

Write your name here

Surname

Other names

Centre Number

Candidate Number

Edexcel GCE

Design and Technology

Product Design: Resistant Materials Technology

Advanced Subsidiary

Unit 2: Design and Technology in Practice

Tuesday 22 May 2012 – Afternoon

Time: 1 hour 30 minutes

Paper Reference

6RM02/01

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches it must be dark (HB or B). Coloured pens, pencils and highlighter pens must not be used.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

Information

- The total mark for this paper is 70.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
– *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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PEARSON

Answer ALL the questions. Write your answers in the spaces provided.

1 Health and safety is an essential aspect of the workshop environment.

(a) State the meaning of the following workshop warning signs.

(i)

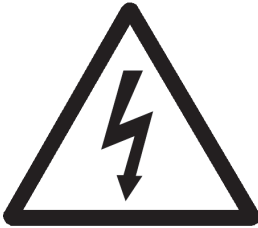
(1)



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(ii)

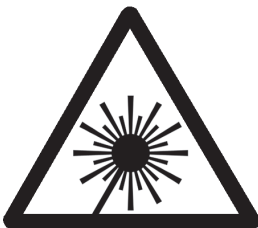
(1)



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(iii)

(1)



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(b) Workshop signs come in different shapes.

Outline the significance of circular shaped workshop signs.

(1)

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(c) Control of Substances Hazardous to Health (COSHH) regulations require employers to carry out risk assessments ensuring that employees are not put at risk from materials being used. One area these regulations deal with is the wearing of appropriate personal and protective equipment (PPE).

Outline **two** other areas that COSHH regulations cover.

(2)

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(Total for Question 1 = 6 marks)



- 2 Figure 1 shows a piece of exercise equipment with an enlargement of the plastic inserts used in the ends of the steel tubes.

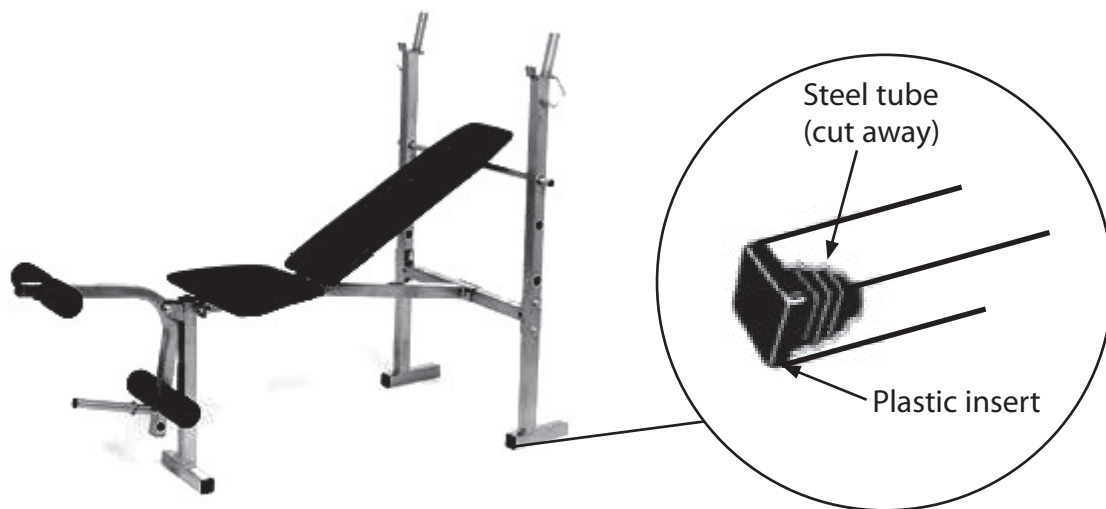


Figure 1

- (a) (i) Name a suitable polymer from which the tube inserts could be made.

(1)

-
- (ii) Name the process used to manufacture the inserts.

(1)



(b) The frame of the exercise equipment is manufactured from mild steel.

Explain **three** key properties that make mild steel a suitable material for this situation.

(6)

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(c) The mild steel tube is assembled using a metal inert gas (MIG) welding system.

Outline, using notes and/or annotated sketches, the features of the MIG welding process.

(4)

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(d) Welding jigs are used during the manufacturing of the frames.

Explain **two** reasons why jigs reduce the costs of manufacture.

(4)

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(Total for Question 2 = 16 marks)



3 (a) Draw a labelled diagram to illustrate the construction of block-board.

(3)



(b) Explain **three** reasons why medium density fibreboard (MDF) might be selected for furniture manufacture in preference to solid timber.

(6)

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(Total for Question 3 = 9 marks)



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- 4 Figure 2 shows an image of a trophy made up of a polystyrene moulding and a hardwood base.

