nylon was used for the bristles. Explain why Nylon was a suitable choice for the bristles. (2)

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Total (8)

# Homework 19



An acrylic stool is shown above

1(a) Acrylic is a thermoplastic. Describe the difference between thermoplastics and thermoset plastics. (2).

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(b) The designer chose to make the stool from acrylic over other thermoplastics.

Describe two disadvantages of using acrylic for the stool.

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(2)

(c) The edges of the plastic had to be prepared .

State the four stages of preparing an acrylic edge.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_ (4)

(d) The stool was manufactured as a 'one off' using workshop techniques.

Describe the equipment and processes required to manufacture the shape of the acrylic seat. (You may include sketches to support your answer).

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(3)

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# Homework 20

A games console is shown below



(a) The console is mass produced. All mass production processes have initial set up costs.

(i) State **two** of the initial set up costs. 2

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(ii) State **one** suitable manufacturing process for the outer casing and justify your answer. 2

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(iii) Describe **two** reasons why ABS is a suitable material for the manufacture of the outer casing. 2

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Total (6)

Date to be returned:

Parental Signature:

# Homework 21

1. Four commercially manufactured products are shown



A



B



C



D

(a) State the name of a suitable commercial manufacturing process used for each product.

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

D \_\_\_\_\_ (4)

(b) Name two identifying features that are visible on each product (8).

A 1 \_\_\_\_\_

2 \_\_\_\_\_

B 1 \_\_\_\_\_

2 \_\_\_\_\_

C 1 \_\_\_\_\_

2 \_\_\_\_\_

D 1 \_\_\_\_\_

2 \_\_\_\_\_

Total (12)

# Homework 22



Metals are often separated into the following two categories, ferrous and non-ferrous:

(a) Explain the difference between ferrous and non-ferrous metals. (2)

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(b) State the name of **two** common non-ferrous metals and list common uses for each. (2)

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(c) State the name of **two** common ferrous metals and list common uses for each. (2)

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(d) Metals are often alloyed. Describe the purpose of creating metal alloys and state the name of an ally. (2)

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Date to be returned:

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# Homework 22 continued



A



B



C

1(a) State the name of the three 'marking out' tools shown in the pictures above.

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_ (3)

(b) Describe the purpose of tool C when marking out on metal.

\_\_\_\_\_

\_\_\_\_\_ (2)



A



B



C

2(a) State the name of the three 'cutting' tools shown in the pictures above.

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_ (3)

(b) Describe the difference between tool A and tool B. (what are they used for?)

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\_\_\_\_\_

\_\_\_\_\_ (2)

# Homework 23

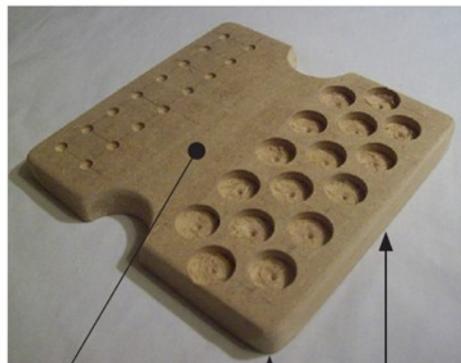
1. A chess box is shown below.



The plastic tray shown below was vacuum formed and is used to hold the chess pieces. The wooden pattern used in the process is also shown.



Plastic tray



Wooden Pattern

Tapered Side

Rounded corner

a) Name a suitable process used for making the plastic tray 1

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b) Explain the reason for the following features in the wooden pattern.

(i) Rounded corners 1

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(ii) Tapered Side 1

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# Homework 23 continued

The aluminium chess pieces shown below were commercially produced by the process of die casting.



2 (i) State **two** reasons for using aluminium for the chess pieces. 2

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ii) State the name of a suitable process used to make the chess pieces 1

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iii) Describe three benefits of using the process you have selected 3

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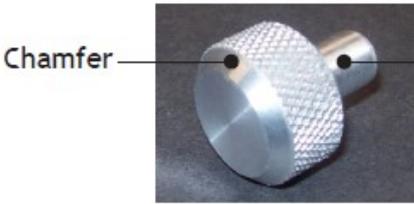
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# Homework 24

1. The aluminium handle below was manufactured using the centre lathe.



Parallel Turned Dowel

(a) Describe how each of the following processes would be carried out on the centre lathe to manufacture the handle.

