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 14 May 2013 – Morning
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   Trees are classified as either hardwood or softwood.

(a) Give **one** reason why a tree is classified as a hardwood.

(1)

....

....

Turn to page 3 for question 1(b).

Figure 1 shows a picture of a toy made from beech.
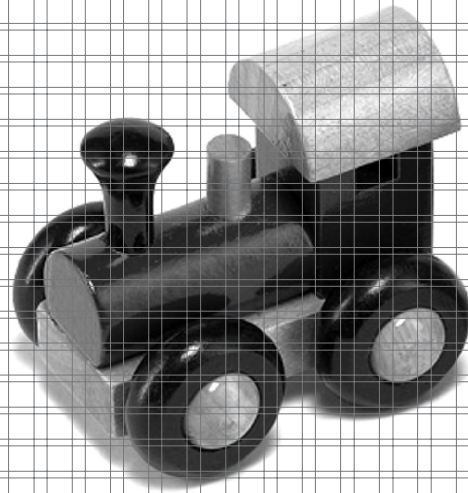
Figure 1

(b) Explain **three** reasons why beech is a suitable material for the toy.

(6)

1 ....

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....

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2 ....

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3 ....

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....

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Figure 2 shows a plank of solid timber.

Figure 2

(c) Draw a diagram to show how the plank would 'cup' if it was not seasoned carefully.

(2)

(Total for Question 1 = 9 marks)

2 Figure 3 shows a bracket made from 10 mm thick mild steel plate with two holes drilled through it.

10 mm thick
mild steel plate
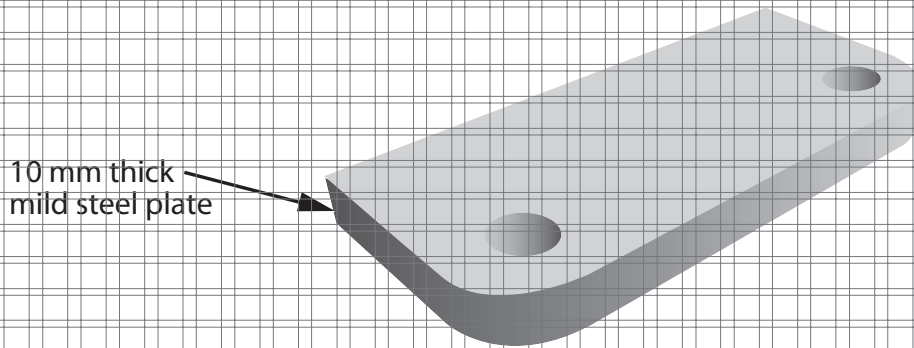
Figure 3

(a) One item of personal protective equipment (PPE) that would be worn when drilling the holes using a bench drill is a pair of goggles.

Name **three** other items of PPE that could be worn in this situation.

(3)

