OCR
RECOGNISING ACHIEVEMENT

SPECIMEN

General Certificate of Secondary Education

A564

Design and Technology
Resistant Materials

Unit A564: Technical aspects of designing and making

Specimen Paper

Time: 1 hour 15 minutes

Candidates answer on the question paper.
Additional materials:

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do not write in the bar codes.
- Do not write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is **60**.

FOR EXAMINER'S USE	
1	
2	
3	
4	
5	
TOTAL	

This document consists of **12** printed pages.

  [Turn over

Section A

Answer **all** questions.

1 Fig. 1 shows views of a self-assembly table made from manufactured board.

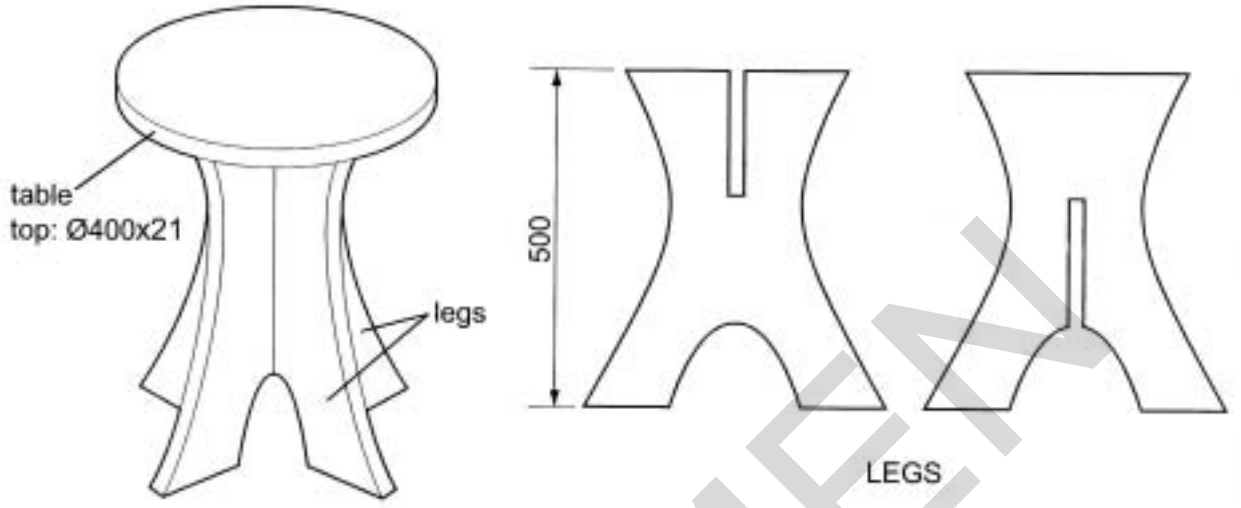

Fig.1

(a) **(i)** Name a suitable manufactured board for the table.

..... **[1]**

(ii) Give **two** advantages of using a manufactured board rather than solid wood for the table.

1 ..... **[1]**

2 ..... **[1]**

(b) The legs are to be attached to the top by means of knock-down (K-D) fittings.

Use sketches and notes to show how **one** K-D fitting could be used to attach a leg to the top.

[2]

Name the K-D fitting. **[1]**

(c) The self-assembly table will be sold without a finish.

(i) Give **two** reasons why the manufacturer has not applied a finish to the table.

1 ..... **[1]**

2 ..... **[1]**

(ii) Give **one** reason why it would be an advantage to apply a finish to the table before it is assembled.

..... **[1]**

(d) The circular table top would be cut from a square piece of manufactured board.

(i) Name **one** portable power tool that could be used to cut out the shape.

..... **[1]**

(ii) Give **two** safety precautions you would need to take when cutting out the shape using the portable power tool.

1 ..... **[1]**

2 ..... **[1]**

[Total: 12]

2 Fig.2 shows views of a free-standing clock.

The clock is made from two separate pieces of acrylic.

