

Example 1

Describe in detail how the hollow plastic body shell shown in Fig. 7 would be manufactured in one piece as a batch of 1,000.
Give details of any specialist tooling and quality control checks that would be used.
Use a flow chart and/or annotated diagrams to support your answer.

GUIDANCE

Level 3 (5-6 marks)

- Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks.

Level 2 (3-4 marks)

- Key stages presented, reasonably well described with key features identified

Level 1 (0-2 marks)

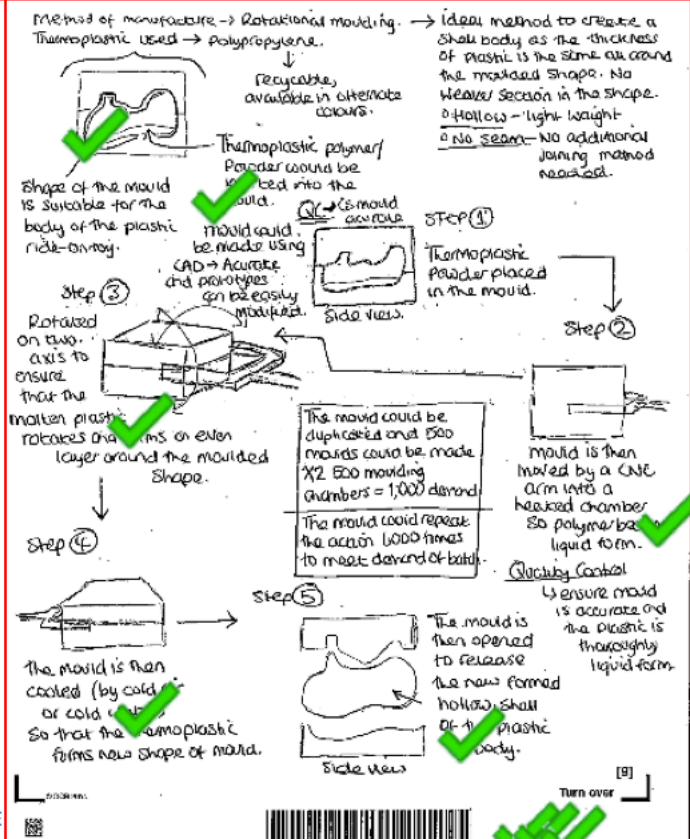
- Some stages outlined (up to 2), very limited description

Quality of description and communication

- Detailed sketch/chart with clear annotation 3 marks
- Good sketch/chart with main features identified and labelled 2 marks
- Basic sketch or chart with limited annotation 1 mark (Max 1 if no sketch/chart used)

Award credit where possible if response doesn't link to chosen material.

YouTube ^{GB} <https://www.youtube.com/watch?v=aS8490xE1IE>



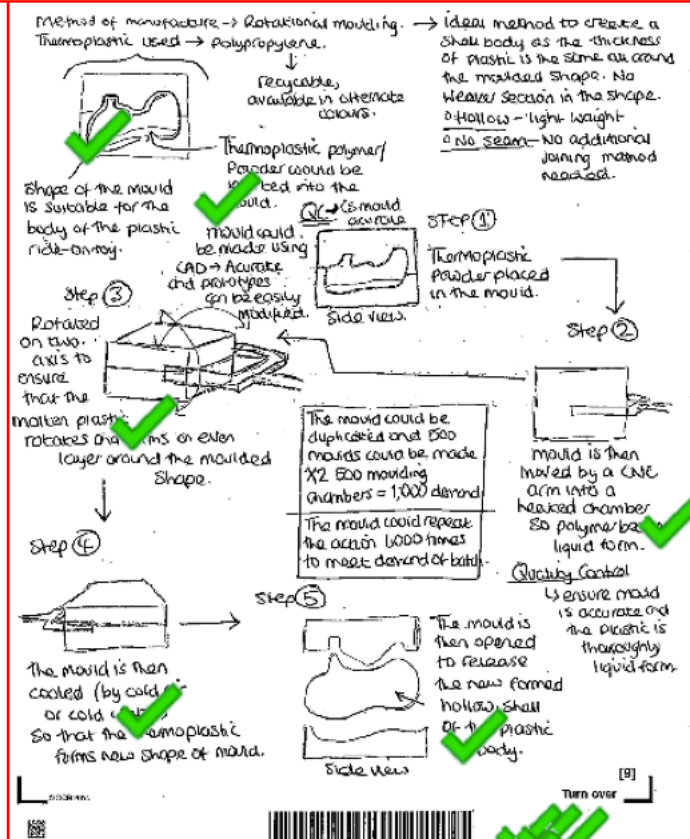
Example 1

Describe in detail how the hollow plastic body shell shown in Fig. 7 would be manufactured in one piece as a batch of 1,000.
Give details of any specialist tooling and quality control checks that would be used.
Use a flow chart and/or annotated diagrams to support your answer.

Accept blow moulding, rotational moulding or fabrication processes.

Rotational moulding:

- Split mould prepared.
- Measured amount of plastic powder inserted
- Mould attached to 2 axis rotating device
- Rotating device activated heat applied until shape formed
- Rotation continues – heat reduced to allow setting Shape extracted, any flash removed
- Moulding mounted in fixture to cut holes for steering and wheels
- QC final check before assembly



MANUFACTURING QUESTION –

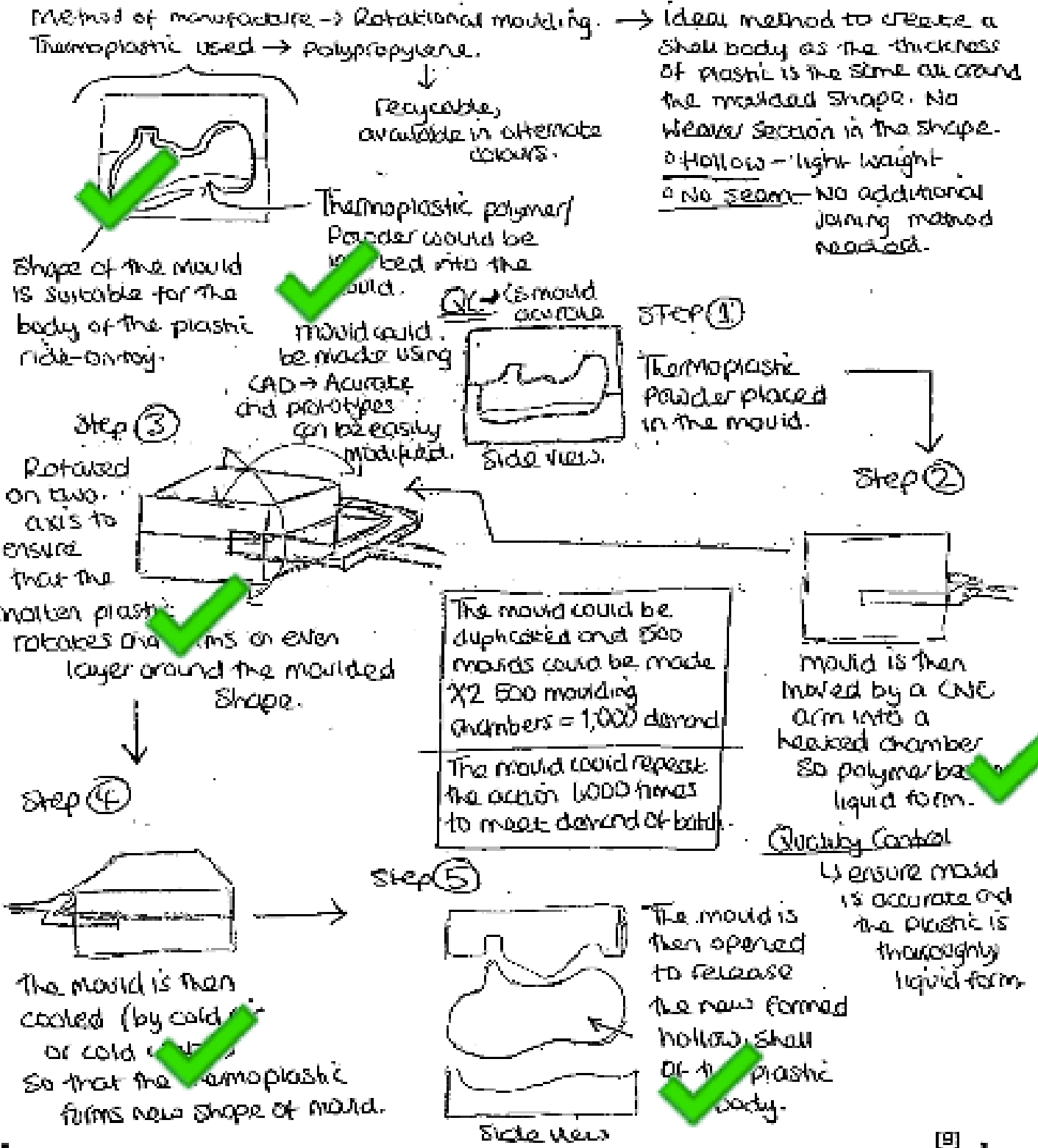
EXAMPLE ANSWER

Fig. 6 shows a plastic ride-on toy for a small child.