(i) Chamfering (3)

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(ii) Parallel turning (3)

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iii) Facing off (3)

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## Homework 24 Continued

(b) State three safety rules when operating the centre lathe (3).

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(c) A change of speed may be required when using the centre lathe.

Describe two reasons why a change of speed may be necessary (2)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

D) the following bit was used in the production of a hole at the back the handle to allow ot to be screwed to doors.



i) State the name of this tool.

\_\_\_\_\_ (1)

ii) Describe the purpose of using this tool before drilling. (2)

\_\_\_\_\_

\_\_\_\_\_

# Homework 25

1. The computer desk below was supplied flat-pack.



1(a) Describe two advantages to the consumer of flat- packed furniture. (2)

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(b) Describe two advantages to the manufacturer of flat pack furniture. (2)

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(c) The desk is made from manufactured board. State the name of two possible manufactured boards which could be used for the manufacture of the desk.

1 \_\_\_\_\_  
2 \_\_\_\_\_ (2)

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

Explain the term “knock down fittings” (1)

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d) Knock down fittings can be described as standard components. (2)

Describe the term standard components and describe on advantages of using them.

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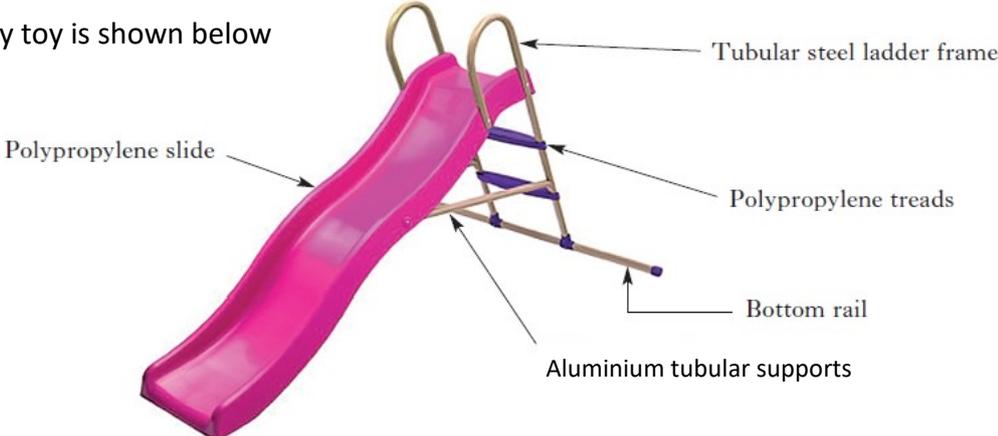
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# Homework 26

A children's activity toy is shown below



(a) State the name of a suitable mass production process used to manufacture the plastic slide.

\_\_\_\_\_ (1)

(b) State two reasons why polypropylene was used in the manufacture of the slide.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (2)

(c) Aluminium tube was used to manufacture the tubular supports.

Describe why aluminium was a suitable choice. (2)