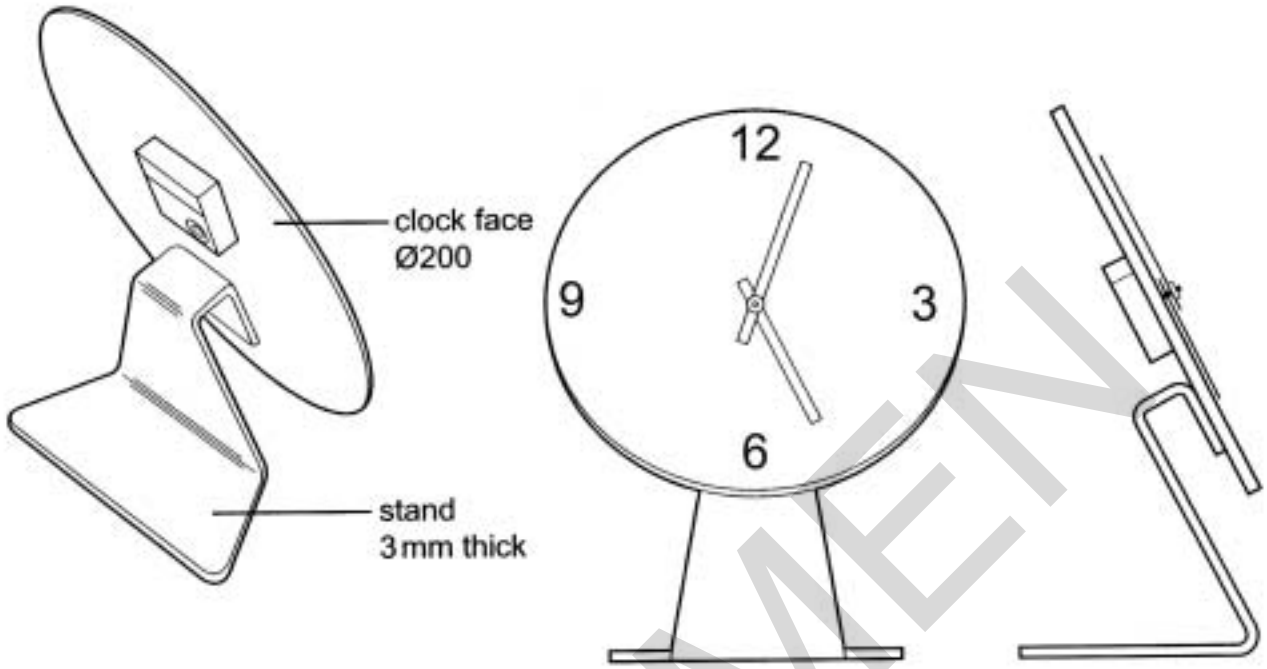

Fig.2

(a) The table below shows some of the tools and items of equipment used to make the clock.

Complete the table by stating the purpose of each tool or item of equipment used when making the clock.

Tool / item of equipment	*Purpose*	
Marker pen		**[1]**
Coping saw		**[1]**
Line bender / strip heater		**[1]**
Wet and dry paper		**[1]**
Tensol cement		**[1]**

(b) State **two** properties of acrylic that make it suitable for this clock.

1..... **[1]**

2..... **[1]**

(c) Give **two** reasons why a designer would construct a prototype model of the clock before making it from acrylic.

1..... **[1]**

2..... **[1]**

(d) The numbers on the clock will be produced using CAM.

Give **three** stages in producing the numbers using CAM.

1..... **[1]**

2..... **[1]**

3..... **[1]**

[Total: 12]

