OCR
Oxford Cambridge and RSA

Thursday 4 June 2015 – Afternoon

GCSE DESIGN AND TECHNOLOGY Industrial Technology

A545/01 Sustainability and Technical Aspects of Designing and Making

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
None

Duration: 1 hour 30 minutes

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions in Section A **and** Section B.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **80**.
- All dimensions are in millimetres unless stated otherwise.
- The quality of your written communication will be taken into account in marking your answers to the questions marked with an asterisk (*****).
- This document consists of **16** pages. Any blank pages are indicated.

SECTION A

Answer **all** the questions.

You are advised to spend 40 minutes on this section.

On questions 1–5 circle your answer.

1 Primary recycling means that:

(a) Products are used again

(b) Products are reprocessed into new materials

(c) Product parts are separated before recycling

(d) Products are buried in landfill sites

[1]

2 Environmentally friendly energy sources are known as:

(a) Hybrid energy

(b) Nuclear energy

(c) Green energy

(d) Non-renewable energy

[1]

3 Packaging:

(a) Ensures that a product is low cost

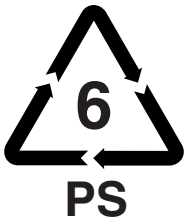
(b) Is good for the environment

(c) Protects a product

(d) Saves energy

[1]

4 The symbol shown means:



(a) Plastic recycling station

(b) Plastic systems

(c) Polystyrene

(d) Polyvinyl section

[1]

5 When exposed to temperature change, thermochromic materials:

(a) Case harden

(b) Change colour

(c) Change shape

(d) Work harden

[1]

6 Name **one** renewable source of energy.

..... **[1]**

7 State the full name of the plastic PVC.

..... **[1]**

8 State the term used to describe a business with poor working conditions.

..... **[1]**

9 Name the 6R which describes when a consumer decides not to buy a product.

..... **[1]**

10 State the term used to measure the impact of our actions on the environment.

..... **[1]**

Decide whether the statements below are **True** or **False**.

Tick (✓) the box to show your answer.	**True**	**False**	
11 Biodegradable products harm the environment	☐	☐	**[1]**
12 Polypropylene cannot be recycled	☐	☐	**[1]**
13 Oil is a renewable source of energy	☐	☐	**[1]**
14 Risk assessment identifies dangerous situations in the workplace	☐	☐	**[1]**
15 Insulating homes reduces energy consumption	☐	☐	**[1]**

16 Fig. 1 shows a bicycle with a frame made of laminated wood.

Fig. 1

(a) Give **three** benefits to the environment of a laminated wood frame compared to a traditional steel frame.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(b) The bicycle is manufactured by an ethical company.

Explain what is meant by the term 'ethical company'.

.....

.....

.....

.....

.....

..... **[3]**

(c)* The bicycle was designed using the process of eco-design.

Explain the process of eco-design and how it helps reduce harm to the environment.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[6]**

(d) Fig. 2 shows a dynamo which generates electricity for powering the lights on the bicycle when the front wheel is rotated.

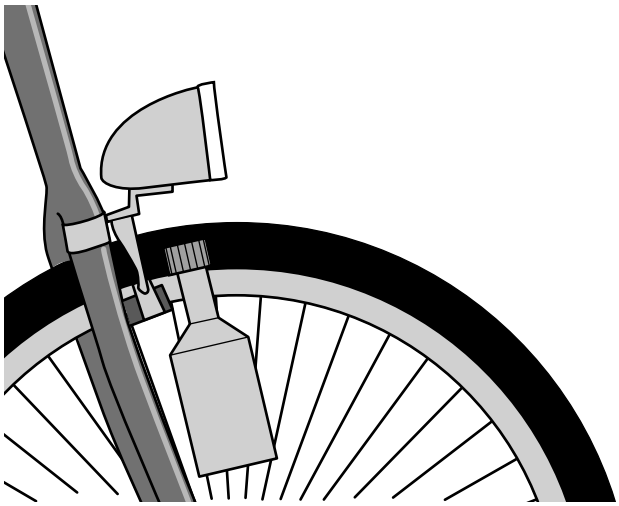


Fig. 2

Use sketches and notes to show how the dynamo could be attached to the bicycle fork.

Your design should:

- Clamp the dynamo securely to the fork
- Allow the dynamo to be quickly removed from the fork
- Be made of a named recyclable material.

[4]

(e) Give **two** ways in which a dynamo powered bicycle light is more eco-friendly than one that is battery powered.

1 .....