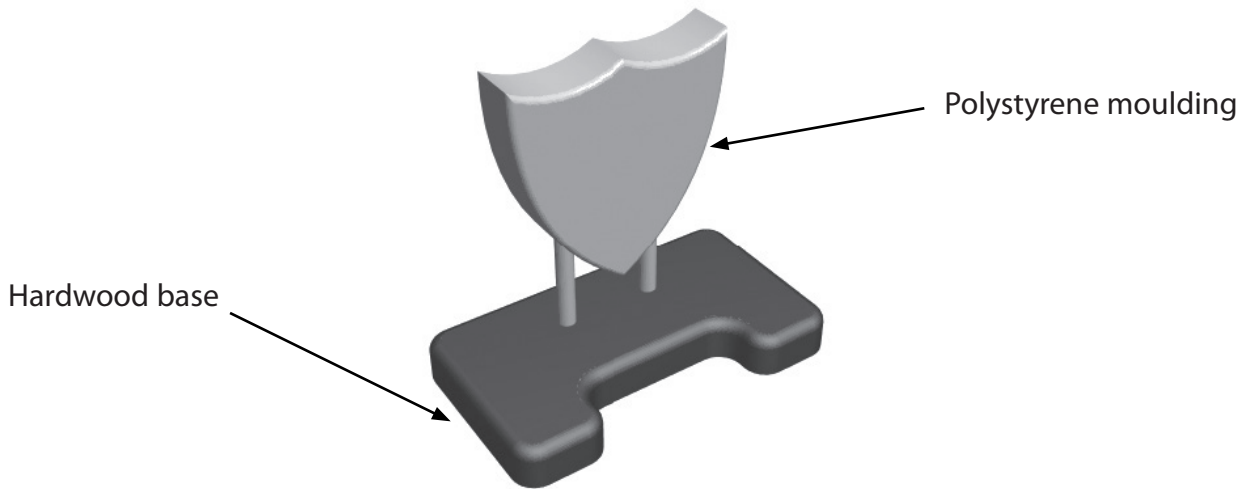


Figure 2

- (a) Give **four** reasons why a computer numerically controlled (CNC) router was selected to manufacture the hardwood base of the trophy.

(4)

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4



(b) The legs of the polystyrene moulding are fixed into the holes in the base using epoxy resin adhesive.

(i) Outline how the adhesive is prepared for use.

(1)

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(ii) Outline **three** reasons why this adhesive was selected.

(3)

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(Total for Question 4 = 8 marks)



5 (a) Figure 3 shows a winch and an enlarged illustration of the gear system it uses.

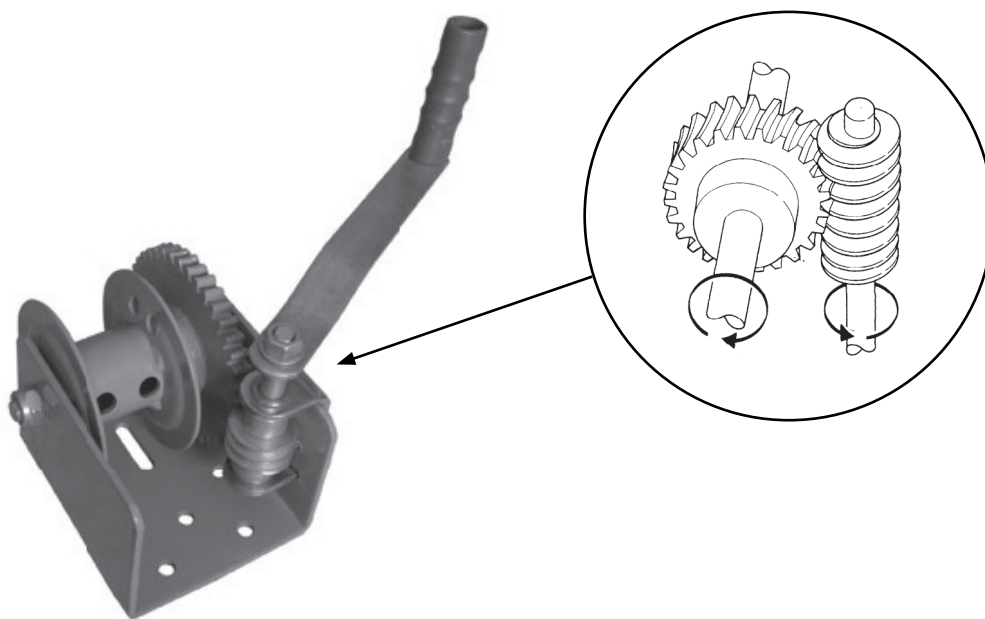


Figure 3

(i) Name the type of gear system shown.

(1)

(ii) Explain **two** reasons why these gear systems are suitable for use in winches.

(4)

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*(b) Plain bearings are used on the axles of the winch.

Justify why plain bearings were selected in preference to ball bearings in this situation.

(4)

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(Total for Question 5 = 9 marks)



- 6 Figure 4 shows one of a batch of machine vices, the body of which has been manufactured using sand casting.



Figure 4

- (a) Outline **two** reasons why sand casting is an appropriate method for manufacturing the body of the machine vice.

(2)

1

2



(b) Draw a labelled diagram to illustrate the structure of a split sand mould suitable for casting one of the vice bodies. (You do not need to show the detailed shape of the vice body.)

(5)



*(c) A batch of one thousand machine vices are to be manufactured.

Justify the selection of die casting in preference to sand casting for this scale of production.

(6)

A series of horizontal dotted lines provided for writing the answer to the question.

(Total for Question 6 = 13 marks)



7 (a) Figure 5 shows the European compliance symbol.



Figure 5

(i) State what a business has to do in order to be able to use the symbol on its products.

(1)

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(ii) Explain why the CE mark was established.

(2)

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* (b) Discuss the implications for a company that is considering upgrading its quality assurance systems to total quality management (TQM) practices.

(6)

Dotted lines for writing.

(Total for Question 7 = 9 marks)

TOTAL FOR PAPER = 70 MARKS



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