DTBase©

Design & Technology
Eduqas GCSE

Timber: scales of production

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
- For the multiple choice questions, circle your 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. Which scale of production has the lowest set-up cost?

A One-off

B Batch

C Continuous

Q2. Which of these is a disadvantage of batch production?

A It is made to exact personal specifications

B There is down time between batches

C It has very low unit costs

Q3. Which device is a shape that is drawn round to mark out the same outline many times?

A Jig

B Former

C Template

Q4. Continuous production is when products are made:

A 24/7 without stopping

B One batch at a time

C Only when a customer orders one

Q5. Which of these timber products is made by high volume production?

A A bespoke fitted kitchen

B A staircase for a particular house

C Wooden pallets

Q6. Which of these is a disadvantage of using a jig?

A It needs a lot of skill to use

B It is only suited to the one part it was made for

C It reduces accuracy

Q7. A birch plywood stool is commercially produced in batches of 50,000. The manufacture of the stool relies on CNC (computer numerical control) machining. Outline two advantages of using CNC machinery to manufacture the stool. **(2 marks)**

Q8. The base of a wooden table top game is marked out using a template. Explain two advantages of using a template to mark out the game base when manufacturing in large quantities. **(4 marks)**

Q9. Kitchen cupboard doors are made with a frame and an inserted MDF panel. Explain two ways that jigs can be used to aid the manufacture of the kitchen cupboard doors. **(4 marks)**

Q10. A wooden toy is manufactured in a batch of 100. The rear wheels are made from 12 mm thick plywood using computer-aided manufacturing (CAM). The front section of the toy is marked out using a template.

Q10a. Explain two advantages of using CAM to manufacture the rear wheels of the toy. **(4 marks)**

Q10b. Explain two disadvantages of using a template to mark out the front section of the toy. **(6 marks)**

Q11. The main body of a toy creature is a block of pine with a sloping cut across one corner. The bodies are to be manufactured in a batch of 1000. Name two different techniques that could be used to batch produce the main body. Explain one advantage of using each technique. **(6 marks)**

Q12. A manufacturer who laser cuts the plywood parts for a light owns 25 laser cutting machines. Each plywood light takes 5 minutes to laser cut. Calculate how many plywood lights the manufacturer makes in an 8-hour shift using all 25 laser cutting machines. Show all workings. **(5 marks)**

Q13. A birch plywood stool is made in a factory that uses a batch production manufacturing system. Evaluate the benefits of this method of production. **(6 marks)**

Answers

Q1. A
Q2. B
Q3. C
Q4. A
Q5. C
Q6. B

Q7.

Any two (1 mark each):

- CNC machining is faster than cutting the legs and seat by hand, so it takes less time (1)
- CNC machining makes sure the birch is cut accurately every time (1)
- CNC machining needs less labour, so the stool can be made at a lower cost (1)
- Pilot holes and screw holes can be predrilled, making assembly easy for the customer (1)

Q8.

Two advantages (1 mark each), each with a linked justification (1 mark each). For example:

- Templates can be drawn or traced around (1), saving time and speeding up production (1)
- Each part will be identical (1), so every part will line up with the others (1)
- The template can also mark out features such as holes and fixing points (1), so all the other parts fit correctly into place (1)
- Templates need little skill to use (1), so workers without specific technical knowledge can use them (1)

Q9.

Two ways (1 mark each), each with a linked justification (1 mark each). For example:

- A jig can hold the door frame while the holes for the hinges or handles are drilled (1), so the holes are always in the same place, with less marking out and a faster process (1)
- A jig can hold the frame while it is glued and assembled (1), so the frame will be square (1)
- A jig can hold the frame while it is machined (1), so any profiles are all in the correct place, to the same size and depth (1)

Q10a.

Two advantages (1 mark each), each with a linked justification (1 mark each). Do not accept answers about working 24/7 or comparisons with making by hand. For example:

- The centre hole will be accurately placed in the centre (1), so the axle will be central to the outside edge (1)
- The wheel will be perfectly round with a clean, smooth edge (1), so it rolls without wobbling (1)
- All the wheels will be identical (1), so the toy will be level when they fit on the axles (1)
- The wheels can be nested (lay planned) in the CAD software (1), making the most efficient use of the plywood and reducing waste (1)
- Cutting speeds and feed rates can be set to give a perfect finish (1), so less finishing is needed afterwards (1)

Q10b.

Two disadvantages (1 mark each), each with two linked justifications (1) + (1). For example:

- The template could be the wrong size to start with (1), so every part marked out from it would be wrong (1), and the parts would not fit the rest of the toy (1)
- The template could get lost (1), so the other front pieces would need marking out by hand (1), and could end up different sizes (1)
- The template could wear or get damaged as it is used (1), so the parts get smaller the longer it is used (1), and will not fit (1)

- The template must be positioned correctly each time (1), and it might slip during marking out (1), giving parts that are the wrong size and wasting material (1)

Q11.

Two techniques (1 mark each), each with two linked justifications (1) + (1). Do not accept answers about marking out. For example:

- CAM or CNC machining (1): it can repeat the cut (1), making identical parts quickly and accurately (1)
- Cutting jigs (1): parts can be cut to shape and size (1) with little or no marking out (1)
- Cutting, sanding or wasting (1): the corner is cut off with a tenon saw or band saw (1) and finished on a disc or belt sander (1)
- Cutting template (1): a profile fixed to the work is followed or copied around (1), producing an exact, identical part each time (1)

Q12.

- 1 hour = 60 minutes (1)
- 8 × 60 = 480 minutes (1)
- 480 ÷ 5 = 96 lights per machine (1)
- 96 × 25 (1)
- = 2400 lights in 8 hours (1)

Credit any other appropriate calculation.

Q13. (6 marks)

Band	Marks	Descriptor
3	5 to 6	A coherent answer with detailed, relevant knowledge and understanding to evaluate the benefits of batch production. Relevant examples and well-developed, substantiated judgements in a logically structured response.
2	3 to 4	Some coherence, with partial knowledge and understanding. Mostly relevant examples and partly substantiated judgements in a generally structured response.
1	1 to 2	Basic knowledge and understanding. Limited relevant examples or judgements, with little structure.
0	0	Incorrect or irrelevant answers.

Indicative content:

- Many similar products are made together; each batch goes through one stage of the process before moving to the next
- Not fully automated like continuous flow, so more workers are on the production line
- Lower capital costs than other forms of production
- Flexible: can produce different variations or different products
- Works well for small production runs and can be tailored to demand and the target market
- Specialist machinery and workforce skills can increase production
- Time can be lost switching production runs to different products
- Tasks can be repetitive, which can demotivate staff
- Raw materials need to be stored for production runs
- Profits can be reinvested into making different products