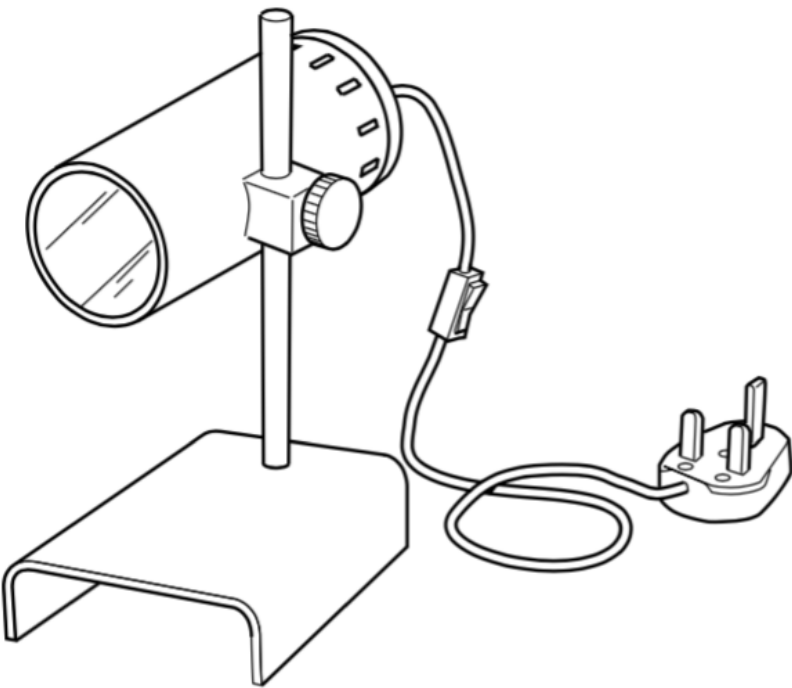


Fig. 6

Describe in detail how the hollow plastic body shell shown in Fig. 7 would be manufactured in one piece as a batch of 1,000.
 Give details of any specialist tooling and quality control checks that would be used.
 Use a flow chart and/or annotated diagrams to support your answer.



ADJUSTABLE LAMP (2015) RM



(e) Fig. 9 shows details of the base of the adjustable desk lamp.

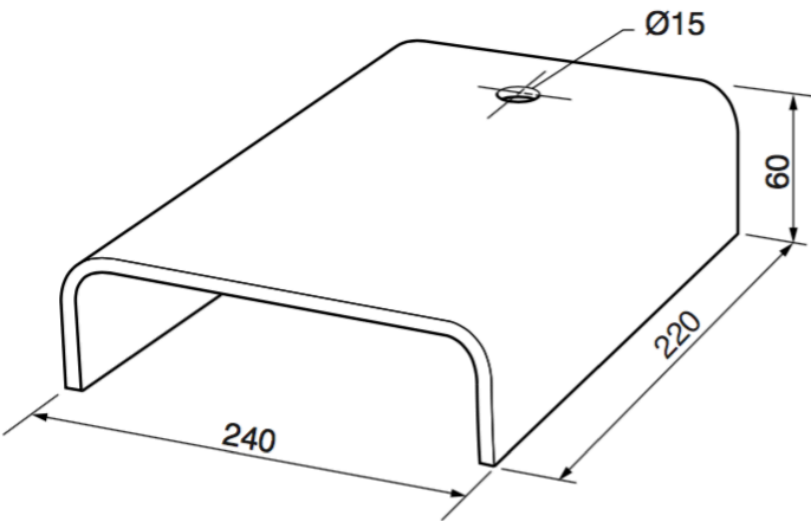


Fig. 9

- (i) State a **suitable specific material** for the base of the adjustable desk lamp.
Give **two** properties or characteristics that make the material suitable for this use.

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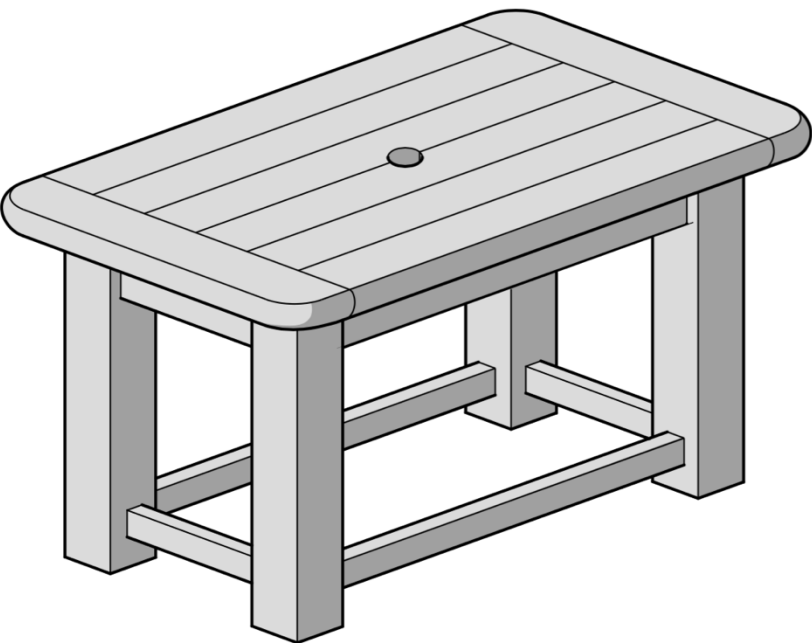
ADJUSTABLE LAMP

- (ii) Describe, in detail, how the base would be manufactured as a batch of 250. Include details of any jigs and/or formers used. Use a flow chart and/or annotated diagrams to support your answer.

ADJUSTABLE LAMP MARK SCHEME

Question			Answer	Mark	Guidance
	(e)	(i)	<p>Material for Base</p> <ul style="list-style-type: none">Specified hardwood for laminating/steam bendingAluminium alloyMild steel with appropriate finishABSPolypropyleneHDPEAcrylic <p>Properties or characteristics</p> <ul style="list-style-type: none">Available in sheet form;rigid;easy to press/formaccepts good finish.	3	<p>award mark for other appropriate material not listed</p> <p>1x1 mark</p> <p>Award mark for other appropriate property/characteristic</p> <p>2x1 mark</p>
		(ii)	<p>Base</p> <ul style="list-style-type: none">For all, consider, marking out/template/tessellation <p>Plastic Forming/heat</p> <ul style="list-style-type: none">Former created (perfect finish) must have detail of draft angles and extraction holesPlace in vacuum formerPlastic heatedVacuum appliedTrim and finishCould be two part press formerSecure, drill 15 mm, hole <p>Could be simple plug and yoke pressing</p> <p>Metal pressing</p> <ul style="list-style-type: none">Mould/press tool designed / createdMaterial cut to exact sizeAccurate locate in pressGuards in placePressCheck edgesSecure, drill 15 mm, hole <p>Wood laminating</p> <ul style="list-style-type: none">Cut veneers to sizeFormer created (could be multiple former)Protective layer on former facesAdhesive applied to faces of veneerAccurately positioned in formerClamps activatedCureRemove, secure, drill 15 mm, holeApply appropriate finish	9	<p>Level 3 (5-6 marks) Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks.</p> <p>Level 2 (3-4 marks) Key stages presented, reasonably well described with key features identified</p> <p>Level 1 (0-2 marks) Some stages outlined (up to 2), very limited description</p> <p>Quality of description and communication</p> <p>Basic sketch or chart with limited annotation 1 mark</p> <p>Good sketch/chart with main features identified and labelled 2 marks</p> <p>Detailed sketch/chart with clear annotation 3 marks</p> <p>Max 1 if no sketch/chart used</p> <p>Award credit where possible if response doesn't link to chosen material.</p>

WOODEN TABLE (Jan 2013) M



(e) Fig. 8 shows the top of the wooden table shown in Fig. 7.

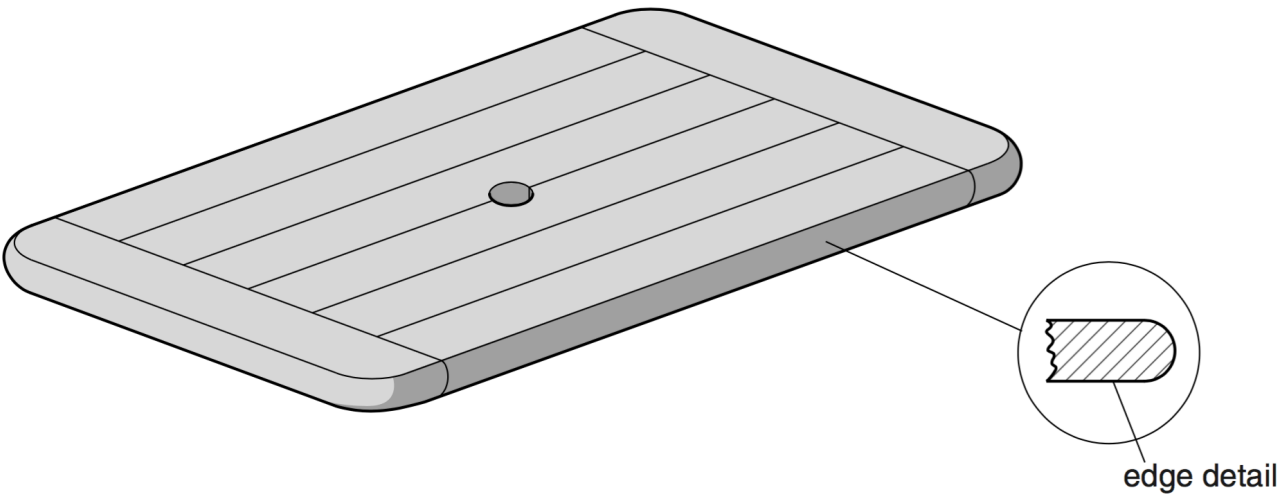


Fig. 8

- (i) State a **suitable specific material** for the table top.
Give **two** properties or characteristics that make the material suitable for this use.