3 Fig.3 shows a wall-mounted shelf unit.

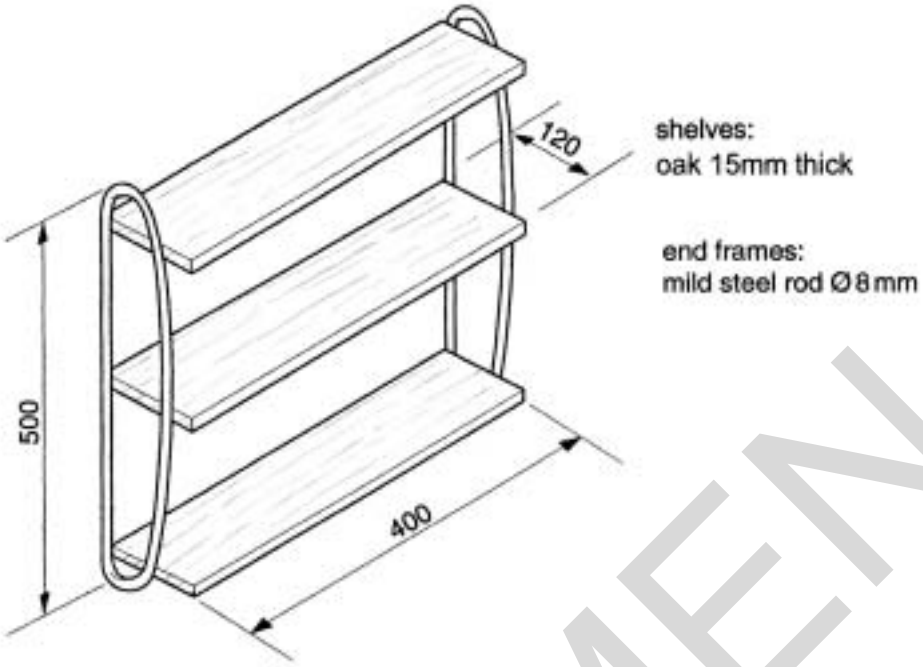

Fig.3

(a) Many shelf units are made entirely from wood. Explain why the designer has used two different materials for the wall-mounted shelf unit shown in Fig. 3.

.....

.....

..... **[2]**

(b) Fig. 4 shows a wooden former around which a length of mild steel rod could be bent to the shape of the end frame. The former is fixed to a baseboard.

Add sketches and notes to Fig. 4 to show how the mild steel could be held in place while it is bent to shape around the former.

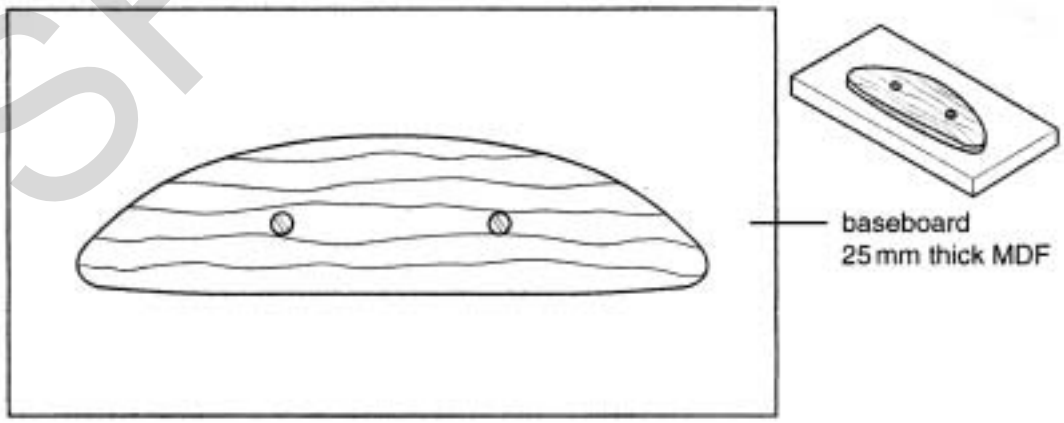

Fig.4

[3]

(c) The oak shelves will be finished with polyurethane varnish.

Complete the table below by describing **three** processes that would need to be carried out before applying a final coat of polyurethane varnish to the shelves.

Stage	*Process*	
1		**[1]**
2		**[1]**
3		**[1]**
4	Apply final coat of polyurethane varnish	

(d) Use sketches and notes to show how the mild steel end frames could be fixed to the shelves. Your solution must be capable of being taken apart.

Modifications may be made to the end frames and / or the shelves.

[4]

[Total: 12]

Section B

Answer **all** questions

4 Fig. 5 shows a wall-mounted DVD rack. The DVD rack is produced by injection moulding.

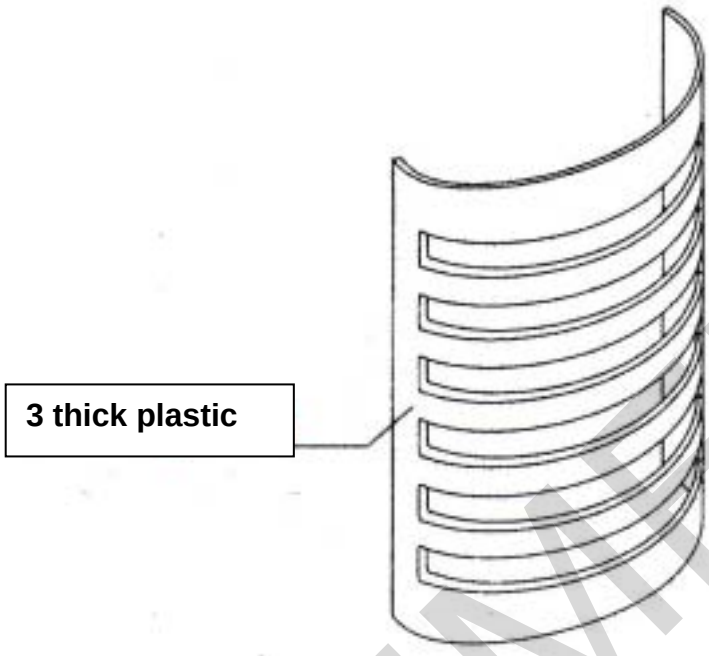

Fig.5

(a) The DVD rack could also be made from sheet plastic rather than by injection moulding.

Describe how the curved shape of the DVD rack could be formed.

.....

.....

.....

.....

..... **[3]**

(b) The DVD rack is to be wall-mounted.

Use sketches and notes to show how the DVD rack shown in Fig. 5 could be modified so that it could be wall-mounted. Include any constructional and/or assembly details.

[4]

(c) *Discuss why the manufacturer has chosen to produce 10 000 DVD racks using the injection moulding process.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[5]**

[Total: 12]

5 Fig. 6 shows a washing machine.

Fig.6

(a) The washing machine casing is made from mild steel sheet.

Give **two** reasons, other than strength, why mild steel sheet is a suitable material for the casing.

1..... **[1]**

2..... **[1]**

(b) The washing machine shown in Fig. 6 is an example of a product that has been designed and manufactured with 'built-in obsolescence'.

Explain what is meant by 'built-in obsolescence'.

.....

..... **[2]**

(c) Many appliances such as washing machines, fridges and freezers can be moved around by lifting the appliance onto the 'rollers' shown below.

Fig. 7 shows details of one roller.

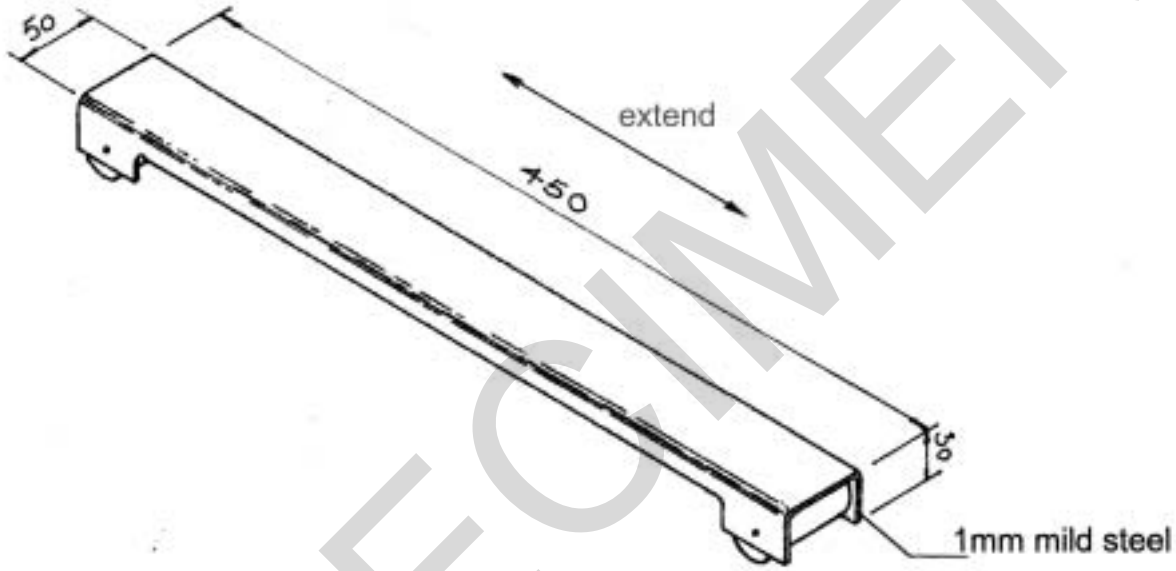

Fig. 7

Use sketches and notes to show how the design of the roller could be modified to extend in the direction shown so that it could be used with different size appliances. Give details showing how the roller could be locked in position when extended.

[4]

(d) Many products are designed for disassembly.

Discuss, with reference to the washing machine, the main issues that designers need to consider when designing products for disassembly.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....**[4]**

[Total: 12]

[Paper Total: 60 marks]

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

General Certificate of Secondary Education

DESIGN & TECHNOLOGY A564

Unit A564: Resistant Materials

Specimen Mark Scheme

The maximum mark for this paper is **60**.