.....

2 .....

.....

[2]

(f) The dynamo is designed so that it can be disassembled.

Explain why this helps the dynamo to be easily recycled.

.....

.....

.....

..... **[2]**

Section B

Answer **all** the questions.

You are advised to spend 50 minutes on this section.

17 Most tools are made from ferrous metals.

(a) Name **two** ferrous metals.

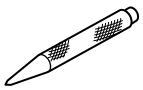
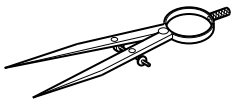
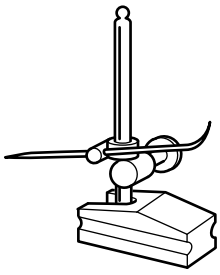
1 .....

2 .....

[2]

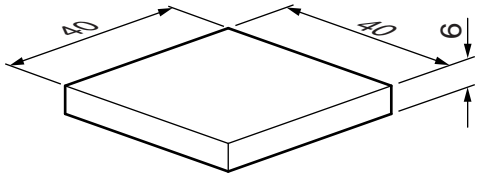
(b) The table below shows a number of tools used when marking-out on metal.

Complete the table by giving the name of each tool and stating what it is used for.
The first one has been done for you.

Tool	Name of tool	Use of tool
	Centre punch	For marking the centre of a hole before drilling
		
		
		

[6]

(c) A Ø6 hole is required in the centre of the square metal blank shown below.



Describe how to find the centre of the blank, and state what tools would be used.

.....

.....

.....

..... **[2]**

(d) Fig. 3 shows the vice used to hold the square blank for drilling the hole.

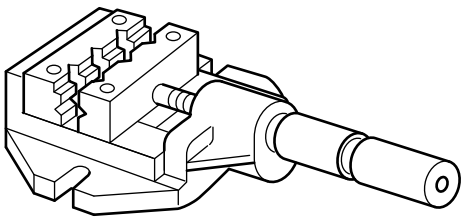


Fig. 3

(i) Tick (✓) to show the correct name for the vice shown in Fig. 3.

Bench vice	Hand vice	Machine vice

[1]

(ii) Explain **two** safety precautions, other than clamping work, that should be taken when using a drilling machine.

1 .....

.....

.....

.....

2 .....

.....

.....

.....

[4]

18 Fig. 4 shows an adjustable jig for bending metal strips.

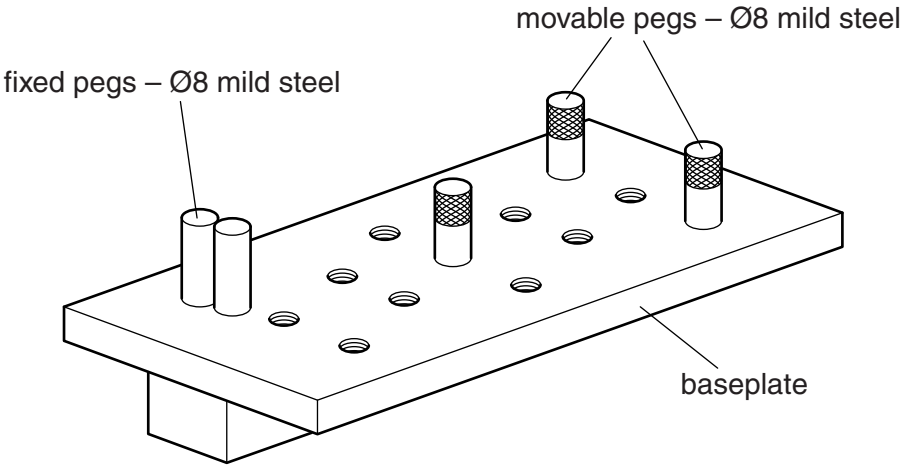


Fig. 4

(a) The fixed pegs are brazed into holes in the baseplate.

Complete the list below to show the stages needed to braze the fixed pegs into the baseplate.

Stage 1 Drill the holes for the pegs

Stage 2 .....

Stage 3 .....

Stage 4 .....

Stage 5 .....

Stage 6 Allow to cool

[4]

(b) The movable pegs screw into M6 threaded holes in the baseplate.

(i) Tick (✓) to show the size of hole that should be drilled before cutting the M6 thread.

5.0 mm	6.0 mm	7.0 mm

[1]

(ii) Name **two** tools needed to cut the M6 threads in the baseplate.