\_\_\_\_\_

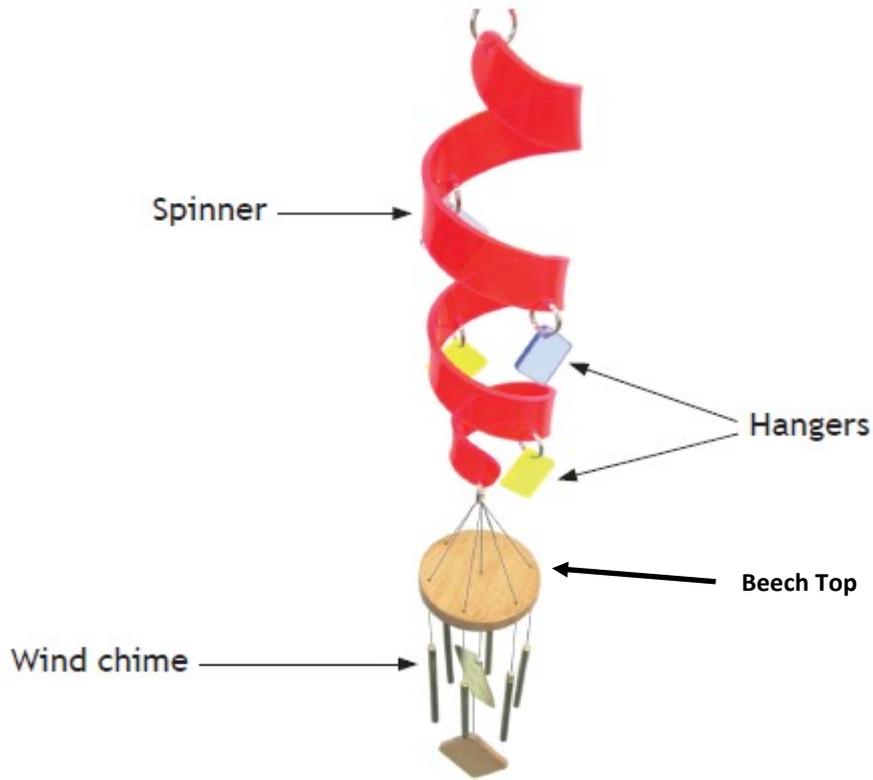
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (2)

# Homework 27

1. A pupil's project for a combined spinner and wind chime is shown below.



A) The strip of thermoplastic was formed into the shape shown below.



Describe how the twists in the thermoplastic strip could be formed. 2

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# Homework 27 continued

2. A hole was drilled in the beech top before it was shaped



- (i) Describe how the position of the central hole could be marked out accurately making reference to workshop tools. 2  
*(You may sketch on the graphic to show your answer.)*

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After Drilling the centre hole the beech top was rounded as shown on the previous page.

- (ii) Describe using correct workshop equipment how the beech top could be rounded. 2  
*(you may use sketches to explain your answer).*

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## Homework 27 continued

After the beech top was rounded five more holes were drilled for the chimes as shown below.



- (iii) Describe using correct workshop equipment how the holes would be drilled in wood.  
(you may use sketches to explain your answer). 2

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**3.** Once completed a finish was applied to the beech top.

- i) Describe how the wood should be prepared for finishing (1).

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- ii) State the name of two suitable finishes for the beech top (2).

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- iii) Describe how one of the finishes chosen previously would be applied to the beech top. (2)

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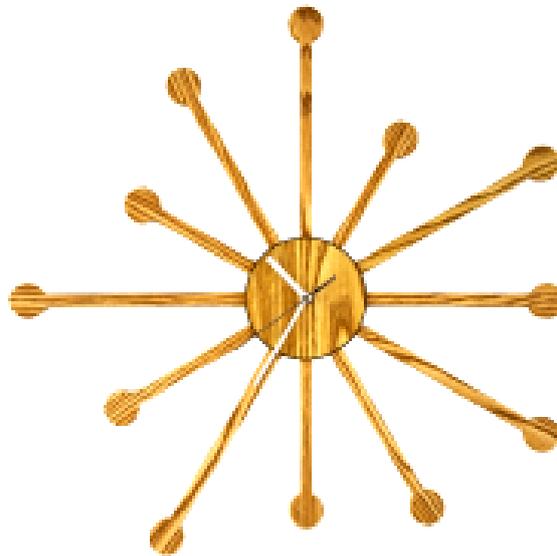
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## Homework 28

Creative use of modern materials and manufacturing methods has made products like this clock easier to produce.



(a) The plywood components of the clock were manufactured using Computer Aided Manufacture (CAM).

(i) State one benefit to the manufacturer of using plywood for the clock. 1

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(ii) State the name of one suitable CAM method for cutting the plywood components of the clock. 1

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(iii) Describe two benefits to the manufacturer of using CAM. 2

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# Homework 29



(a) (i) With reference to the multi-tool, describe the difference between primary function and secondary function. **(2)**

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(2) (ii) Describe two aesthetic qualities of the multi-tool. **(2)**

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(2) (ii) Describe a technique to evaluate the ergonomics of the multi-tool. **(2)**

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(2) Describe an idea generation technique that the designer could have used at the idea generation stage in the design of the multi-tool. **(2)**

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Date to be returned:

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