1 ....
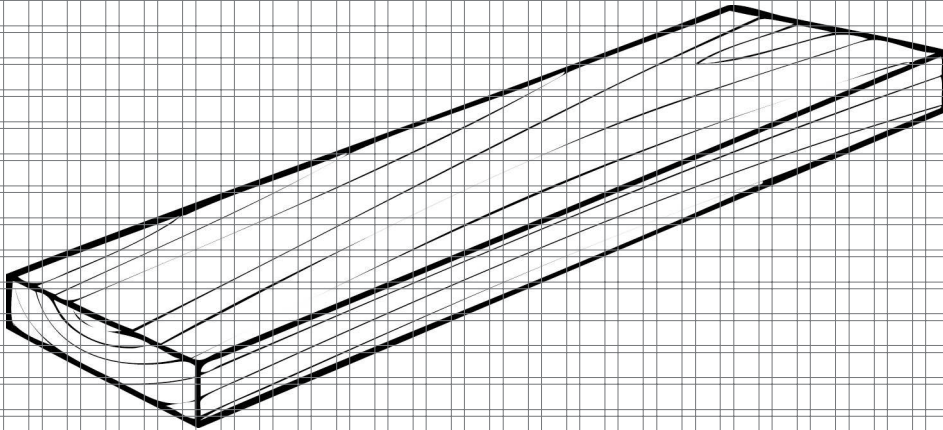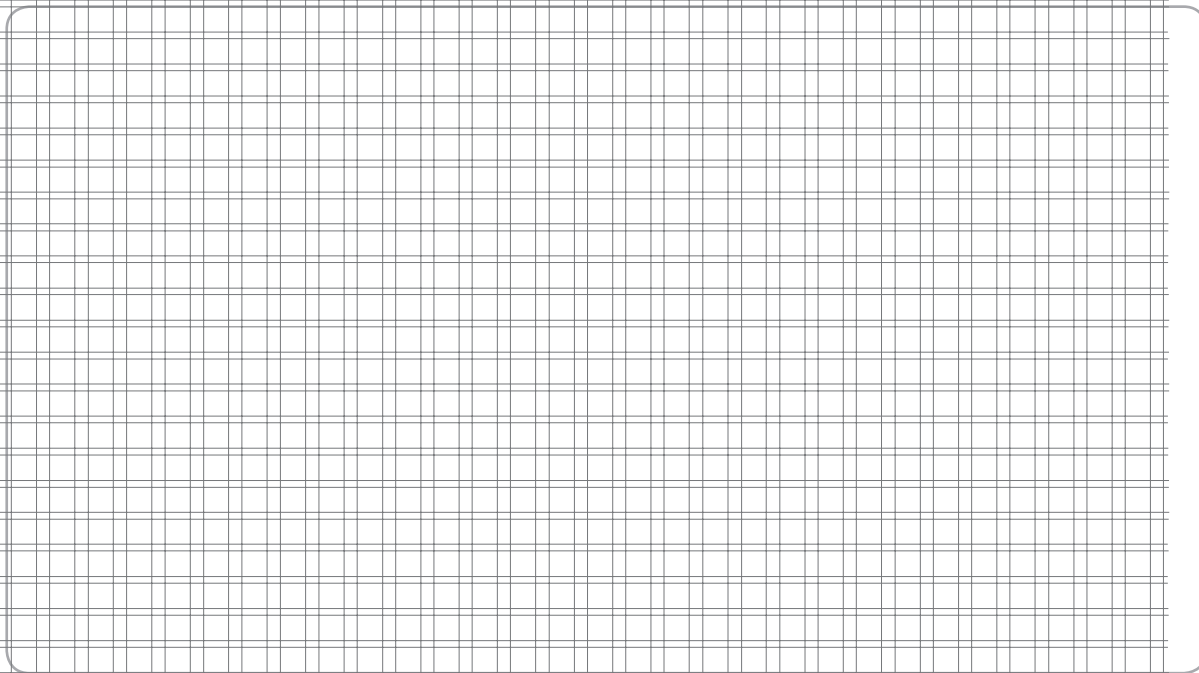
2 ....

3 ....

(b) Before the holes are drilled the mild steel needs to be centre punched.

State why centre punching is needed.

(1)

....

....

....

(c) Give **three** reasons why cutting fluids would be required when drilling holes in the 10 mm thick mild steel plate.

(3)

1 ....

....

2 ....

....

3 ....

....

(Total for Question 2 = 7 marks)

Turn over ▶

3 There is a wide range of fixing components available for joining materials together.

(a) State **one** benefit of using each of the following components:

(i) Wing nut

(1)

....

....

....

(ii) Spring washer

(1)

....

....

....

(b) Draw a countersunk head machine screw in the box below.

(2)

(c) Three common thread forms used in engineering are:
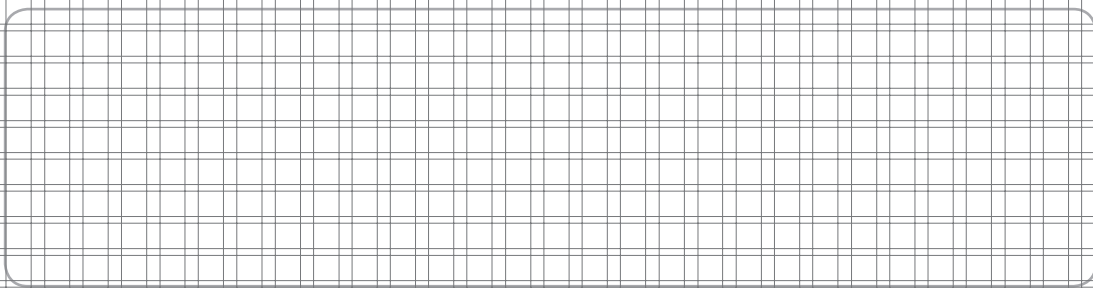
- V-thread

- Buttress thread

- Acme thread

Choose **two** of the thread forms listed above.

