Candidate 1

SECTION 1 — 60 marks
Attempt ALL questions

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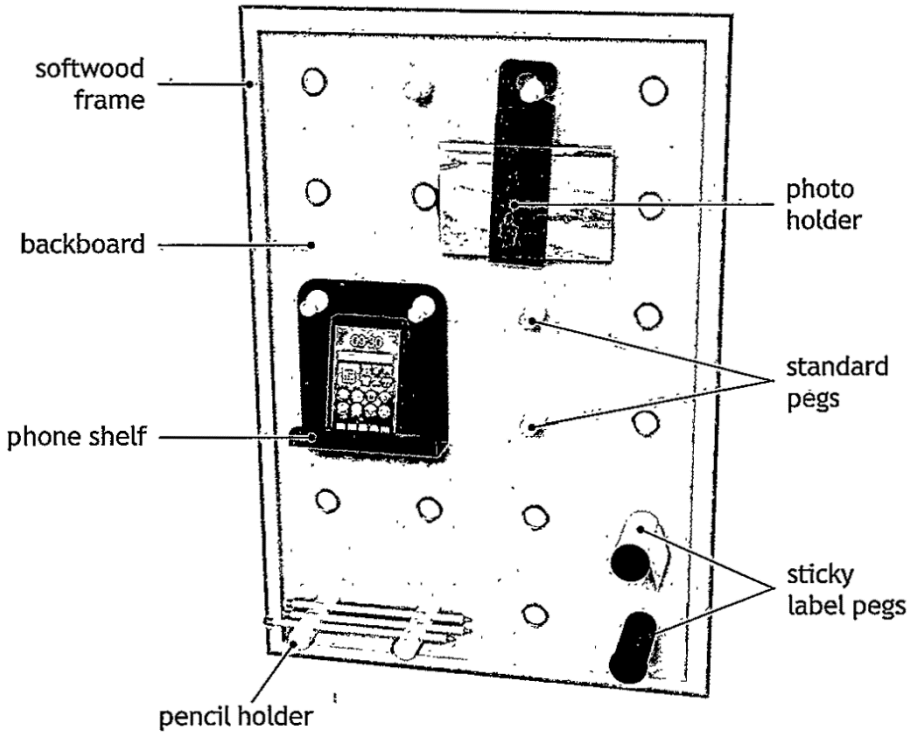
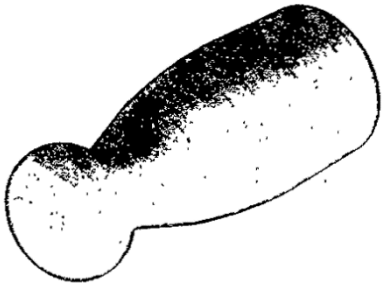
1. A design proposal for a peg board and accessories is shown below.



(a) The standard pegs were made from hardwood.



(i) Name a suitable light coloured hardwood for the standard peg. 1

Beech

or ash

1. (a) (continued)

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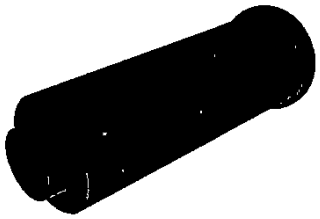
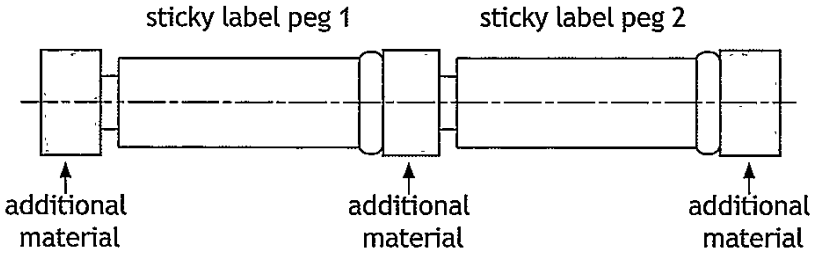
Two sticky label pegs were turned on the wood lathe from a single length of wood.

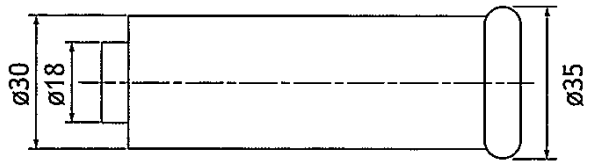




(ii) Outline **two** reasons why additional material is included on the length of wood. 2

- So wood can be held at both ends in the chuck
- So when cutting wood you do not cut the peice turned, you cut waste wood

The sticky label pegs were turned to the sizes shown below.



