

Design & Technology

Joining Techniques

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- Use black ink or ball-point pen
- Try to answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary
- For the multiple choice questions, circle your answer

Advice

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

Good luck!

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

- A** Dowel joint
- 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?

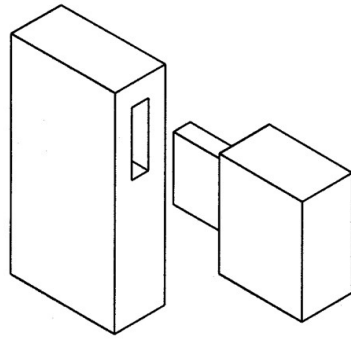


- A** Countersunk head screw
- B** Knock down fitting
- C** Pop rivet

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 sometimes needs filler
- B** Welding needs filler, brazing does not
- C** Soft soldering produces an equally strong joint than hard soldering

Q9. A curved beam has been laminated using an adhesive. Explain **two** reasons why PVA (polyvinyl acetate) adhesive should be used **(4 marks)**

1.

2.

Q10. A bespoke chair has been made using laminated hardwood.



Name **three** joints that could be used to join parts of the chair together **(3 marks)**

1.

2.

3.

Q11. The front wing panel for a mass produced car has been manufactured using sheet steel. It is attached to the steel supporting structure of the car.

Name **three** joining methods that could be used to attach the steel front wing panel to the steel supporting structure of the car during assembly **(3 marks)**

1.

2.

3.

Q12. Describe the main stages in the process of soft soldering **(6 marks)**

Q13. Hot melt glue is widely used in furniture manufacturing and packaging.
Give two benefits of using hot melt glue **(2 marks)**

Answers

Q1. B

Q2. A

Q3. C

Q4. A

Q5. C

Q6. B

Q7. B

Q8. A

Q9.

Any **two** valid reasons with linked justification:

- Provides a strong joint (1) so bridge can withstand a lot of weight / last a long time / be durable (1)
- Dries quickly (1) which reduces manufacturing time (1)
- Does not dry instantly (1) which allows time for positioning laminates / clamping in the former (1)
- Water resistant version could be used (1) so suitable for outdoors / close proximity to water (1)
- Requires no mixing / can be used straight out of the bottle (1) reducing waste / time (1)
- Dries clear / does not discolour the wood (1) so cannot be seen / will not detract from aesthetics / beams do not require cleaning / colouring / staining (1)
- Cheap (1) reducing overall costs (1)
- Non-toxic (1) so safe to use / no need for PPE / more environmentally friendly (1)

Q10.

Three appropriate joints from:

- Mortise and tenon (1)
- Dowel (1)
- Mechanical (screw) fixing (1)
- KD fixings / cross dowels / barrel nuts (1)
- Halving joint (1)
- Dovetail halving joint (1)

Q11.

Three appropriate joining methods from:

- Welded (1)
- Bolted / machine screwed (1)
- Self-tapping screwed (1)
- Bonded (adhesive) (1)
- Lapped seam (1)
- Riveted (1)

Q12.

- The components should be clean and free from grease or impurities (1)
- Flux may be used to help the solder flow and prevent oxidation when heating. The flux can be added separately or may be present in the core of the solder itself (1)
- The components should be held in place while being heated to approximately 200 degrees Celsius (1)
- Heating can be undertaken with a soldering iron, small gas blow torch or hot air gun depending on the application (1)
- The solder should be added to the joint (1)
- The heat source should be removed and the component or joint allowed to cool in order for the solder to return to a solid state (1)
- Any excess flux should be removed to prevent corrosion (1)
- An electrical circuit may be tested after soldering as part of effective quality control (1)
- A solder bath may be used to solder several components to a complete circuit board at one time (1)

Q13.

- Speed / ease of use / production (1)
- Bonds well / strong bond (1)
- Rapid set / can be moved immediately (1)
- Cramps / holding devices not needed (1)
- Can be automated (1)
- Can join dissimilar materials (1)
- Can flow to fill gaps / spaces (1)
- Accurate glue distribution / placement (1)
- Reduces wastage / glue can be reheated (1)
- Can come in a range of colours / clear (1)

- Relatively inexpensive (1)