Draw a diagram to show the profile of each thread and give **one** working characteristic which results from its specific shape.

(2)
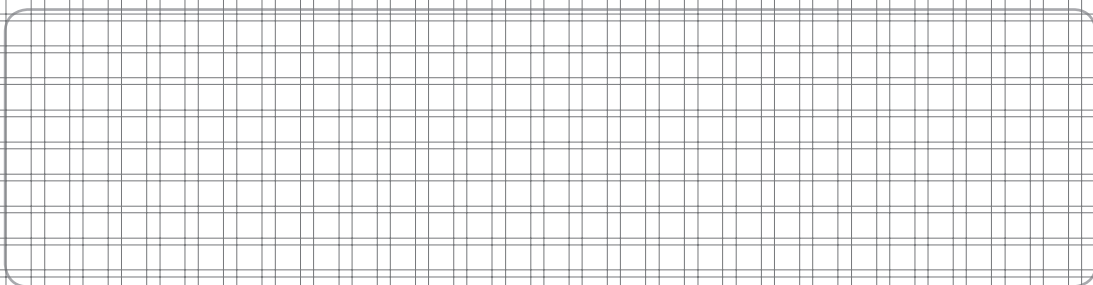
(i) Chosen thread form 1 ....

Working characteristic

....

....

....

(2)

(ii) Chosen thread form 2 ....

Working characteristic

....

....

....

(Total for Question 3 = 8 marks)

4 Figure 4 shows two views of a mains plug. The body of the plug is made from urea formaldehyde.
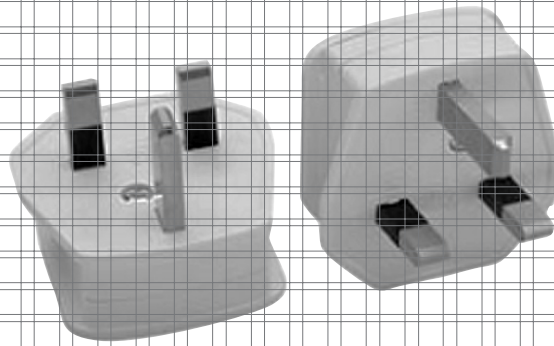
Figure 4

(a) Explain **three** reasons why urea formaldehyde is a suitable material for the body of the plug.

(6)

1 ....

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....

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2 ....

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....

....

3 ....

....

....

....

(b) Photochromic paint is a smart material.

Explain the 'smart' action of photochromic paint.

(2)

*(c) Justify the use of electroluminescent (EL) lighting over other forms of lighting.

(6)

(Total for Question 4 = 14 marks)

P 3 9 2 5 4 A 0 9 1 6

5 Adhesives are used in a range of different situations.

(a) Name **one** adhesive used to chemically bond two pieces of acrylic together.

(1)

....

(b) Describe the process of using PVA adhesive to join two pieces of wood.

(3)

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(c) Justify the use of hot melt glue when constructing a model out of material off-cuts.

(4)

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(d) Many adhesives contain volatile organic compounds (VOCs).

State **two** risks to health posed by adhesives that contain VOCs and identify the subsequent control measures required when using them.

(4)

Risk 1 ....

....

Control measure ....

....

Risk 2 ....

....

Control measure ....

....

(Total for Question 5 = 12 marks)

6 Outline the advantages of using a laser for cutting out shapes from sheet material rather than using a milling machine or router.

(4)

(Total for Question 6 = 4 marks)

7 (a) There are a range of organisations that deal with safety and quality standards.

Describe the role of the International Standards Organisation (ISO).

(2)

*(b) Manufacturers must have quality assurance (QA) systems in place in order to ensure that customers receive quality products.

Explain the different aspects of a quality assurance system.

(6)

(Total for Question 7 = 8 marks)

*8 Evaluate the suitability of a continuous production system for the manufacture of drinks cans.

(8)

(Total for Question 8 = 8 marks)

TOTAL FOR PAPER = 70 MARKS

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