(iii) Name the lathe process carried out to reduce the diameter from 35 to 30mm. 1

Parallel turning

(iv) Name the hand tool that should be used to check that the diameters are the correct size. 1

Outside callipers

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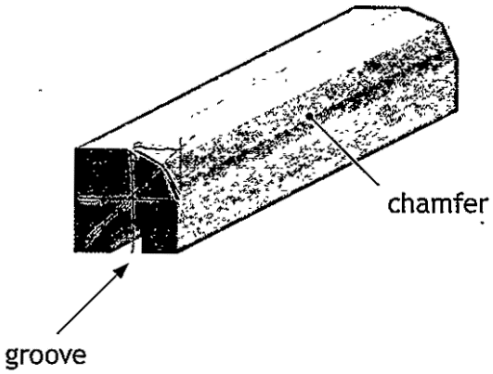
1. (continued)

(b) The four sides of the frame were cut from one length of wood and shaped as shown below.



Complete the sequence of operations shown below by filling in the appropriate process and tools.

(i)

Step	Process	Tools
1	Mark lengths	Try-square, rule, pencil
2	Mark chamfer	Steel rule, try square, pencil
3	Cut groove	Plough plane
4	Cut chamfer	Wood plane
5	Cut lengths	Tenon saw

4

(ii) Explain why Step 4 was carried out before Step 5 in the table above. 1

So the chamfer is even across all peices. Cutting then changering could mean changes aren't even so this way keeps things uniform

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1. (b) (continued)

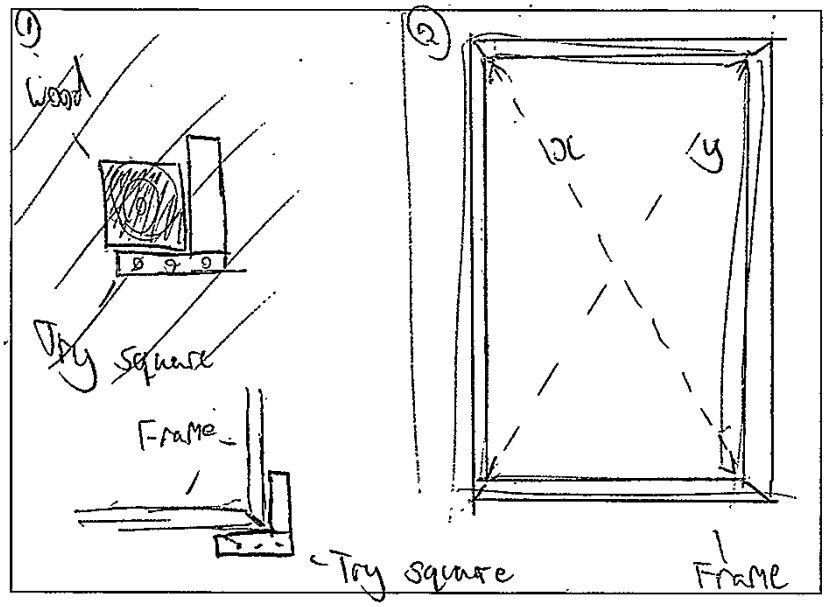
The frame was checked for squareness during assembly.

(iii) Describe **two** methods of checking the frame is square.

You may use sketches to illustrate your answer in the box below. 2

① place try square on corner and push frame against. If frame lines up with both sides of square it is square

② Measure diagonals. If x=y it is square



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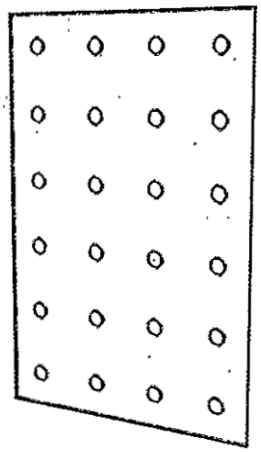
1. **(continued)**

(c) MDF was used to make the backboard.



(i) State **two** reasons why MDF is a suitable choice of material for the backboard. 2

- backboard is large peice. MDF will not warp however normal wood at this size would
- Easy to drill holes into due to no grain

A pillar drill was used to create the holes.