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WOODEN TABLE

- (ii)

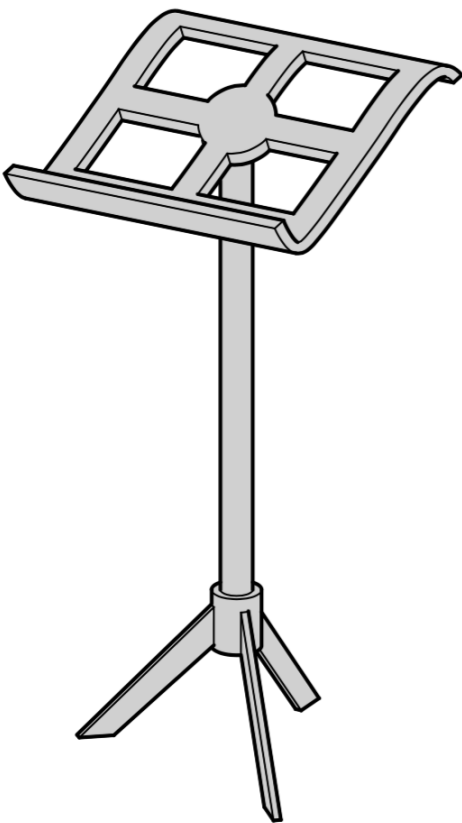
Describe, in detail, how the table top would be manufactured as a batch of 500.
Include details of any jigs or specialist equipment used.
Use a flow chart and/or annotated diagrams to support your answer.

[9]

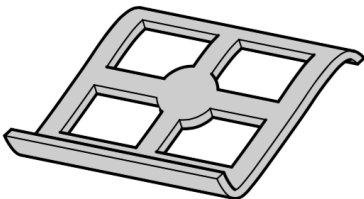
WOODEN TABLE MARK SCHEME

Question			Answer	Mark	Guidance						
	(e)	(i)	<p>Material</p> <p>Suitable hardwood – teak, oak, beech, mahogany, meranti, iroko</p> <p>Accept pine and marine plywood, but <u>not</u> other manufactured boards such as MDF, blockboard, chipboard,</p> <p>Properties or characteristics</p> <ul style="list-style-type: none">• weather resistant/durable• produces a strong structure• easy to machine for assembly• fits in well with garden surroundings• is a sustainable material• aesthetically pleasing grain• accepts finishes easily.	3	<p>Material must be a type of wood (as stated in the question)</p> <p>Award mark for other appropriate wood not listed</p> <p>1x1 mark</p> <p>Award mark for other appropriate property/characteristic, but must clearly relate to the material given</p> <p>2x1 mark</p>						
		(ii)	<p>Table top:-</p> <ul style="list-style-type: none">• prepared boards cut to size – band/circular saw; planer• boards edge-joined to give table top size (biscuit jointing along board edges; glued with external quality glue; clamped to set.) *allow use of dowel joints if jig-drilled holes; holes/biscuit slots may be cut on CNC router QC-Visual check for gaps in joints and adequate coverage of glue• top and bottom surfaces planed/sanded to give smooth, level surface QC-Visual and touch test; straight edge check for warping/distorting• edge moulding shape produced – CNC router; spindle moulder• central hole (for parasol) cut – jig drilled/CNC router• QC – moulding shape (template); hole position; finished quality• final sanding• finish applied – exterior varnish; teak oil; preservative stain. <p>No reference to the base or assembly of the table is required in the response.</p>	9	<p>Level 3 (5–6 marks) Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks.</p> <p>Level 2 (3–4 marks) Key stages presented, reasonably well described with key features identified</p> <p>Level 1 (0–2 marks) Some stages outlined (up to 2), very limited description</p> <p>Quality of description and communication</p> <table><tr><td>Basic sketch or chart with limited annotation</td><td>1 mark</td></tr><tr><td>Good sketch/chart with main features identified and labelled</td><td>2 marks</td></tr><tr><td>Detailed sketch/chart with clear annotation</td><td>3 marks</td></tr></table> <p>Max 1 if no sketch/chart used</p> <p>Award credit where possible if response doesn't link to chosen material or specified batch size.</p>	Basic sketch or chart with limited annotation	1 mark	Good sketch/chart with main features identified and labelled	2 marks	Detailed sketch/chart with clear annotation	3 marks
Basic sketch or chart with limited annotation	1 mark										
Good sketch/chart with main features identified and labelled	2 marks										
Detailed sketch/chart with clear annotation	3 marks										

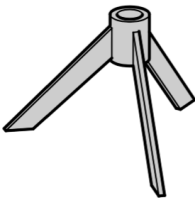
MUSIC STAND (Jan 2013) RM



(e) Fig. 10 shows parts of the music stand.



A



B

Fig. 10

Choose **one** of the parts shown in Fig. 10

Chosen part

- (i) State a **suitable specific material** for the part that you have chosen.
Give **two** properties or characteristics that make the material suitable for this use.

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MUSIC STAND

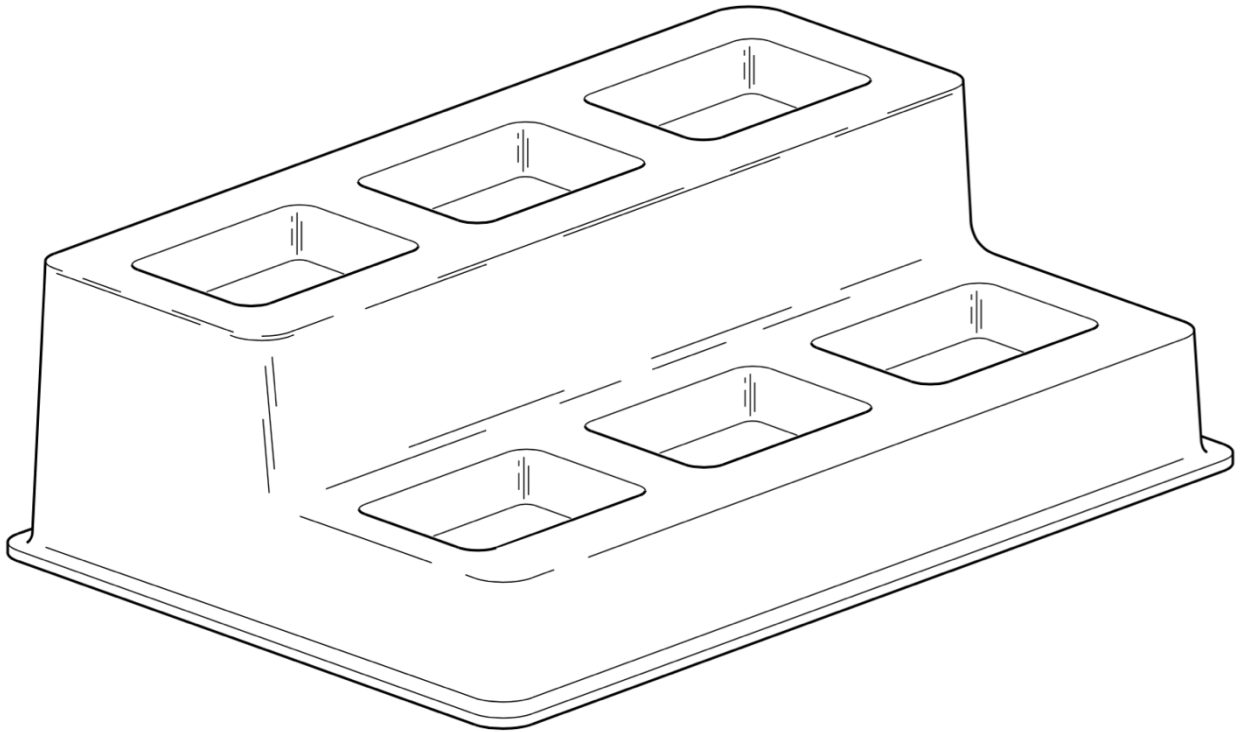
- (ii) Describe, in detail, how the part you have chosen would be manufactured as a batch of 50.
Include details of any jigs and/or formers used.
Use a flow chart and/or annotated diagrams to support your answer. **[9]**

MUSIC STAND MARK SCHEME

Question			Answer	Mark	Guidance
	(e)	(i)	Material-Platform <ul style="list-style-type: none"> abs polypropylene polystyrene acrylic aluminium alloy laminated birch/beech/maple; Stainless steel. Properties or characteristics <ul style="list-style-type: none"> high quality finish easily formed to required shape produces rigid platform. Material-Base <ul style="list-style-type: none"> mild steel aluminium alloy beech/appropriate hardwood plywood. Properties or characteristics <ul style="list-style-type: none"> rigid can be turned and joined can accept appropriate finish. 	3	award mark for other appropriate material not listed 1x1 mark Award mark for other appropriate property/characteristic 2x1 mark
		(ii)	Platform Heat formed in plastic <ul style="list-style-type: none"> plastic sheet cut to size shapes cut (laser cutter, CNC router, use templates, drill, fine tooth saw) male/female former prepared and finished plastic evenly heated pressed in former edge treatment applied. Metal shaping/forming <ul style="list-style-type: none"> sheet metal cut to shape (guillotine, nibbler, fine tooth saw) shapes cut (plasma cutter), use templates, drill, fine tooth saw) press former used to bend to shape – fly press or applied pressure, roller finishing. Laminated <ul style="list-style-type: none"> male/female former prepared veneers pre cut glue spreading (one side) silicon release on former (prevent glue damage) veneers inserted into former former closed – pressure applied shape released edge shaping/finish applied. Base-metal <ul style="list-style-type: none"> centre part turned and bored to size 	9	Level 3 (5–6 marks) Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks. Level 2 (3–4 marks) Key stages presented, reasonably well described with key features identified Level 1 (0–2 marks) Some stages outlined (up to 2), very limited description Quality of description and communication Basic sketch or chart with limited annotation 1 mark Good sketch/chart with main features identified and labelled 2 marks Detailed sketch/chart with clear annotation 3 marks Max 1 if no sketch/chart used Award credit where possible if response doesn't link to chosen material.
			<ul style="list-style-type: none"> legs shaped parts brazed/welded clean/flux/position/heated/apply spelter/rod file/clean up finish. wood <ul style="list-style-type: none"> centre part turned and bored to size legs shaped joints cut glued/cramped cleaned up finished. 		