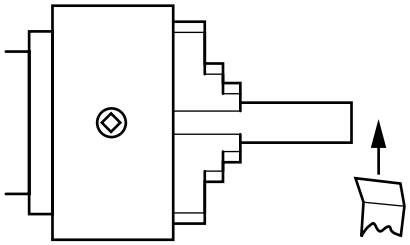
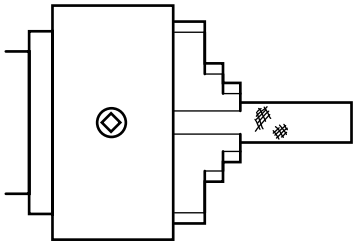
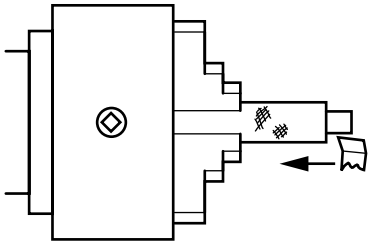
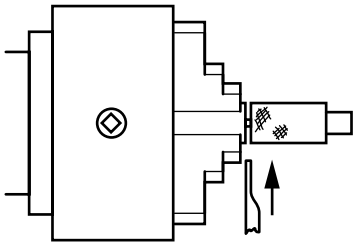
1 .....

2 .....

[2]

(c) The table below shows processes used to make the movable pegs on a centre lathe.

(i) Complete the table by giving the name of each of the processes shown.

Process	Description of process	Name of process
	Cutting across the end of the Ø8 mild steel bar	
	Putting a grip on the outside of the round bar	
	Making the diameter of the bar smaller for the thread to go on	
	Cutting off the finished peg	

[4]

(ii) Name **two** materials used to make cutting tools for lathes.

1 .....

2 .....

[2]

(d) Lathes are often Computer Numerically Controlled (CNC).

Name **two** other CNC machines.

1 .....

2 .....

[2]

19 Fig. 5 shows a rack for holding round files.
The rack is made from acrylic sheet 3 mm thick.

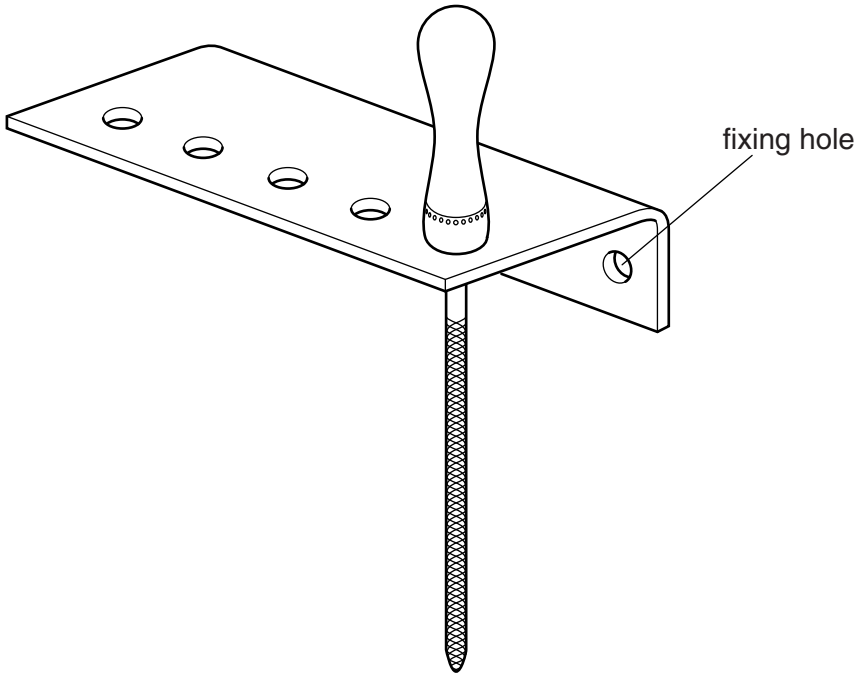


Fig. 5

(a) Give **two** reasons why acrylic is a suitable material for the file rack.

1 .....

2 .....

[2]

(b) Acrylic is a thermoplastic.

Name **three** other thermoplastics.

1 .....

2 .....

3 .....

[3]

(c) When the rack was used, it was found that:

- the rack bends when five files are put in it
- the files are difficult to get out of the rack.

Use sketches and notes to show how the file rack could be modified to overcome these two problems.

The modified design must use the same thickness acrylic as the original file rack.

[4]

(d)* Explain the advantages and disadvantages of using CAD/CAM when designing and developing products.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[6]**

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE