

Design & Technology

A-Level

Joining Techniques

Multiple Choice

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- Use black ink or ball-point pen
- Try answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary
- Use a cross in the box to mark you answer



Advice

- Marks for each question are in brackets
- Read each question fully
- Try to answer every question
- Don't spend too much time on one question

Good luck!

Q1. What type of joint provides a strong interlocking join?

A Housing

☐

B Comb

☐

C Mitre

☐

Q2. What type of adhesive joins wood to wood?

A PVA

☐

B Epoxy resin

☐

C Contact adhesives

☐

Q3. Which method of joining is non-permanent?

A Brazing

☐

B Arc welding

☐

C Nuts and bolts

☐

Q4. Which one of the processes below involves the use of heat?

A Soldering

☐

B Pop riveting

☐

C Knock down fittings

☐

Q5. What is the name of the component shown below?

A countersunk head screw

☐

B knock down fitting

☐

C Pop rivet

☐

Q6. Which method of join is permanent?

A Nuts and bolts

☐

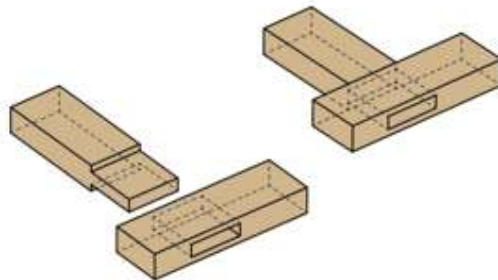
B Welding

☐

C Knock down fitting

☐

Q7. What type of joint is the diagram below?



A Half lap joint

☐

B Mortise and tenon

☐

C Dowel joint

☐

Q8. Which of the following statements is true?

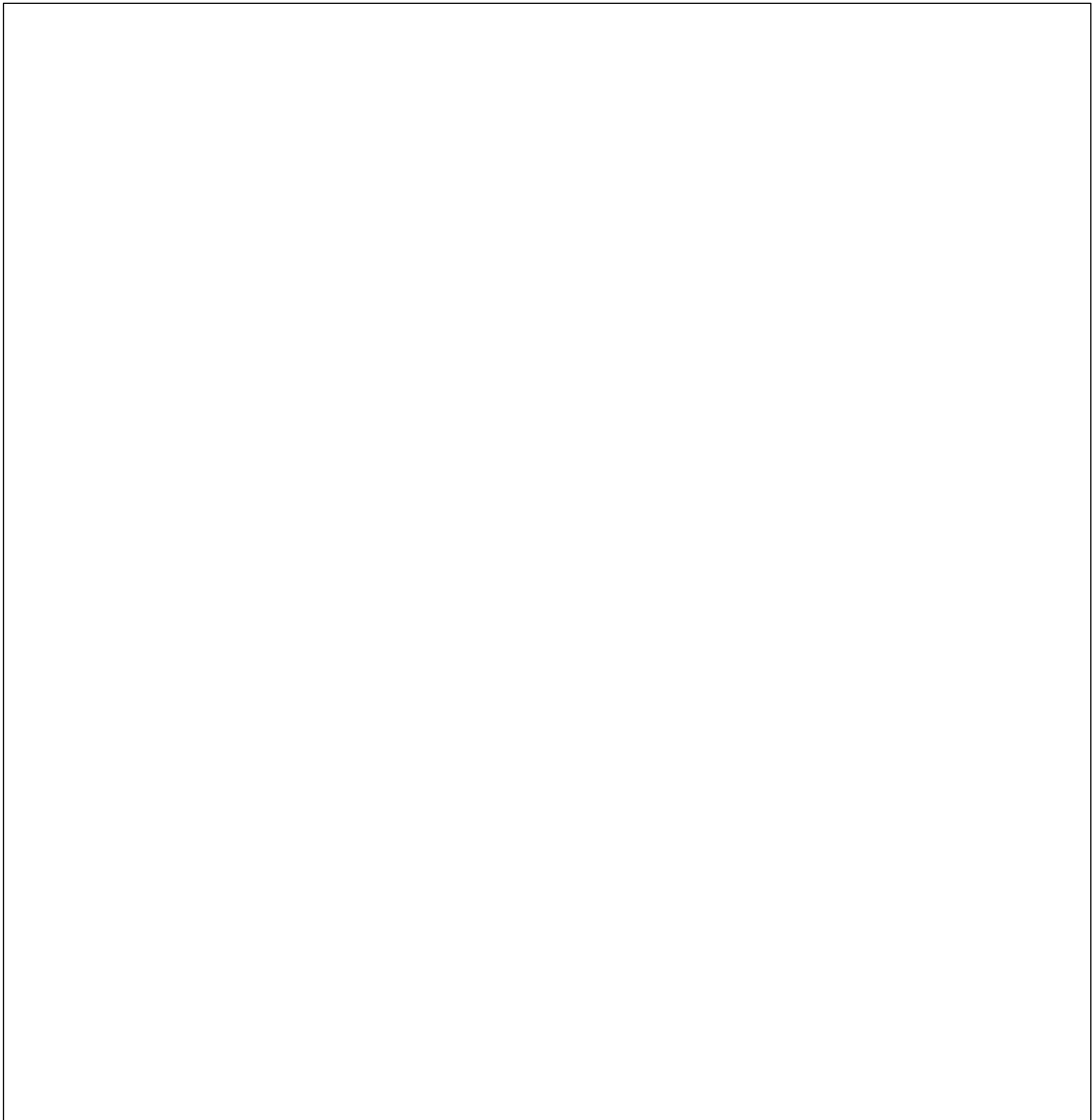
- A** Brazing needs filler, welding does not ☐
- B** Welding needs filler, brazing does not ☐
- C** Soft soldering produces a equally strong joint
than hard soldering ☐

Q9. Choose one of the addition processes in the table below


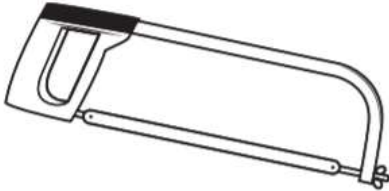


Lamination	Printing	Sewing	Soldering	Welding
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My chosen process is:

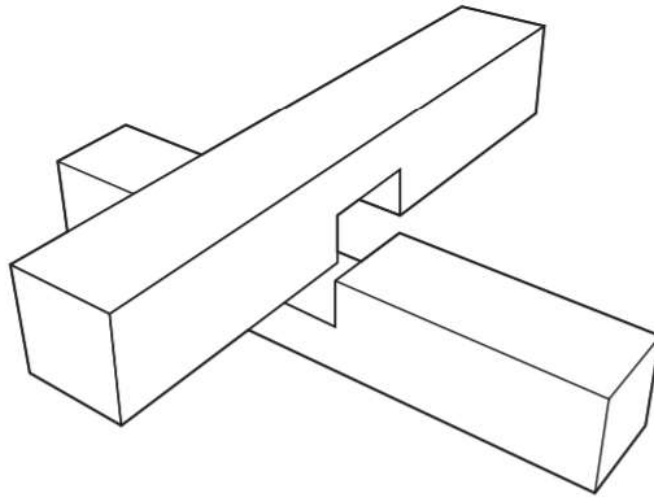
In the box below, use notes and sketches to describe your chosen process. Identify the equipment used in your chosen process. **(4 marks)**



Q10a. Complete the table below by giving the missing names and uses **(4 marks)**

Tools/equipment	Name	Use
		Making temporary joints
		Cutting metal
	Laser cutter	
	Tap wrench	

10bi. A cross halving join is used to join the 2 pieces of pine together.



Name three hand tools that would be used to mark out and make the cross halving **(3 marks)**

1.

2.

3.

10bii. Explain 2 advantages of using pine to make the frame rather than MDF **(4 marks)**

1.

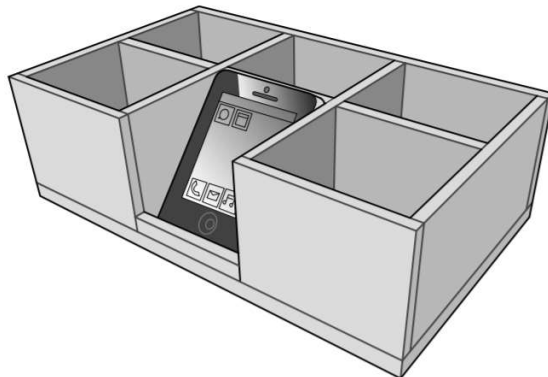
2.

10biii. The image below shows the frame of a mass-produced chair made from mild steel.



1 reason mild steel was chosen was because it is easily welded
Name 1 other method of joining mild steel which involves the use of heat **(1 mark)**

Q11. The drawing below a storage unit for a mobile phone and accessories



11a. Give 1 reason why 5mm thick acrylic would be suitable for making the storage holder. **(1 marks)**

11b. Explain 2 reasons for modelling the storage unit before making it from acrylic **(4 marks)**

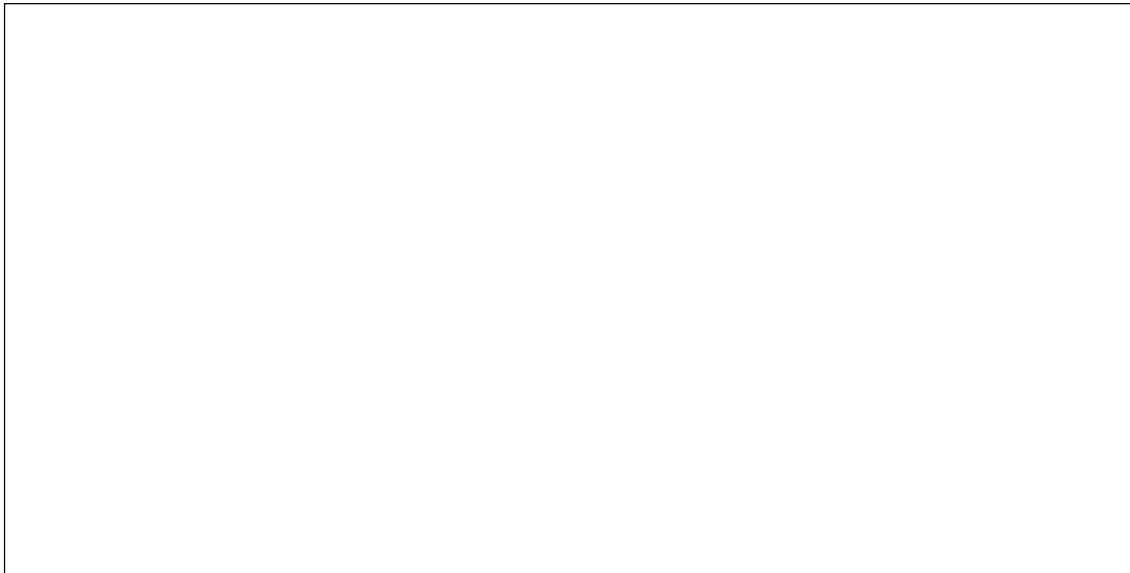
1.

2.

11c. Use sketches and notes to describe how the parts of the storage unit would be marked out, cut finished and fixed together **(4 marks)**

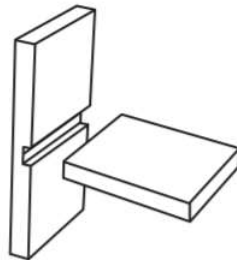
Your answer should include details of:

- Tools to be used
- Finishing techniques
- Named adhesives



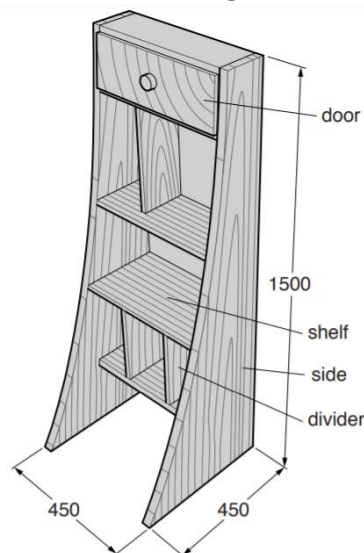
Q12. Name the most appropriate adhesive to use to permanently join 2 manufactured boards **(1 mark)**

Q13a. Name the type of joint shown below which is used in the frame **(1 marks)**



13b. Name an appropriate adhesive to use when gluing the joint **(1 mark)**

Q14. The figure below shows a storage unit for use in a bedroom



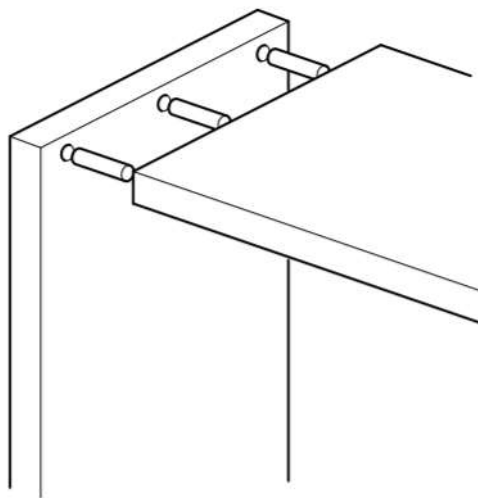
a. The unit is to be manufactured from 19mm thick veneered MDF
Name 1 suitable hardwood that could be used to veneer MDF **(1 mark)**

b. Explain 2 benefits, other than cost of using veneered MDF for the unit instead of solid wood **(4 marks)**

1.

2.

c. The figure below shows a dowel butt joint to fix the top of the storage unit to the side



List 4 stages required to mark out and make this joint **(4 marks)**

1.

2.

3.

4.

Answers

Q1. B

Q2. A

Q3. C

Q4. A

Q5. C

Q6. B

Q7. B

Q8. A

Q9.

Indicative content:

Lamination

Expect reference to lamination of paper, plastics, textiles or wood. Looking for reference to use in order to improve strength, stability, flexibility and possibly aesthetics, | Possible consideration of laminating machine with polymer pouches to stiffen and water proof card. Gluing layers of veneer under pressure (clamps) with adhesive using formers. Fabric interfacing to stiffen collars and caps on clothing.

Printing/3D printing

Expect reference to application on paper, card and textiles. Do not forget developing technologies using PLA polymer with 3D printing machines to manufacture parts/components etc. Specific additional printing techniques include screen printing, digital printing, offset lithography printing, flexography, dye sublimation printing, direct printing, mordant printing, discharge printing and resist printing e.g. batik.

Sewing

Expect reference to hand or machine. Candidates may share understanding of specific sewing techniques making a seam or adding decorative stitching/embroidery e.g. running, back, chain or blanket stitching or machine stitching like zig zag or overlocking stitch.

Soldering

Expect reference to use in electronics, hard (brazing) soldering and soft soldering. Soldering irons e.g. electronic component soldering or commercial electronic soldering like wave or flow soldering. Soft soldering using a gas torch used in for example by a silversmith may be considered. Use of flux to allow solder to flow.

Welding

Expect reference to welding metals or polymers.

Metals are welded using gas e.g. oxyacetylene using a very hot flame or MIG and TIG welding using a large electrical current to create heat and fuse metals together.

Polymers can be fused using either heat or chemicals. Chemical welding e.g. Tensol and solvent cement are common in school environments. Heat welding involves using a hot air gun and polymer filler rod of a range of thermoforming plastics e.g. HDPE.

Accept all other valid responses

Q10a.

	Name	Use
ai	Bolt / Hexagonal Bolt (1) (only answers)	
aii	Adjustable hacksaw / hacksaw (1) (only answers Do not accept saw on its own)	
aiii		Cutting / engraving materials Marking out / scoring (1)
aiv		Turning/holding a taper/ second/bottom/ plug/ tap to cut / form a screw thread (1)

4 x 1

Q10bi.

Any three tools listed from:

- Pencil (1)
- Ruler / tape measure (1)
- Marking knife / knife (1)
- Try square/combination square (1)
- Gauge/marketing gauge (1)
- Tenon/Dovetail/Back/Coping saw/Gentleman's saw (only accept 1 type of saw but DO NOT ACCEPT saw on its own)(1)
- Chisel (1)
- Mallet (1)
- Bench hook / G clamp (1)
- Vice (1)
- G-Clamp/Cramp

3 x 1

10bii.

Two advantages explained from:

- More durable (1) therefore pine will last longer (1)
- Tougher (1) therefore will withstand any knocks and bumps better (1)
- Better resistance to water/moisture (1) whereas MDF will soak up / expand / become useless (1)
- Pine is more aesthetic / looks better (1) whereas MDF is plain and has no grain / structure (1)
- Easier to cut joints in (1) whereas MDF will crumble because it has no grain /
- made from fibres (1)
- MDF will be significantly weaker than pine (1) when cut into to make the joint
- (1)
- Pine is less dangerous / safer to use than MDF (1) because MDF contains harmful chemicals / gives off fine dust when cut (1)

2 x 1

2 x 1

10biii.

One other method from: Brazing (1) Hard/Silver soldering (1) Soldering (1) (Do not accept any other form of welding – Arc / MIG)

1 x 1

Q11ai.

Any 2 properties from:

- Hard
- Ductile
- Malleable
- Toughness

11aii.

One reasons described from:

- Rigid/stiff/structurally strong
- Easy to stick/join together
- Aesthetic/looks nice/self-finished
- Easy to clean

11b.

Can see if size/shape are adequate for purpose (1) ... before final design is confirmed (1)

Can use cheap materials (1) ... before committing to plastic (1)

Can model in scale size (1) ... to reduce material content (1)

Will highlight deficiencies in design (1) ... and make cheap changes if necessary (1)

Finalised model speeds up production process (1) ... keeping costs down/profits up (1)

Look at aesthetics of the piece (1)

Can make sure components fit (1)

Make sure phone and accessories fit (1) (One description + one relevant explanation) = (1+1)x2

11c.

Mark out:

Try square/engineer's square; "Chinagraph" pencil; permanent marker pen; scribe; steel rule; CAD (e.g. 2D design)

Cut:

Laser/hacksaw/coping saw/fretsaw/"Hegner" saw/ scroll saw/band saw/, CAM

Finish:

File/wet n dry/polish/buffing mop(machine)

Adhesive:

Acrylic adhesive, glue or cement ("Tensol")/ epoxy(araldite)

Q12.

PVA / polyvinyl acetate (1)
(only answer)

Q13a.

Accept any one from:

Housing joint (1)
Housing (1)
(Only answer)

13b.

Accept any one from:

- PVA (1)
- Cascamite (1)
- Synthetic Resin (1)

(Only answers)

Q14a.

Suitable named hardwood –

Oak, Ash, Cherry, Beech, Elm, Mahogany, Birch, Teak

14b.

Benefit:

Uses stable substrate (base) ...

Base can be large width and length ...

Boards easier to work/cut ...

Base not limited to standard plank widths ...

Uses rare woods in a sustainable/environmental way ...

Uses less oak than solid oak ...

Explanation

... so less chance of warping/twisting

... so product can be used in a more decorative room

... so wide boards can be made and used

... so fewer joints seen

... as it is less dense

... so rare timbers can be managed better as more is made from each tree

... so outcome is still aesthetically pleasing

(One benefit + one explanation) = (1+1)x2

14c.

(1)Mark positions of holes

Mark centre line of cut end 9.5mm from face

Mark centres of 2-3 holes along centre line

Drill suitable holes at marked points, Ø6-8mm

Insert centre-point tool into holes

Mark line across top of side, 9.5mm down from top edge

Line up top with side and tap side to mark hole centres

Drill holes to suitable depth (less than 18mm deep)

Mark length of dowel

Tenon saw to cut dowels to length

Insert dowels into side holes

Dry-fit joint

(4) Apply PVA/wood glue to protruding dowels and assemble/tap top in place

Consecutive steps must commence with (1) and end with (4), with any two other intermediate stages Must specify type of glue Do not accept: mark out (given in question)

4 separate steps