PERFUME POS DISPLAY (June 2012) M

Fig. 6 shows part of a point-of-sale display for bottles of perfume.



State a **suitable specific material** for the point of sale display shown in Fig. 6.
Give **two** properties or characteristics that make the material suitable for this use.

PERFUME POS DISPLAY

- (ii) Describe, in detail, how the point of sale display would be manufactured as a batch of 500.
Give details of any special tooling and quality control checks that would be used.
Use a flow chart and/or annotated diagrams to support your answer.

PERFUME POS DISPLAY MARK SCHEME

Question			Answer	Mark	Guidance
	(e)	(i)	<p>Material</p> <ul style="list-style-type: none">• Polystyrene (HIPS)• ABS• Polyethylene (HDPE)• PET• Acrylic <p>Properties or characteristics</p> <ul style="list-style-type: none">• high quality finish• available in different colours• easily formed to required shape• recyclable after use• readily accepts printing on surface• adequate strength when formed	3	<p>award mark for other appropriate thermoplastic not listed</p> <p>1x1 mark</p> <p>Properties must relate to material stated.</p> <p>Award mark for other appropriate property/characteristic</p> <p>2x1 mark</p>
		(ii)	<ul style="list-style-type: none">• Selection and quality check of material• Preparation of mould/plug used to form desired shape – indication of mould requirements (smooth surface; draft angle, fillet radii; suction/vent holes)• Vacuum forming shape – clamping of sheet material on machine. Description of process must include reference to the heating stage to soften (not melt) the plastic sheet. Introduction of mould/plug and application of vacuum to form softened plastic. (reference to a 'blowing ' stage may be made prior to the vacuum) Remove heat source and allow to cool/set before lowering mould Removal of formed sheet from machine A higher level response will make reference to the use of a 'multi-impression' mould to speed up the manufacture in batch production quantities such as those given.• Separation of moulding from sheet / waste material. Reference to band-saw / 'gerbil' cutter acceptable; higher level response will suggest pressing / die-cutting	9	<p>Level 3 (5-6 marks) Processes fully described, key features and technical details identified,</p> <p>Level 2 (3-4 marks) Key processes presented, reasonably well described with key features identified</p> <p>Level 1 (0-2 marks) Some processes outlined (up to 2), very limited description.</p> <p>Quality of description and communication</p> <p>Basic sketch or chart with limited annotation 1 mark</p> <p>Good sketch/chart with main features identified and labelled 2 marks</p> <p>Detailed sketch/chart with clear annotation 3 marks</p>
			<ul style="list-style-type: none">• QC check on quality of moulding following cutting moulding from sheet• Removal of any sharp edges produced by cutting process		<p>Max 1 if no sketch/chart used</p> <p>Award credit where possible if response doesn't link to chosen material.</p>

Child’s ride on toy (2014) RM

Fig. 6 shows a plastic ride-on toy for a small child.

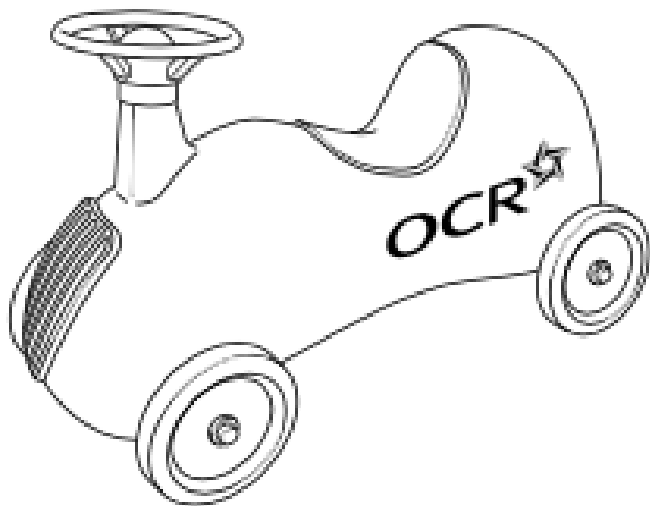


Fig. 6

Fig. 7 shows the hollow body shell of the plastic ride-on toy shown in Fig. 6.

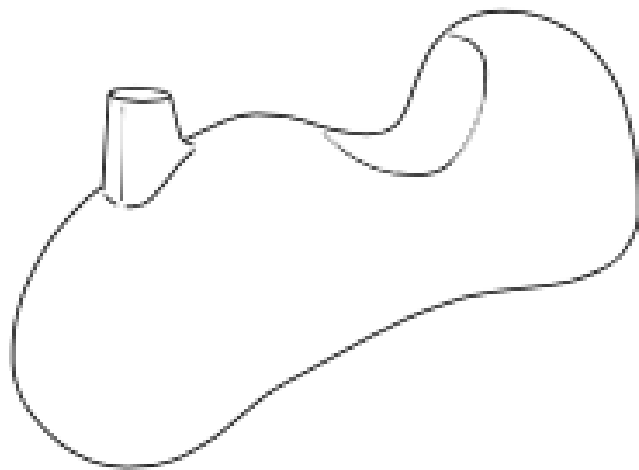


Fig. 7

- (i) State a **suitable specific plastic** for the hollow body shell shown in Fig. 7.
Give **two properties or characteristics** that **make the material suitable** for this use.

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Child's ride on toy

Describe in detail how the hollow plastic body shell shown in Fig. 7 would be manufactured in one piece as a batch of 1,000.

Give details of any specialist tooling and quality control checks that would be used.

Use a flow chart and/or annotated diagrams to support your answer.

Child's ride on toy **MARK SCHEME**

Question			Answer	Mark	Guidance
	(e)	(i)	<p>Materials: Any appropriate thermoplastic eg: PP, HIPS, PVC, ABS Mild steel sheet</p> <p>Properties/characteristics: Easy to form into shape required Available in a range of colours / doesn't need finishing Relatively inexpensive material Readily recyclable at end-of-life Easily accepts surface finishing processes</p>	3	<p>Award mark for other <i>appropriate</i> material not listed</p> <p>1 x 1 mark</p> <p>Award mark for other appropriate property/characteristic. Must relate to the specific material given. eg : not 'range of colours' if mild steel given.</p> <p>2 x 1 mark</p>
		(ii)	<p>Accept blow moulding, rotational moulding or fabrication processes.</p> <p>Blow moulding:</p> <ul style="list-style-type: none">• Split mould prepared• Soft thermoplastic 'parison' fed into mould• Mould closed onto parison• Air blown in to spread plastic against walls of mould• Mould opened and cooled moulding removed• QC - visual or scanned check for complete moulding• Mould 'flash' removed from moulding• Moulding mounted in fixture to cut holes for steering and wheels• QC final check before assembly <p>Rotational moulding:</p> <ul style="list-style-type: none">• Split mould prepared• Measured amount of plastic powder inserted• Mould attached to 2 axis rotating device		<p>Level 3 (5-6 marks) Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks.</p> <p>Level 2 (3-4 marks) Key stages presented, reasonably well described with key features identified</p> <p>Level 1 (0-2 marks) Some stages outlined (up to 2), very limited description</p> <p>Quality of description and communication</p> <p>Basic sketch or chart with limited annotation 1 mark</p> <p>Good sketch/chart with main features identified</p>
			<ul style="list-style-type: none">• Rotating device activated, heat applied until shape formed• Rotation continues – heat reduced to allow setting• Shape extracted, any flash removed		<p>and labelled 2 marks</p> <p>Detailed sketch/chart with clear annotation 3 marks</p> <p>Max 1 if no sketch/chart used</p> <p>Award credit where possible if response doesn't link to chosen material.</p>

Sweet Shop Scoop (June 2012) RM

Fig. 7 shows a scoop used in a sweet shop.

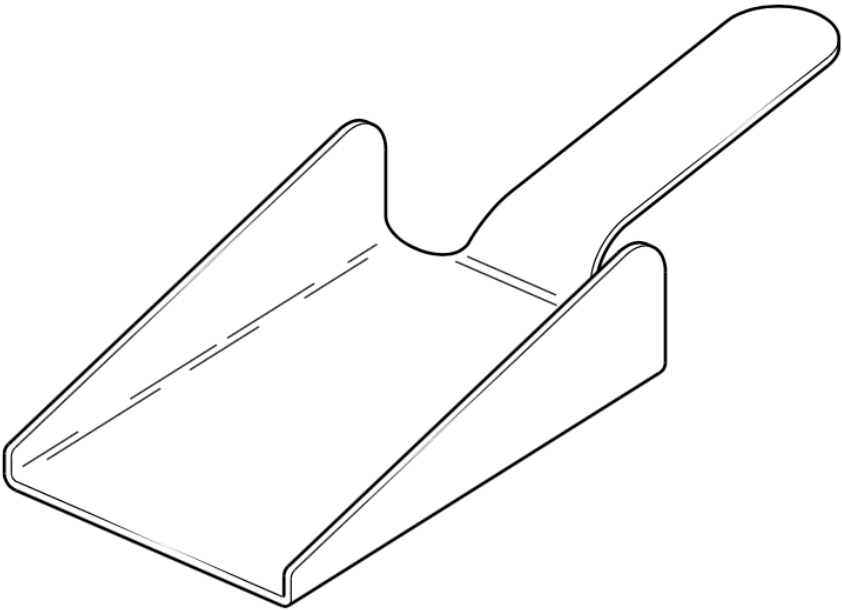


Fig. 7

State a **suitable specific material** for a scoop of the type shown in Fig. 7.
Give **two** properties or characteristics that make the material suitable for this use.

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Sweet Shop Scoop

Describe, in detail, how the scoop shown in Fig. 7 would be manufactured as a batch of 250.

Include details of any jigs and/or formers used.

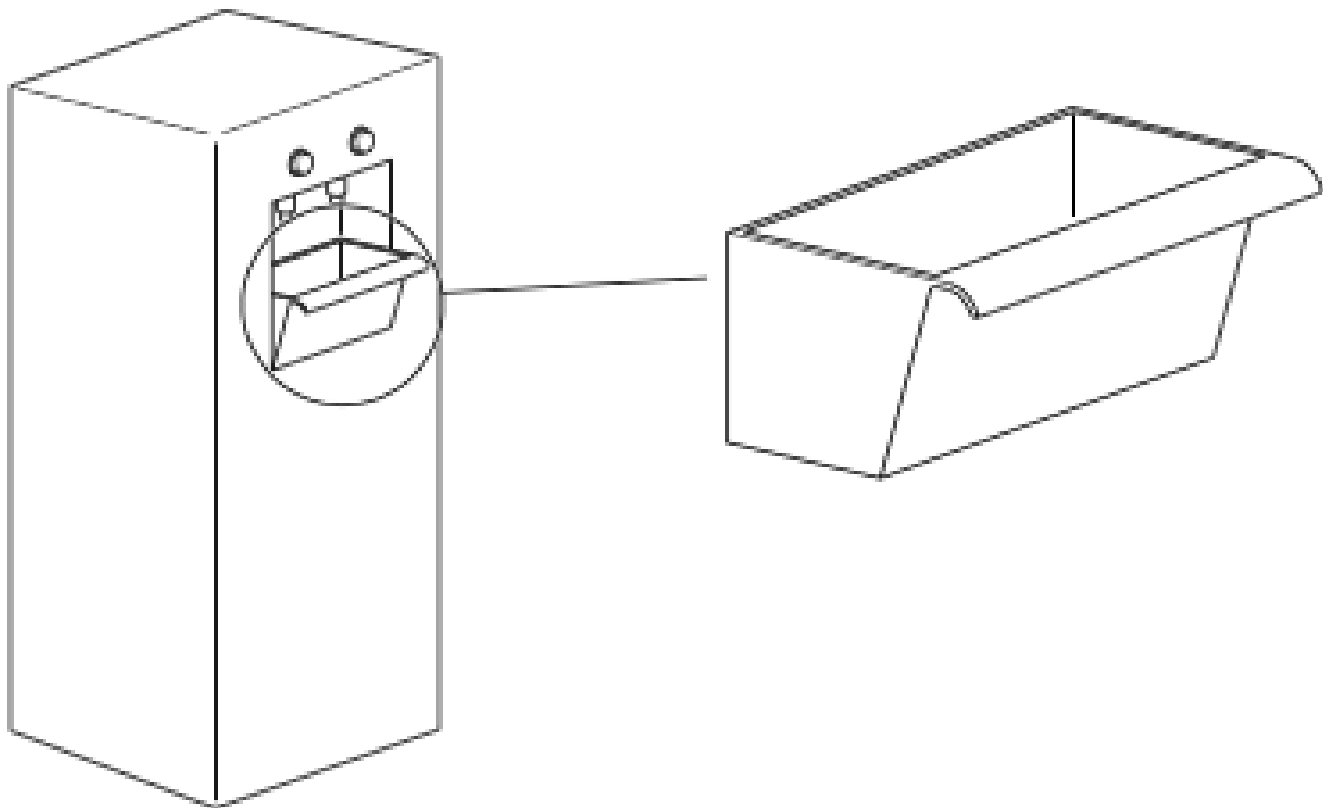
Use a flow chart and/or annotated diagrams to support your answer.

Sweet Shop Scoop MARK SCHEME

Question		Answer	Mark	Guidance
(e)	(i)	<p>Material</p> <ul style="list-style-type: none">• acrylic;• abs;• polypropylene;• HIPS (polystyrene);• laminated birch/beech/maple;• aluminium;• chromed (or plastic coated) mild steel;• Stainless steel <p>Properties or characteristics</p> <ul style="list-style-type: none">• high quality finish;• cleaned easily;• easily formed to required shape;• produces rigid structure;	3	<p>Award mark for other appropriate material not listed</p> <p>1x1 mark</p> <p>Award mark for other appropriate property/characteristic</p> <p>2x1 mark</p>
	(ii)	<p>Heat forming of plastic materials</p> <ul style="list-style-type: none">• net produced• shaped plastic, fine toothed saw,• edge finished• jigs/formers used to shape after strip heating• or – male female mould <p>Laser cutting/thermoforming</p> <ul style="list-style-type: none">• design created CAD• print details setup/speed, thickness of material• laser cutter set up, auto focus• laser cut• auto removal/replacement• thermoformed using line bend system• held until shape set.• edges may be flame polished <p>Laminated</p> <ul style="list-style-type: none">• male/female former prepared• veneers cut• glue spreading (one side)• silicon release on former• veneers inserted into former• former closed – clamped• shape released• edge shaping• ends glued into shape• finish applied <p>Metal forming</p> <ul style="list-style-type: none">• net produced,• metal shaped, guillotine, nibbler• edges checked, sharp edges ground• folding bars / jig to bend to shape	9	<p>Level 3 (5-6 marks) Processes fully described, key features and technical details identified.</p> <p>Level 2 (3-4 marks) Key processes presented, reasonably well described with key features identified</p> <p>Level 1 (0-2 marks) Some processes outlined (up to 2), very limited description</p> <p>Quality of description and communication</p> <p>Basic sketch or chart with limited annotation 1 mark</p> <p>Good sketch/chart with main features identified and labelled 2 marks</p> <p>Detailed sketch/chart with clear annotation 3 marks</p> <p>Max 1 if no sketch/chart used</p> <p>Award credit where possible if response doesn't link to chosen material.</p> <p>Injection moulding not appropriate for batch of 250</p>

Spill Box (Jan 2012 RM)

Fig. 8 shows a tray to catch spills from a drinks dispenser.



State a suitable specific material for the tray shown in Fig. 8.
Give two properties or characteristics that make the material suitable for this use.

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Spill Box (Jan 2012 RM)

Describe, in detail, how the tray shown in Fig. 8 would be manufactured as a batch of 250.

Include details of any jigs and/or formers used.

Use a flow chart and/or annotated diagrams to support your answer.

Spill Box MARK SCHEME

Question			Answer	Mark	Guidance
	(e)	(i)	<p>Material</p> <ul style="list-style-type: none">abs;polypropylene;pvc;acrylic;laminated birch/beech/maple(appropriate finish);aluminium;copper;Stainless steel <p>Properties or characteristics</p> <ul style="list-style-type: none">high quality finish;does not easily degrade/corrode;easily formed to required shape;produces rigid structure;	[3]	<p>award mark for other appropriate material not listed</p> <p>1x1 mark</p> <p>Award mark for other appropriate property/characteristic Must relate to the specific material</p> <p>2x1 mark</p>
		(ii)	<p>Heat formed in plastic using jig/former</p> <ul style="list-style-type: none">plastic sheet cut to sizeplug and yolk former (male/female former) prepared and finished- consideration of handle shapeplastic evenly heatedpressed in formeredge treatment applied <p>Vacuum formed</p> <ul style="list-style-type: none">plastic sheet cut to size of machineformer in placeplastic evenly heatedvacuum applied when plastic loweredremoved and trimmed to shapeedge finishedhandle shape thermo-formed		<p>Level 3 (5-6 marks) Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks.</p> <p>Level 2 (3-4 marks) Key stages presented, reasonably well described with key features identified</p> <p>Level 1 (0-2 marks) Some stages outlined (up to 2), very limited description</p> <p>Quality of description and communication</p> <p>Basic sketch or chart with limited annotation 1 mark</p>
			<p>Allow a description of line bending a net cut from a plastic sheet</p> <p>Metal shaping/forming</p> <ul style="list-style-type: none">net createdsheet metal cut to shape (guillotine, nibbler, fine tooth saw) simple shape pressed/stampedformer/folding jig used to bend to shapecorners joined (soldered/brazed) or rivetedfinishing, check for waterproofing <p>Basic press forming using plug and yolk former on softer or annealed metals eg. aluminium or copper</p>	[9]	<p>Good sketch/chart with main features identified and labelled 2 marks</p> <p>Detailed sketch/chart with clear annotation 3 marks</p> <p>Max 1 if no sketch/chart used</p> <p>Max 1 if clearly described and logical response given but no sketch/chart used</p> <p>Award credit where possible if response doesn't link to chosen material.</p> <p>Injection moulding is an inappropriate method for the batch size – award a maximum of 3 marks total.</p>

Art Box (Jun 2011) RM

Fig. 8 shows a holder for art materials.

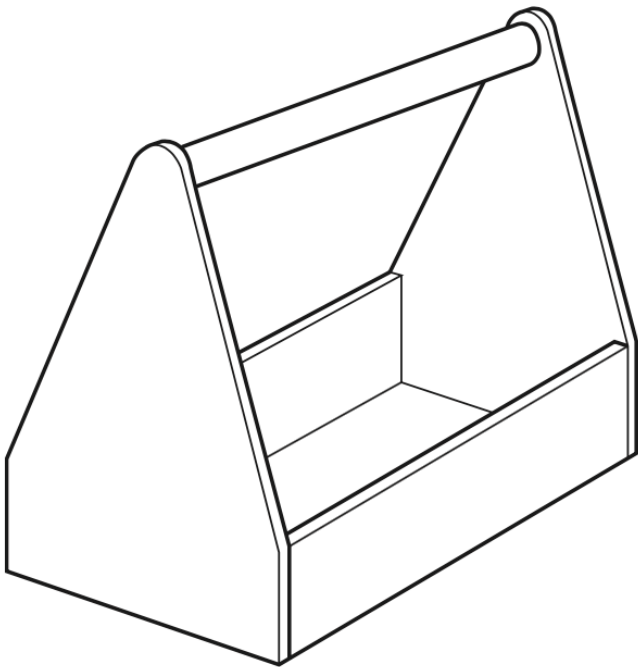


Fig. 8

State a **suitable specific material** for the holder of art materials shown in Fig. 8.
Give **two** properties or characteristics that make the material suitable for this use.

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Art Box

Describe, in detail, how the holder of art materials shown in Fig. 8 would be manufactured as a batch of 100.

Include details of any jigs and formers used.

Use a flowchart and/or annotated diagrams to support your answer.

Art Box MARK SCHEME

Question	Expected answers	Rationale		Mark
(e) (i)	<p>State a suitable specific material for the holder of art materials shown in Fig. 8.</p> <p>Give two properties or characteristics that make the material suitable for this use.</p> <p>Material</p> <ul style="list-style-type: none"> abs; polypropylene; aluminium; mdf plywood pine, deal, beech, cherry. <p>Properties or characteristics</p> <ul style="list-style-type: none"> easily formed to required shape; produces rigid structure; takes a quality finish; durable, takes knocks. 	<p>award 1 mark for other appropriate material not listed</p> <p>1x1 mark</p> <p>Award 1 mark for other appropriate property/characteristic.</p> <p>2x1 mark</p>	<p>1</p> <p>2x1</p>	<p>3</p>

Question	Expected answers	Rationale		Mark
(ii)	<p>Describe, in detail, how the holder of art materials shown in Fig.8 would be manufactured as a batch of 100.</p> <p>Include details of any jigs and formers used.</p> <p>Use a flowchart and/or annotated diagrams to support your answer.</p> <p>Could be a combination of materials (base/handle) and manufacturing processes.</p> <p>Plastic forming</p> <ul style="list-style-type: none"> mark out/cut developments (batch of 100) use strip heater/bending jig to form base/sides secure corners (adhesive, corner strip turn, shape and locate handle. <p>Plastic assembly</p> <ul style="list-style-type: none"> mark out parts (batch of 100) cut and prepare shapes assemble using appropriate cement/adhesive and jig/former to hold whilst setting handle made and secured edges finished. <p>Laser cutting/thermoforming</p> <ul style="list-style-type: none"> design created CAD print details setup/speed, thickness of material laser cutter set up, auto focus laser cut auto removal/replacement thermoformed using line bend system held until shape set 	<p>Level 1 (0-2 marks) Some stages outlined (up to 2), very limited description.</p> <p>Level 2 (3-4 marks) Key stages presented, reasonably well described with key features identified.</p> <p>Level 3 (5-6 marks) Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks. To achieve full marks, the described process must be relevant for the batch size.</p> <p>Award maximum of Level 1 if an inappropriate process for the product (or the batch number) is described.</p> <p>Quality of description and communication</p> <p>Basic sketch/chart with limited annotation 1 mark</p> <p>Good sketch/chart with main features identified and labelled 2 marks</p> <p>Detailed sketch/chart with clear annotation 3 marks</p> <p>Max 1 if no sketch used</p> <p>Award full 3 marks if candidate demonstrates good communication.</p> <p>NB A sequence of manufacturing stages can be given in place of a flowchart.</p>	<p>6</p> <p>3</p>	<p>9</p>

	<ul style="list-style-type: none"> Other parts assembled (adhesive/cement) or all parts could be designed to join/clip together edges may be flame polished attach handle. <p>Wood construction</p> <ul style="list-style-type: none"> pieces marked and cut (batch of 100) appropriate joining method (eg comb/finger joint using router/saw) routed groove or rebate for base parts assembled (glued and clamped) handle turned and attached appropriate finish. 	<p>Award credit where possible if response doesn't link to chosen material.</p>		<p>9</p>
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Desk Lamp (Jan 2011) RM

Fig. 8 shows a desk lamp.

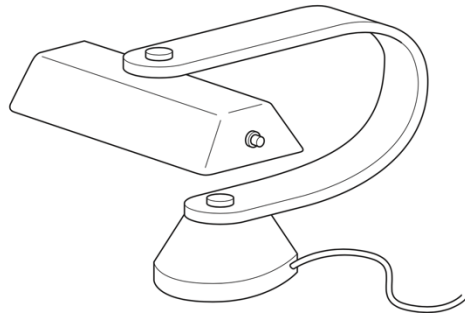
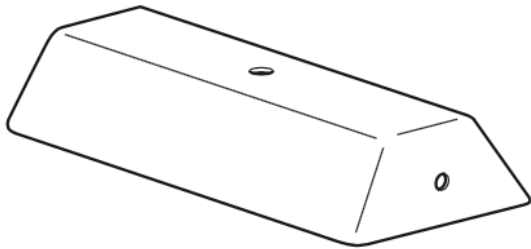


Fig. 8

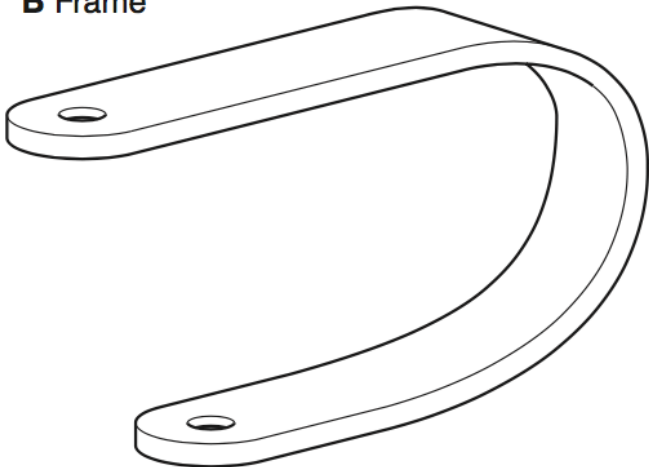
This question could be done 3 times – focusing on each part

(e) Fig. 9 shows parts of the desk lamp.

A Shade



B Frame



C Base

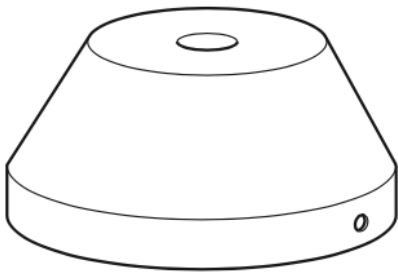


Fig. 9

Choose **one** of the parts shown in Fig. 9.

Chosen part

- (i) State a **suitable specific material** for the part that you have chosen.
Give **two** properties or characteristics that make the material suitable for this use.

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Desk Lamp

Describe, in detail, how the part you have chosen would be manufactured as a batch of 50.
Include details of jigs, presses or formers.
Use a flowchart and/or annotated diagrams to support your answer.

Desk Lamp MARK SCHEME pt1

Question			Expected answers	Rationale		Marks
	(e)	(i)	<p>State a suitable specific material for the part you have chosen.</p> <p>Give two properties or characteristics that make the material suitable for this use</p> <p>Part A shade</p> <p>Material</p> <ul style="list-style-type: none">• acrylic;• abs;• polypropylene;• aluminium;• chromed (or plastic coated) mild steel;• copper; <p>Properties or characteristics</p> <ul style="list-style-type: none">• high quality finish;• easily formed to required shape;• produces rigid structure;• in-keeping with rest of desk lamp design <p>Part B Frame</p> <ul style="list-style-type: none">• laminated beech/birch/maple• solid ash/ chestnut/ maple• aluminium;• chromed (or plastic coated) mild steel; <p>Properties or characteristics</p> <ul style="list-style-type: none">• high quality finish;• easily bent to required shape;• rigid structure (allows flex);• in-keeping with rest of desk lamp design	<p>award mark for other appropriate material not listed. 1x1 mark</p> <p>Award mark for other appropriate property/characteristic. 2x1 mark</p>	1	[3]
					2x1	
	(e)	(i)	<p>Part C Base</p> <ul style="list-style-type: none">• aluminium• turned hardwood beech/maple/ash• zinc• chromed (or plastic coated) mild steel; <p>Properties or characteristics</p> <ul style="list-style-type: none">• easily turned;• can have finish from cast;• suitable weight for stability;• in-keeping with rest of desk lamp design.			
Question			Expected answers	Rationale		Marks
		(ii)	<p>Describe, in detail, how the part you have chosen would be manufactured as a batch of 50. Include details of jigs, presses or formers.</p> <p>Use a flowchart and/or annotated diagrams to support your answer.</p> <p>Part A</p> <p>Vacuum forming</p> <ul style="list-style-type: none">• Before carrying out the vacuum forming process, a quality mould, identical to the finished product, has to be produced• The mould is placed on the bed or platen of the machine. The platen is then lowered and a piece of thermoplastic sheet is clamped into position onto an air-tight gasket• The heater is switched on until the plastic becomes soft. Once the plastic is soft the platen is raised and the mould pushes into the plastic• The heat is then removed and the vacuum pump switched on to remove the air. The plastic is forced against the mould by atmospheric pressure. Where a deep draw is required a top 'plug' may be used to push material into the mould during the forming process• The material is allowed to cool. The cooling process may be shortened with blown air or a fine water spray• The component is then released from the mould by introducing a small air pressure• After moulding, mould finishing may be performed (trimming, cutting, drilling, polishing)	<p>Level 1 (0 – 2 marks)</p> <p>Some stages outlined (up to 2), very limited description.</p> <p>Level 2 (3 – 4 marks)</p> <p>Key stages presented, reasonably well described with key features identified.</p> <p>Level 3 (5 – 6 marks)</p> <p>Process fully described, key features and technical details identified. Answer must include detail of specialist tooling and reference to template/system of checking batch of 10 for full marks.</p> <p>Quality of description and communication</p> <p>Basic sketch/chart with limited annotation 1 mark</p> <p>Good sketch/chart with main features identified and labelled 2 marks</p> <p>Detailed sketch/chart with clear annotation 3 marks</p> <p>Max 1 if no sketch used.</p> <p>Award credit where possible if response doesn't link to chosen material.</p>	6	[9]
					3	

Desk Lamp MARK SCHEME pt 2

Question			Expected answers	Rationale		Marks
		(ii)	<p>Part B Frame</p> <p>Laminated</p> <ul style="list-style-type: none">• male/female former prepared (suitable material for 50 units)• veneers pre cut• automatic glue spreading (one side)• silicon release on former (prevent glue damage)• veneers inserted into former• former closed – pressure applied• shape released• edge shaping• finish applied <p>Steam Bending</p> <ul style="list-style-type: none">• prepare steam chamber – heat up water• insert hardwood length• steam for approx 3 minutes for each mm thickness• prepare former to hold hardwood in desired shape, high quality finish,• remove from steam chamber, insert in former• secure for period (min 4 hours)• remove and use abrasive paper, drill hole• apply finish			
		(ii)	<p>Part C Base</p> <p>Casting (sand)</p> <ul style="list-style-type: none">• prepare high quality pattern• pattern face down on turnover board, drag placed around it• parting powder sprinkled over pattern• sand added, building up and tapping down until firm and levelled• turned over – cope added• runners positioned – parting powder• sand added, building up and tapping down until firm and levelled• mould taken apart – gates for runners cut• mould completed – pouring area cut, aluminium poured• mould left to cool – remove and shape/finish <p>Turned in wood</p> <ul style="list-style-type: none">• prepare block• attach to faceplate• bring guide as close as possible to work• set speed, use gouge for first cuts – rough shape• use scrapers then chisels to exact shape – template to check• drill hole using tailstock• glasspaper for final finish• add finish			

Toast Rack (June 2010) RM

Fig. 8 shows a toast rack to be used in a chain of hotels.

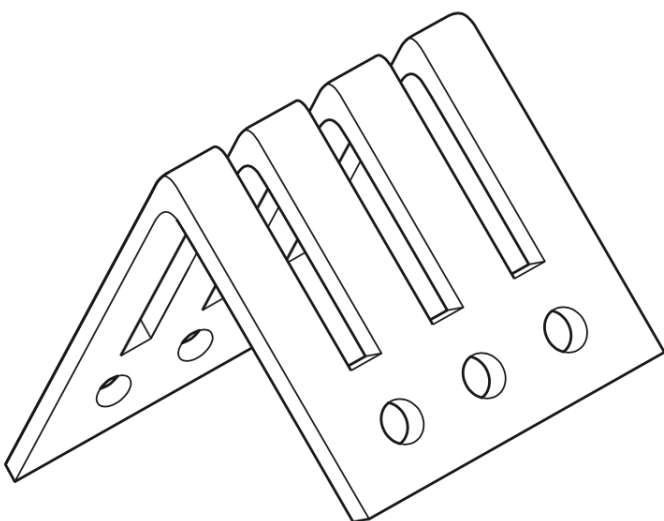


Fig. 8

State a **suitable specific material** for the toast rack shown in Fig. 8 and give **two** properties or characteristics that make the material suitable for this use.

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Toast Rack

Describe, in detail, how the toast rack shown in Fig. 8 would be manufactured as a batch of 50,000. Include details of specialist tooling used.

Use a flowchart and/or annotated diagrams to support your answer.

Toast Rack MARK SCHEME

(e) (i)	<p>State a specific suitable material for the toast rack and give two properties or characteristics that make the material suitable for this use</p> <p>Material</p> <ul style="list-style-type: none">• acrylic;• abs;• polypropylene;• laminated birch/beech/maple;• aluminium;• chromed (or plastic coated) mild steel;• copper;• Stainless steel <p>Properties or characteristics</p> <ul style="list-style-type: none">• high quality finish;• does not easily degrade/corrode;• easily formed to required shape;• produces rigid structure;	<p>award mark for other appropriate material not listed</p> <p>1x1 mark</p> <p>Award mark for other appropriate property/characteristic</p> <p>2x1 mark</p> <p>[3]</p>
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Question	Expected answers	Mark	Additional Guidance
(ii)	<p>Describe, in detail, how the toast rack shown in Fig. 8 would be manufactured as a batch of 50,000. Include details of specialist tooling used.</p> <p>Injection moulding</p> <ul style="list-style-type: none">• split mould prepared/preheated• plastic granules in hopper• granules heated in chamber, archimedian screw• molten plastic injected into mould• mould is water cooled• mould opens, toast rack is ejected• sprue/flashing removed <p>Laser cutting/thermoforming</p> <ul style="list-style-type: none">• design created CAD• print details setup/speed, thickness of material• laser cutter set up, auto focus• laser cut• auto removal/replacement• thermoformed using line bend system• held until shape set.• edges may be flame polished <p>Laminated</p> <ul style="list-style-type: none">• male/female former prepared (suitable material for 50,000 units)• veneers pre cut• automatic glue spreading (one side)• silicon release on former• veneers inserted into former• former closed - heat applied• shape released• edge shaping• finish applied		<p>Level 1 (0-2 marks) Some stages outlined (up to 2), very limited description</p> <p>Level 2 (3-4 marks) Key stages presented, reasonably well described with key features identified</p> <p>Level 3 (5-6 marks) Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks.</p> <p>Quality of description and communication</p> <p>Basic sketch with limited annotation 1 mark</p> <p>Good sketch with main features identified and labelled 2 marks</p> <p>Detailed sketch with clear annotation 3 marks</p> <p>Max 1 if no sketch used</p> <p>Award credit where possible if response doesn't link to chosen material.</p>
	<p>Stamped – pressing</p> <ul style="list-style-type: none">• stamping – press tool prepared• metal sheet positioned to ensure maximum usage, least wastage• metal secured, guards in place• press operated – produces blank• blank removed• next sheet/roll of metal positioned for next press (Candidates may describe process with roll of sheet metal and rotating drum stamping system.)• sharp edges ground• if appropriate, finish applied		

Folding Picnic table (Jan 2011) M

Fig. 6 shows a folding picnic table.

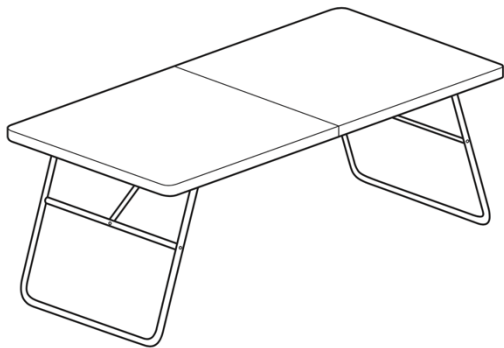


Fig. 6

Fig. 7 shows one of the legs from the picnic table.

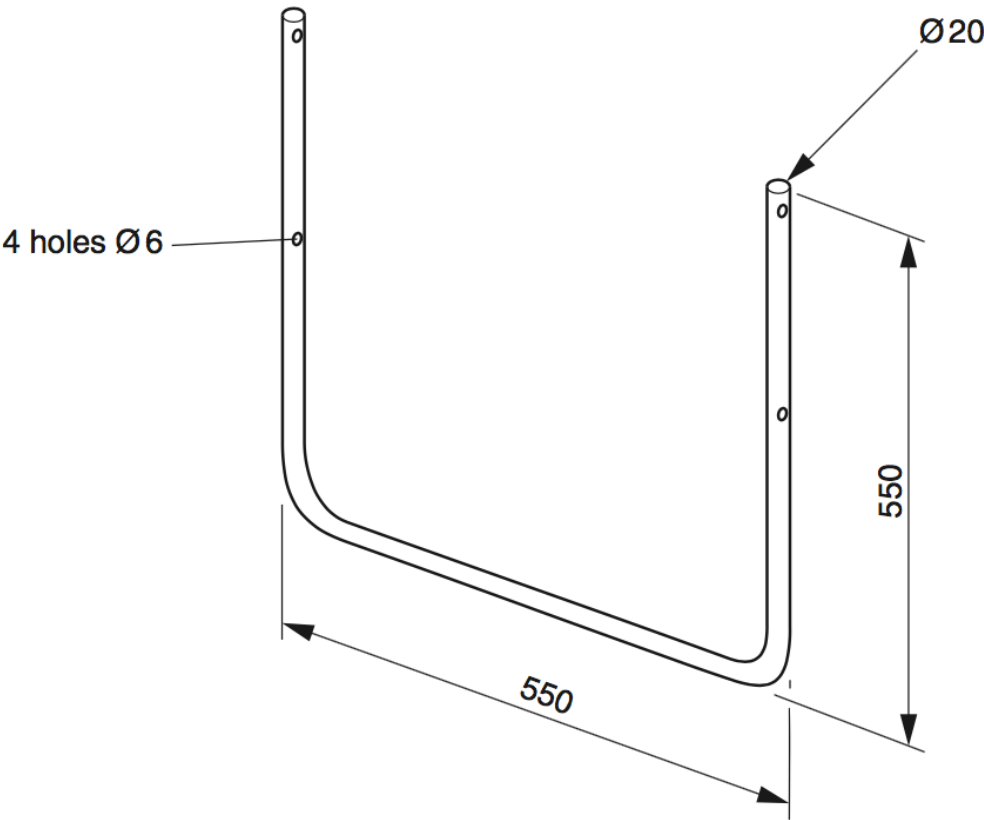


Fig. 7

- (e) (i) State a **suitable specific material** for the leg shown in Fig. 7.
Give **two** properties or characteristics that make the material suitable for this use.

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Folding Picnic table

Describe, in detail, how the leg shown in Fig. 7 would be manufactured as a batch of 10 000.

Include details of any special equipment and quality control checks that would be used.

Use a flowchart and/or annotated diagrams to support your answer.

Folding Picnic table

MARK SCHEME

Question		Expected answers	Additional Guidance		Marks
(e)	(i)	<p>State a suitable specific material for the leg shown in Fig. 7.</p> <p>Give two properties or characteristics that make the material suitable for this use.</p> <p>Material</p> <ul style="list-style-type: none">• Steel tubing (low carbon/mild/galvanised/stainless)• aluminium alloy tubing (accept aluminium)• brass tubing• composite (GRP/carbon fibre) <p>Properties or characteristics will include</p> <ul style="list-style-type: none">• Strength to weight ratio• Ease of forming/machining• Relative cost• Corrosion resistance• Durability	<p>1 mark</p> <p>Properties must relate to the material stated and be justified. eg not relative cost if brass or composite given.</p> <p>2x1 mark</p>	1	[3]

Question		Expected answers	Additional Guidance	Marks							
	(ii)	<p>Describe, in detail, how the leg shown in Fig. 7 would be manufactured as a batch of 10 000. Include details of any special equipment and quality control checks that would be used. Use a flowchart and/or annotated diagrams to support your answer.</p> <ul style="list-style-type: none">• Cut tubing to required length (QC – end stop on cut-off machine or gauge to ensure accuracy)• Drill 2 holes in each end of tube (QC – use of jig)• De-burr drilled holes (QC check alignment of all holes to ensure ease of assembly)• Produce bends using formers/hydraulic benders• (QC check position and angle of bends against template/gauge)• Degrease finished leg (remove lubricant used during bending)• Final QC check <p>Description to relate to ‘moulding’ not ‘bending’ if composite material (GRP/carbon fibre) used in (i)</p> <p>Bends may be formed before drilling</p> <p>Description of semi-automated machine must include details of stages and suitably annotated diagrams</p>	<p>Level 1 (0 – 2 marks) Some stages outlined (up to 2), very limited description, limited.</p> <p>Level 2 (3 – 4 marks) Key stages presented, reasonably well described with key features identified.</p> <p>Level 3 (5 – 6 marks) Process fully described, key features and technical details identified, Answer must include detail of quality control checks for full marks.</p> <p>Mark at lower end of scale if one-off manufacture described.</p> <p>Do not award marks for preparation of raw materials.</p> <p>Quality of description and communication</p> <table><tr><td>Basic diagrams/chart with limited annotation</td><td>1 mark</td></tr><tr><td>Good diagrams/chart with main features identified and labelled</td><td>2 marks</td></tr><tr><td>Detailed diagrams/chart with clear annotation</td><td>3 marks</td></tr></table> <p>Max 1 mark in this strand if no diagrams or flowchart used.</p> <p>Award credit where possible if response doesn't link to chosen material.</p>	Basic diagrams/chart with limited annotation	1 mark	Good diagrams/chart with main features identified and labelled	2 marks	Detailed diagrams/chart with clear annotation	3 marks	6	[9]
Basic diagrams/chart with limited annotation	1 mark										
Good diagrams/chart with main features identified and labelled	2 marks										
Detailed diagrams/chart with clear annotation	3 marks										

IKEA Chair (June 2011) M

Fig. 6 shows a chair with wooden side frames.



Fig. 6

Fig. 7 shows one of the wooden side frames for the chair.

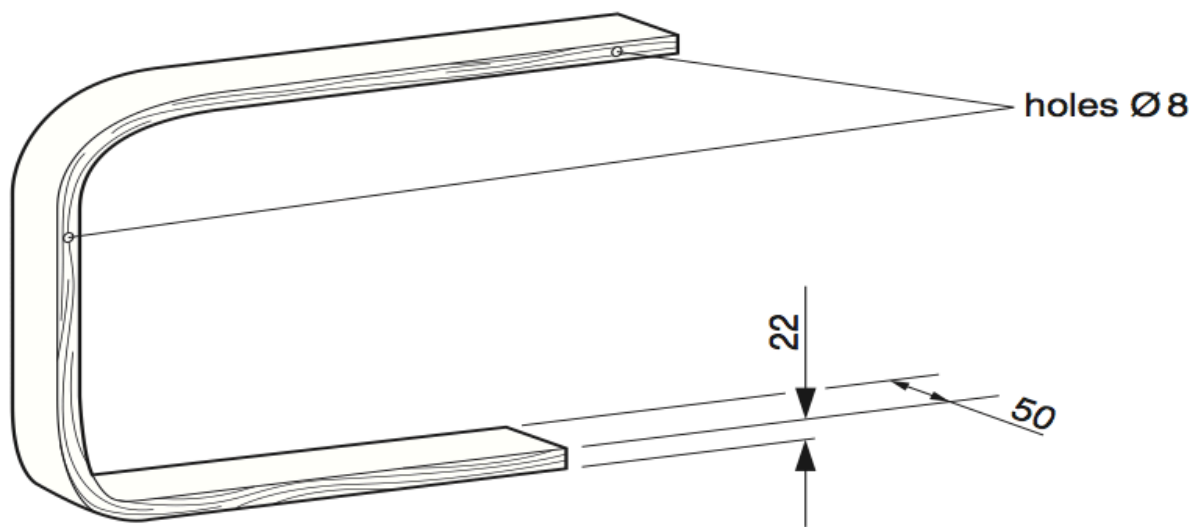


Fig. 7

- (e) (i) State a **suitable specific material** for the side frame shown in Fig. 7.
Give **two** properties or characteristics that make the material suitable for this use.

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IKEA Chair

Describe, in detail, how the side frame shown in Fig. 7 would be manufactured as a batch of 5000. Include details of any special equipment and quality control checks that would be used. Use a flowchart and/or annotated diagrams to support your answer.

IKEA Chair MARK SCHEME

5. Manufacturing				
Question		Expected answers	Additional Guidance	Mark
(e)	(i)	<p>State a suitable specific material for the side frame shown in Fig. 7.</p> <p>Give two properties or characteristics that make the material suitable for this use.</p> <p>Material</p> <ul style="list-style-type: none"> Suitable hardwood, eg beech, birch, maple, mahogany, cherry NOT MDF 	<p>Accept 'plywood' with no specified timber.</p> <p>1 mark</p>	1
		<ul style="list-style-type: none"> Laminated strips/veneers of hardwood. <p>Properties or characteristics will include</p> <ul style="list-style-type: none"> Strength/closeness of grain Visual appearance Sustainable resource Relative cost Suitability for bending/laminating. 	<p>Award 1 mark for other appropriate property/characteristic.</p> <p>2x1 mark</p>	2x1 3
	(ii)	<p>Describe, in detail, how the side frame shown in Fig. 7 would be manufactured as a batch of 5 000.</p> <p>Include details of any special equipment and quality control checks that would be used.</p> <p>Use a flowchart and/or annotated diagrams to support your answer.</p> <ul style="list-style-type: none"> Cut timber/strips to length Steam solid timber/glue strips for laminating (QC – control steaming time/ensure even coverage of strips with adhesive) Clamp softened timber/assembled strips onto pre-prepared former (QC – ensure full contact with former – visual; remove excess adhesive from edges of laminations) Drying timber/curing adhesive Remove completed arm from former (QC – ensure fully dried/cured) Trim ends of arm and finish to shape/size (QC – check against template for accuracy) Drill holes (QC – use of jig to ensure alignment) Final sanding Apply finish Final QC check 	<p>Level 1 (0-2 marks) Some stages outlined (up to 2), very limited description, limited.</p> <p>Level 2 (3-4 marks) Key stages presented, reasonably well described with key features identified.</p> <p>Level 3 (5-6 marks) Process fully described, key features and technical details identified, Answer must include detail of quality control checks for full marks.</p> <p>To achieve full marks, the described process must be relevant for the batch size. Award maximum of Level 1 if an inappropriate process for the product (or the batch number) is described.</p> <p>Quality of description and communication</p>	6
		Fully/semi-automated process to include the above stages; details required of special equipment/procedures at each stage.	<p>Basic diagrams/chart with limited annotation 1 mark</p> <p>Good diagrams/chart with main features identified and labelled 2 marks</p> <p>Detailed diagrams/chart with clear annotation 3 marks</p> <p>Max 1 mark in this strand if no diagrams or flowchart used.</p> <p>Award full 3 marks if candidate demonstrates good communication.</p> <p>NB A sequence of manufacturing stages can be given in place of a flowchart.</p> <p>Award credit where possible if response doesn't link to chosen material.</p>	3 9



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