Section A		
Question Number	**Answer**	**Max Mark**
1(a)(i)	**Name a suitable manufactured board for the table.** Suitable manufactured board: plywood, MDF. Not blockboard, chipboard, laminboard.	**[1]**
1(a)(ii)	**Give <u>two</u> advantages of using a manufactured board rather than solid wood for the table.** 2 advantages: stable, available in wide boards, cheaper, more environmentally friendly. Not easier to work.	**[1]** **[1]**
1(b)	**The legs are to be attached to the top by means of knock-down (K-D) fittings.** **Use sketches and notes to show how one K-D fitting could be used to attach a leg to the top. Name the K-D fitting.** Accurate sketch of K-D fitting [1] Clear sketch of K-D fitting in correct position [1] Correct name of K-D fitting.	**[2]** **[1]**
1(c)(i)	**The self-assembly table will be sold without a finish.** **Give <u>two</u> reasons why the manufacturer has not applied a finish to the table.** 2 reasons for manufacturers not applying finish: reduces cost to consumer, quicker production, customer preferences.	**[1]** **[1]**
1(c)(ii)	**Give <u>one</u> reason why it would be an advantage to apply a finish to the table before it is assembled.** Advantage for applying finish before assembly: better finish, quicker, less awkward.	**[1]**
1(d)(i)	**The circular table top would be cut from a square piece of manufactured board.** **Name <u>one</u> portable power tool that could be used to cut out the shape.** Portable power tool: jig saw, router.	**[1]**
1(d)(ii)	**Give <u>two</u> safety precautions you would need to take when cutting out the shape using the portable power tool.** 2 safety precautions: correct blade, workpiece held securely, no trailing leads, clearance under workpiece.	**[1]** **[1]**
	Total	**[12]**

Section A

Question Number	Answer	Max Mark
2(a)	**The table below shows some of the tools and items of equipment used to make the clock.** **Complete the table by stating the purpose of each tool or item of equipment used when making the clock.**	

Tool / item of equipment	*Purpose*	
Marker pen	To mark out the bend lines/shape of the clock	**[1]**
Coping saw	To cut the shape of the clock	**[1]**
Line bender / strip heater	To heat the acrylic to make it soft so that it can be bent to shape	**[1]**
Wet and dry paper	To finish/polish/smooth the edges of the acrylic	**[1]**
Tensol cement	To stick the clock face to the stand	**[1]**

		[5]
2(b)	**State <u>two</u> properties of acrylic that makes it suitable for this clock.** 2 properties of acrylic: easily machined, bent to shape, good impact resistance, inherent colour.	**[1]** **[1]**
2(c)	**Give <u>two</u> reasons why a designer would construct a prototype model of the clock before making it from acrylic.** 2 reasons for prototype model: check size and shape, balance, position of bends, show potential customers.	**[1]** **[1]**
2(d)	**The numbers on the clock will be produced using CAM.** **Give <u>three</u> stages in producing the numbers using CAM.** 3 stages using CAM for the numbers: can be engraved **or** applied.[1] Engraved using CAMM 2, laser cutter or equivalent: set up workpiece, set tool parameters, start machine. **OR** Applied using CAMM1 vinyl cutter or equivalent: set up vinyl in machine, transfer data from computer to machine, start cut, peel off, apply tape, apply to clock face.	**[3]**
	Total	**[12]**
3(a)	**Many shelf units are made entirely from wood. Explain why the designer has used two different materials for the wall-mounted shelf unit shown in Fig. 3.** Unusual appearance/combination of materials. Manufacturing efficiency argued. Cost of manufacture. Result of market research/customer preference. Accept any two from list or one extended/detailed explanation.	**[2]**

Section A		
Question Number	**Answer**	**Max Mark**
3(b)	**Fig. 4 shows a wooden former around which a length of mild steel rod could be bent to the shape of the end frame. The former is fixed to a baseboard.** **Add sketches and notes to Fig. 4 to show how the mild steel could be held in place while it is bent to shape around the former.** Use of blocks and pegs to position the mild steel rod against the former. [0-2] Retention of end of rod.[1]	**[3]**
3(c)	**The oak shelves will be finished with polyurethane varnish.** **Complete the table below by describing three processes that would need to be carried out before applying a final coat of polyurethane varnish to the shelves.** 3 processes carried out before applying varnish: plane surface with smoothing plane, cabinet scraper, medium grade glasspaper, fine grade glasspaper, remove surface dust.	**[3]**
3(d)	**Use sketches and notes to show how the mild steel end frames could be fixed to the shelves. Your solution must be capable of being taken apart.** **Modifications may be made to the end frames and / or the shelves.** Modifications to the mild steel ends including the use of brackets, modifications to the length/width of shelf. [1] Details of sizes/materials [1] Fixing to the shelf. Use of screws, nuts and bolts. [1] Fixing to the frame. Use of screws, nuts and bolts. [1]	**[4]**
	Total	**[12]**
	Section A Total	**[36]**

Section B		
Question Number	**Answer**	**Max Mark**
4(a)	**The DVD rack could also be made from sheet plastic rather than by injection moulding.** **Describe how the curved shape of the DVD rack could be formed.** Heat in an oven to make it soft [1] Shape around a former [1] Retain in position while plastic cools [1]	**[3]**
4(b)	**The DVD rack is to be wall-mounted.** **Use sketches and notes to show how the DVD rack shown in Fig. 5 could be modified so that it could be wall-mounted. Include any constructional/assembly details.** Practical method includes use of 'lugs' or flange. [0-2] Construction/assembly details [0-2]	**[4]**
4(c)*	**Discuss why the manufacturer has chosen to produce 10 000 DVD racks using the injection moulding process.** Level 1 (0-2 marks) Shows limited understanding of the injection moulding process and its effectiveness when manufacturing large quantities. There will be little or no use of specialist terms. Answers may be ambiguous or disorganised. Errors of grammar, punctuation and spelling may be intrusive. Level 2 (3-4 marks) Shows some understanding of the injection moulding process and its effectiveness when manufacturing large quantities with some analysis of the issues involved. There will be some use of specialist terms, although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, grammar and punctuation Level 3 (5 marks) Shows detailed understanding of how effective injection moulding process when manufacturing products in large quantities and analyses most of the issues involved. Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate can demonstrate the accurate use of spelling, punctuation and grammar. Discussion of issues may include: • Speed of process/output • Minimal waste • Intricacy or otherwise of process • Need for volume production to recover costs • Initial set up inc. machinery, retraining, reorganisation	**[5]**

Section B		
Question Number	**Answer**	**Max Mark**
	Total	**[12]**
5(a)	**The washing machine casing is made from mild steel sheet.** **Give <u>two</u> reasons, other than strength, why mild steel sheet is a suitable material for the casing.** 2 reasons include: relatively cheap material, hardwearing / durable, can be shaped easily, takes different finishes.	**[1]** **[1]**
5(b)	**The washing machine shown in Fig. 6 is an example of a product that has been designed and manufactured with 'built-in obsolescence'.** **Explain what is meant by 'built-in obsolescence'.** Planned obsolescence is the decision by the manufacturer to produce a product that will become obsolete or cease to function in a defined time. [1] The washing machine has parts that are made to last a specific length of time or number of operations. [1]	**[2]**
5(c)	**Use sketches and notes to show how the design of the roller could be modified to extend in the direction shown so that it could be used with different size appliances. Give details showing how the roller could be locked in position when extended.** Extend using two different size channels inside / outside each other. [0-2] Method of locking: use of screws, nuts and bolts. [0-2]	**[4]**
5(d)	**Many products are designed for disassembly. Discuss, with reference to the washing machine, the main issues that designers need to consider when designing products for disassembly.** Level 1 (0-2 marks) Basic discussion, showing limited understanding of the issues designers need to consider Level 2 (3 marks) Adequate discussion, showing some understanding of the issues designers need to consider Level 3 (4 marks) Thorough discussion, showing detailed understanding of the issues designers need to consider	

Section B		
Question Number	**Answer**	**Max Mark**
	Discussion may include: • ease that parts can be disassembled • speed that parts can be disassembled • use of materials in washing machine that can be reused • use of materials in washing machine that can be recycled • safety in terms of individuals when disassembling • safety in terms of the environment when disassembling	**[4]**
	Section B Total	**[24]**
	Paper Total	**[60]**

Assessment Objectives Grid (includes QWC)

Question	AO1	AO2	AO3	Total
1(a)(i)	1			**1**
1(a)(ii)	2			**2**
1(b)	3			**3**
1(c)(i)	2			**2**
1(c)(ii)	1			**1**
1(d)(i)	1			**1**
1(d)(ii)	2			**2**
2(a)	5			**5**
2(b)	2			**2**
2(c)	2			**2**
2(d)	3			**3**
3(a)	2			**1**
3(b)	3			**2**
3(c)	3			**3**
3(d)	4			**3**
4(a)	3			**3**
4(b)	4			**4**
4(c)*			5	**5**
5(a)	2			**2**
5(b)	2			**2**
5(c)	4			**4**
5(d)			4	**4**
Totals	**51**		**9**	**60**