

Design & Technology

Machining

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

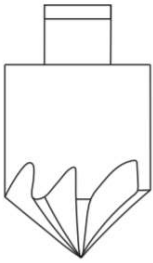
- Use black ink or ball-point pen
- Try to answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary
- For the multiple choice questions, circle your answer

Advice

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

Good luck!

Q1. Which type of drill is shown below?

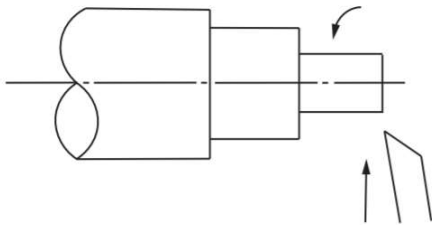


A Countersink

B Twist

C Masonry

Q2. Which turning process is shown in the diagram below?



A Parting off

B Facing off

C Taper turning

Q3. Which one of the following tools is an abrading tool?

A Plane

B File

C Twist drill

Q4. Which piece of safety equipment should be worn when using a pillar-drilling machine?

- A** Ear defenders
- B** Goggles
- C** Heat protective gloves

Q5. A screw thread M8 x 1.2 is to be cut in a metal block. What size hole must be drilled before the thread can be cut?

- A** 9.2mm
- B** 8mm
- C** 6.8mm

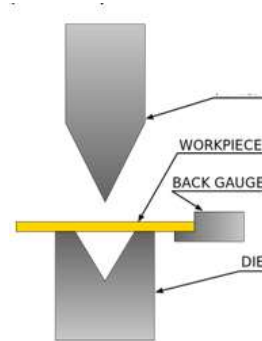
Q6. Which one of the following processes involves the use of heat?

- A** Vacuum forming
- B** Laminating
- C** Turning

Q7. In which order would you drill a hole with a countersink profile for a screw?

- A** Drill, screw, countersink
- B** Countersink, screw, drill
- C** Drill, countersink, screw

Q8. The figure below shows the machining method of pressing, there is a label missing in the figure.



Which one of the following is the correct label?

- A** Drill
- B** Drive centre
- C** Punch

Q9. Mild steel weights are turned on a centre lathe. Give **three** risks associated with turning on a centre lathe **(3 marks)**

1. _____

2. _____

3. _____

Q10. An aluminium component has been machined as part of a small batch of 50 using a milling machine. Explain **two** advantages of milling the aluminium component from a solid piece of material rather than making it from two separate pieces **(6 marks)**

1.

2.

Q11. A mass-produced steel front wing panel is produced using an automated machine process. The steel is supplied in roll form. Outline the process used to form the front wing panel from the steel roll **(6 marks)**

Q12a. Explain one property of mahogany that makes it a suitable material for turning on a wood lathe. **(2 marks)**

Q12b. Describe, using labelled sketches, how a square section of mahogany would be prepared and then turned into a cylinder, using a wood lathe. **(4 marks)**

Answers

Q1. A

Q2. B

Q3. C

Q4. B

Q5. C

Q6. A

Q7. C

Q8. C

Q9.

A maximum of **three** risks given from:

- Chuck key/work flying out (1)
- Bits flying off into your eyes / work coming out (1)
- Tie / hair /clothing getting caught (1)
- Tool banging into chuck (1)
- Cuts from swarf / waste material (1)
- Hot bits of metal / work burning you (1)
- Fingers/ hands caught/trapped/injuries (1)

Q10.

Any **two** of the following explanations that include identification of an advantage (1) and linked justifications of that advantage (1) + (1):

- An extra process is required (joining / welding) (1) which takes more time / more labour / more equipment / costs more (1)
- Welding produces a fillet / visible joint (1) which may compromise the shape / aesthetics / need removing (1)
- It gives a stronger component / less likely to break (1) as there is no joint / no weak point (1)
- More likely to be accurate (1) as parts do not need aligning (1)

Q11.

An outline covering **six** of the following:

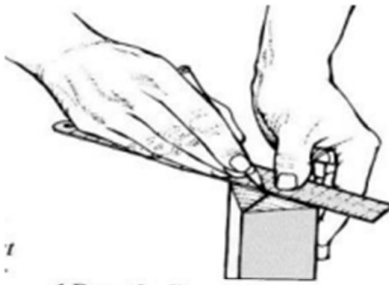
- Steel is straightened (1)
- Steel is cut to required blank size (1)
- Blank passes through an automated feeder (1)
- Blank loaded into press / former / die (1)
- Press is activated (1)
- High pressure forces sheet steel to take the shape of the former (1)
- Die cuts / stamps out any apertures / openings / holes / outline shape (1)
- Finished pressing is removed from the machine (1)

Q12a.

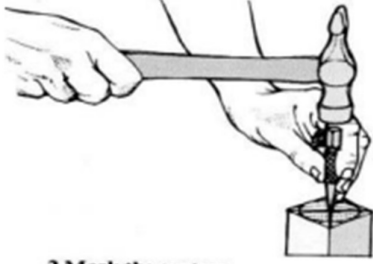
- Fine / tight / straight / even / dense grain (1) allows for a good finish / fine detail / machines well (1)
- Interlocking grain reduces the risk of splitting / cracking / splintering during turning (1) because Mahogany is a hard material (1)
- Mahogany has relatively few knots/blemishes (1) which would reduce the strength of the turned spindle / reduce the risk of an accident during manufacture (1)

Q12b.

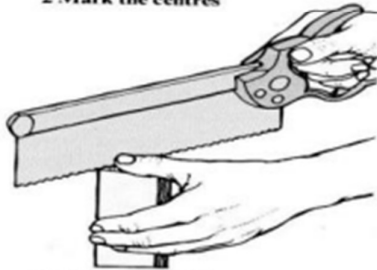
- Marking centre / diagonals (1)
- Cutting along the diagonals to embed drive centre / punch centre (1)
- Plane to an octagonal section / to remove corners (1)
- Mounting the workpiece in the lathe / between centres (1)
- Positioning the tool rest (1)
- Workpiece/mahogany rotates (1)
- Initial cut using roughing-out gouge/insert (1)
- Smooth with a skew chisel/insert (1)
- Sanding (1)
- Parting-off (1)



1 Draw the diagonals



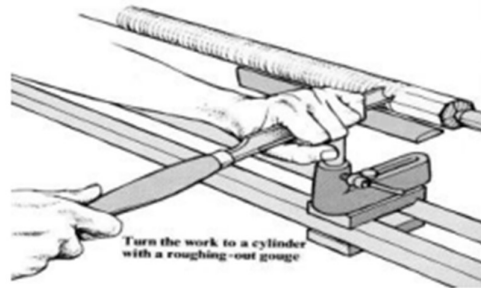
2 Mark the centres



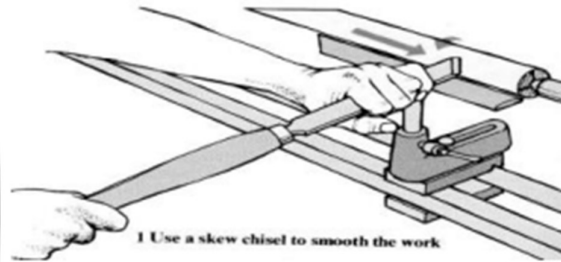
3 Cut shallow kerfs



4 Plane the stock to an octagon



*Turn the work to a cylinder
with a roughing-out gouge*



1 Use a skew chisel to smooth the work