(ii) State **two** safety checks that must be carried out on the pillar drill before use. 2

- Check if the bit is loose (if so tighten)
- Tie long hair back
- ensure gerard is down
- ~~Ensure eye protec~~

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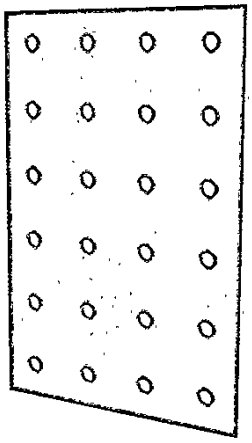
1. (c) (continued)

Grey paint was applied to the surface of the backboard.



(iii) Describe **three** ways to ensure a high quality paint finish. 3

- Ensure that backboard is clear of debris
- Do not use excess paint on brush as this will cause drips
- Use a roller for an even coat
- If using brush ensure there are no loose bristles • Apply multiple coats of paint so colour is clearer • Lay backboard flat so there are no drips

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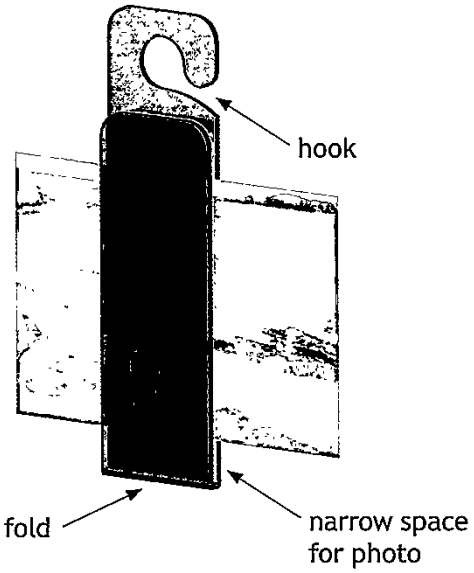
1. (continued)

(d) A photo holder was made from thermoplastic sheet.



The thermoplastic sheet was marked out and folded to securely hold a photo.

Describe how the photo holder would have been folded into shape, with reference to workshop tools and equipment. 2

Sheet • rule used to mark line of fold
• Engineers square used to mark 90° line across plastic
• Strip heater used to heat line of fold
• Place sheet of scrap paper where (dummy photo) where photo goes
• Fold plastic to shape

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1. **(continued)**

(e) The phone shelf was made from copper sheet.

(i) State **two** reasons why copper is a suitable choice of material for the phone shelf. 2

- It is strong so will support the weight of a phone (or tablet if user desires)
- Copper is fairly malleable so will be easy to form to shape

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1. (e) (continued)

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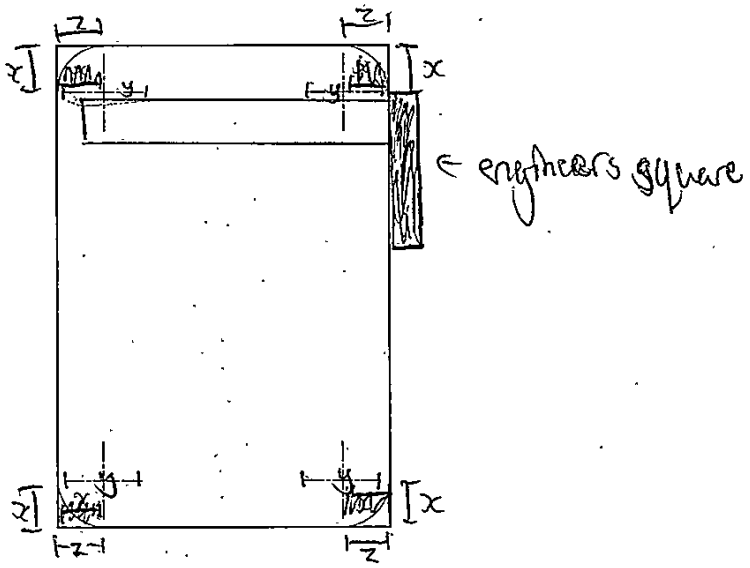
The phone shelf corners were marked out on a sheet of copper as shown below.



← engineers square

(ii) Describe how to mark out the corners, with reference to workshop tools.

You may use sketches to illustrate your answer in the box below. 3

- Steel rule used to find x length depth
- Depth marked with ~~scrap~~ scriber
- Engineers square used to mark y lines along with scriber
- Steel rule used to mark z depth and engineers square to mark the line crossing y

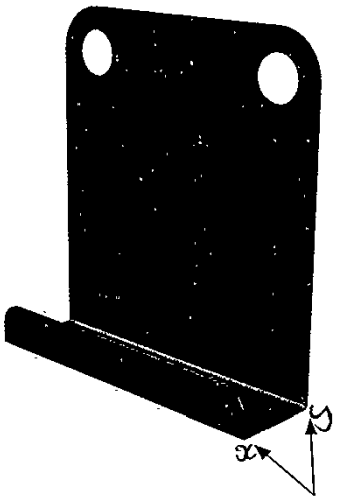
6

MARKS | DO NOT WRITE IN THIS MARGIN

1. (e) (continued)

(iii) Describe how to cut and shape the corners, with reference to workshop tools. 2

- Use junior hacksaw, then after putting metal in vice with vice guards so metal doesn't get damaged, to cut a diagonal.
- Use flat file to file metal down to the curve desired



90° bends

(iv) Describe how to form the 90° bends, with reference to workshop tools. 2

~~Form a bend~~ • Place ~~the~~ metal on a 90° corner so line of bend ~~matches~~ lines up with corner and clamp it

• Use a hide mallet to evenly hit ~~the~~ metal so it bends around corner

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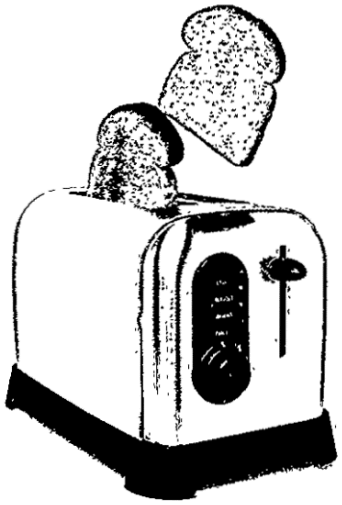
MARKS | DO NOT WRITE IN THIS MARGIN

2. A company that manufactures kitchen appliances wishes to add a toaster to their range.



(a) The designer used a questionnaire to research existing toasters.

(i) Describe the key stages of a questionnaire. 3

- Develop a list of questions about product designer wants answered
- Interview people of target market and record their responses to your questions
- Review answers and use them to develop design / specification

(ii) Name an alternative research technique which the designer may have used. 1

User trials

MARKS | DO NOT WRITE IN THIS MARGIN

2. (continued)

The designer produced a product specification after completing the research.

(b) Explain why a specification is used during the design process. 1

& Used as guidance when developing ideas and a check that ideas are still relevant to brief

The designer used brainstorming as an idea generation technique.

(c) Describe the key stages of brainstorming. 3

- Sit as a group or individual and write think of task • Write down all ideas that come to mind, as whether good or bad • Discuss why ideas are good or bad * • Use good ideas and aspects of bad ones to generate new ideas

* and what makes them that way

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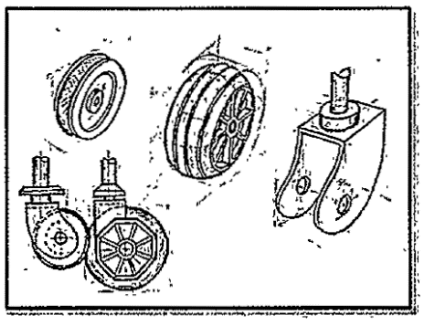
3. A range of graphic techniques were used throughout the design of the trolley wheel shown below.



(a) Sketches were used at the initial ideas stage.

State **two** reasons why this graphic technique is appropriate. **2**

- Easier to do as designs are complex and would be difficult to model or make on CAD
- Cheaper as there is no need to pay for modelling materials
- Initial ideas are meant to be rough and quick to do

(b) During the planning for manufacture stage, the designer would produce working drawings.

State **two** reasons why working drawings are required. **2**

- So manufacturers can see all measurements and materials needed
- So manufacturer can make ~~multiple~~ multiple parts and they will be the same since they are all compared to the same drawing/markings

MARKS | DO NOT WRITE IN THIS MARGIN

4. Models are often used during the design process.

Explain why models may be used during the design process. 3

In order to refine design

- They allow ~~a visual image~~ designers to model and analyse the ergonomics of the design
- They can be shown to clients to give physical impression of what a proposed design will become if manufactured
- Model can also be used to test specific parts of ~~desing~~ design e.g. making a model of bin lid shape to see if it functions properly

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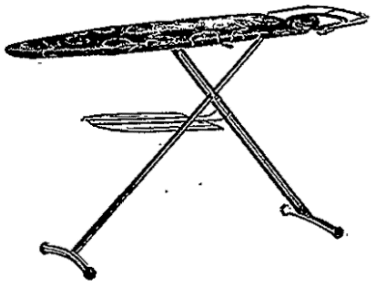
5. An iron and ironing board are shown below.



You must give different examples in (a), (b) and (c).

(a) Describe how ergonomics may have influenced the design of the iron and/or the ironing board. 4

- Circumference of iron handle will have been influenced by anthropometrics and made to fit be able to be held by small hands
- Handle to adjust height of ironing board will be easy to use by weaker hands
- Heights of ironing board will be adjustable so the 5th to 95th percentile of heights are capable of comfortably using the board
- Buttons on iron will be easy to press so weak people can still use them
- Iron will be light enough so that the 5th percentile of strength (weak) can carry and use iron

MARKS | DO NOT WRITE IN THIS MARGIN

5. (continued)

(b) Describe how function may have influenced the design of the iron and/or the ironing board. 2

- Ironing board used to iron shirts, so will have been made so shirts and trousers can sit and trousers
- Ironing board needs to be steady on all surfaces so rubber feet are there so it doesn't slide, and can be on slightly uneven ground and still be stable

(c) Describe how safety may have influenced the design of the iron and/or the ironing board. 2

- Steam can burn so when iron is not being used steam ejection should stop (ie when upright)
- Cable for iron should be heat resistant so if iron accidentally falls on it it doesn't melt and cause damage to electrics

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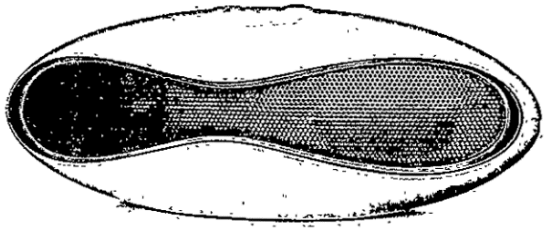
6. A portable speaker is shown below.



(a) Describe **three** aesthetic aspects of the speaker. 3

- Colour of blue colour is bright and eyecatching, drawing customers to look at it
- Unusual shape of speaker like is eye catching as its quirky and different to conventional speakers
- Round inner shape is in harmony with round casing of speaker

The company developing the speaker has a strong brand image.

(b) Explain **two** benefits of a strong brand image. 2

- Customers trust the brand already as it is established so will buy their products with less scrutiny
- Customers may be loyal to your brand and chose to buy all the new products

Marketing techniques can be used to influence sales.

(c) Name **two** marketing techniques that the company could use to promote the speaker. 2

- Celebrity endorsement
- Television Adverts.

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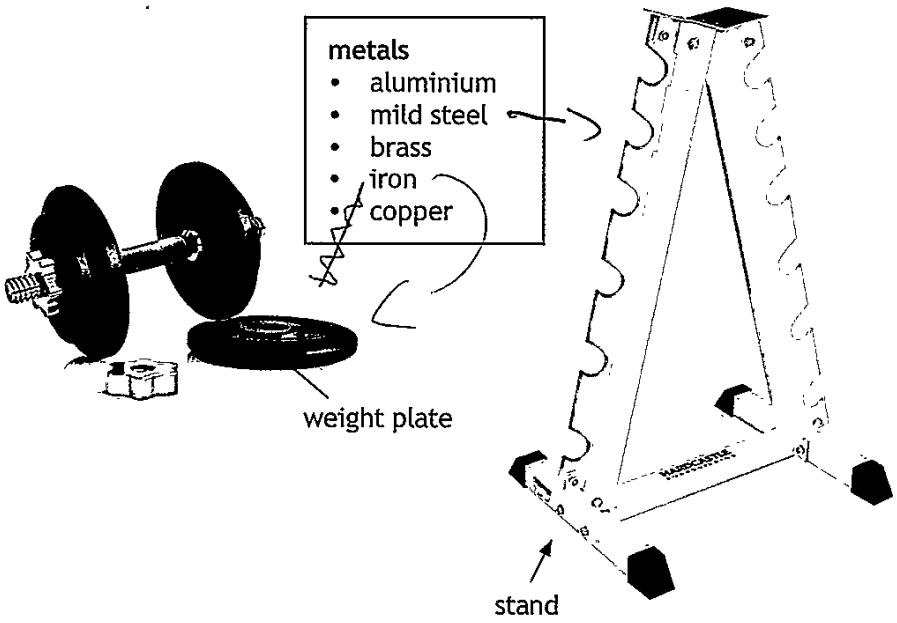
SECTION 2 — 20 marks

Attempt ALL questions

7. The dumbbell and stand shown below have been produced using a range of metals and processes.



(a) Select appropriate metals for the weight plate and stand from the list provided **and** explain why they would be suitable.

You must give a different metal and explanation for each item.

(i) Weight plate. 2

Metal Iron

Suitable because It is heavy and strong

(ii) Stand. 2

Metal Mild steel

Suitable because Stronger than iron and is able to be put under stress which it needs to be since it holds weights

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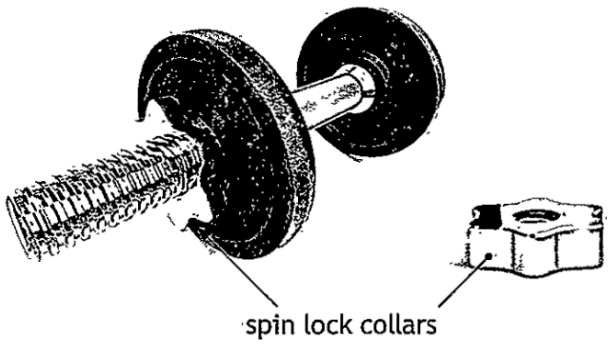
7. (continued)

(b) The weight plates have been sand cast.

Describe **two** identifying features that would show the weight plates have been sand cast. **2**

- Runner and fibre marks & where they have been filed away
- Lack of detail as the sand cannot be sand cast cannot show intricate details

(c) The spin lock collars have been die cast.



Explain why die casting was used to manufacture the spin lock collars. **2**

- So they are all the same size so will fit the screw
- Easier to die cast than sand cast then create thread because that takes a long time and can sometimes lead to drunken threads

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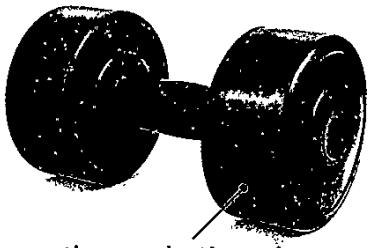
7. (continued)

(d) A concrete filled dumbbell is shown below.



Name a suitable process to manufacture the thermoplastic casing of the dumbbell **and** explain why it is suitable. 2

Process Rotational Moulding

Suitable because Creates a hollow shape which can then be filled with concrete

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8. Many products are mass manufactured.

(a) Describe the impact of mass manufacturing on society. 3

• Products are cheaper for consumers than because they are made on such a large scale which is good. • A product may be mass manufactured and then be unsuccessful so it will be dumped or sold cheap: dumping causes damage to environment but cheap means customers save money. • Practical jobs in mass manufacturing are trivial and often machines replace people so these are fewer jobs

Not all products are mass manufactured.

(b) Explain why some products are not suitable for mass manufacture. 1

Some products are custom ordered so the consumer designs a product. This means since each design is different they cannot be made en mass

9. Manufacturers often use standard components in the production of products.

Outline the possible benefits of using standard components. 2

• They are cheaper as manufacturers do not need to spend time making them and the company making them produces them en mass • More reliable as the producer only makes that component • They can be used in multiple designs as their size is constant

MARKS | DO NOT WRITE IN THIS MARGIN

10. Manufacturers have a responsibility to reduce the damage they cause to the environment.

Outline the steps that a manufacturer could take to reduce their impact on the environment. 4

• Ensure factory waste is recycled or disposed of in safe ways • Use a renewable energy electricity supplier and/or install renewable energy on their sites • Ensure resources for products come from sustainable sources (eg wood from sustainable forests). • Make their products easy to ~~recycle~~ recycle • Make products last longer to reduce one-time-use wastage • Encourage and educate communities on how to recycle and be eco friendly • Make it clear on their products how to recycle them.

[END OF QUESTION PAPER]