OCR
Oxford Cambridge and RSA

Friday 24 May 2019 – Afternoon

LEVEL 1/2 CAMBRIDGE NATIONAL IN ENGINEERING MANUFACTURE

R109/01 Engineering materials, processes and production

Time allowed: 1 hour

7743052389

Candidates answer on the Question Paper.

OCR supplied materials:
- None

Other materials required:
- None

R109/01

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

INSTRUCTIONS
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- 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).

INFORMATION
- The total number of marks for this paper is **60**.
- The number of marks for each question is given in brackets **[ ]** at the end of each question or part question.
- Dimensions are in millimetres unless stated otherwise.
- Your quality of written communication will be assessed in questions marked with an asterisk (*****).
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Complete the following questions on engineering materials.

(a) Fig. 1 shows a range of children's construction bricks.

Fig. 1

(i) (Circle) the material from the list below which is commonly used to make children's toys such as the construction bricks.

copper **lead** **ABS** **concrete** **epoxy resin** **[1]**

(ii) Give **two** reasons why the material chosen is suitable for the toy construction bricks.

1 .....

.....

2 .....

.....

[2]

(b) Fig. 2 shows a brick wall that has been completed using 300 × 300 × 100 decorative wall blocks on the top course.

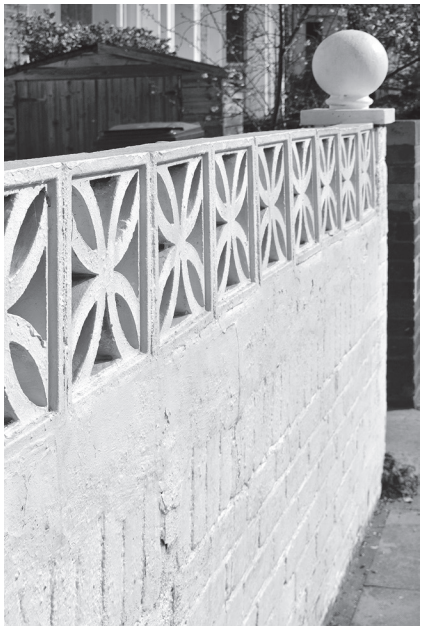

Fig. 2

(i) State the name of the material used to make the wall blocks.

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

(ii) (Circle) the term from the list below which describes the type of material used in the production of the wall blocks.

Ferrous **Non-ferrous** **Ceramic** **Composite** **[1]**

(iii) Give **two** reasons why the material is suitable for the wall blocks.

1 .....

.....

2 .....

.....

[2]

(c) Fig. 3 shows three lengths of insulated copper wire.

Fig. 3

(i) (Circle) the term from the list below which describes the type of material that copper is.

Ferrous **Non-ferrous** **Ceramic** **Composite** **[1]**

(ii) Give **two** reasons why copper is suitable for electrical wires.

1 .....

.....

2 .....

.....

[2]

2 **(a)** Some modern bicycles are made from composite materials such as carbon fibre.

State **two** benefits of using carbon fibre in bicycle manufacture.

1 .....

.....

2 .....

.....

[2]

(b) Engineering materials are often selected according to their properties.

Complete the table to explain the meaning of each property and give an example of a metal having that property.

The first one has been done for you.

Property	Meaning	Metal
Hardness	Resistance of a metal to being deformed, not easy to bend, cut or shape.	Tungsten
Machinability		
Malleability		
Corrosion Resistance		

[6]

(c) Relative cost is one characteristic of engineering materials.

Name **two** other characteristics that you would consider before ordering engineering materials.

1 .....

2 .....

[2]

3 Fig. 4 shows a drilling machine.

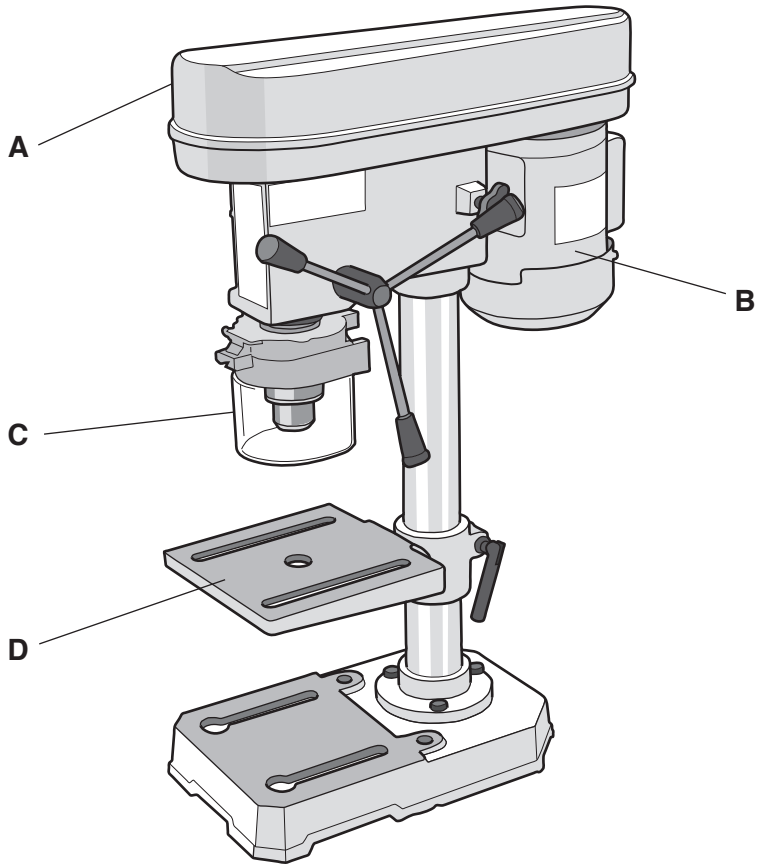

Fig. 4

(a) Name the **four** parts of the drilling machine that have been labelled in Fig. 4.

A .....

B .....

C .....

D .....

[4]

(b) Name **three** safety features you may find on or near to a drilling machine.

1 .....

2 .....

3 .....

[3]

(c) (i) State what is meant by the term 'risk assessment'.

.....

.....

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

(ii) Describe **one** example of a risk assessment being applied in a workshop.

.....

.....

.....

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

4 Fig. 5 shows a door number plate that has been made from acrylic sheet 125 × 125 × 5.

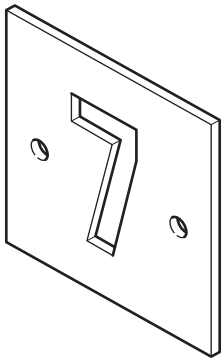

Fig. 5

(a) Use the statements below to complete the table to show the correct order of stages in making the number plate.

Three stages have been done for you.

Clamp work securely and drill holes for screws

File down to marked lines

~~**Put work in bench vice**~~

~~**Mark out number 7 and centres for screw holes**~~

Using a coping saw cut inside number 7 and remove waste

~~**Remove burrs and clean edges**~~

Drill a series of holes inside number 7

Stage	Process
1	*Mark out number 7 and centres for screw holes*
2	
3	
4	*Put work in bench vice*
5	
6	
7	*Remove burrs and clean edges*

[4]

(b) State **two** advantages of using a CNC laser to cut out the number plate shown in Fig. 5.

1 .....

.....

2 .....

.....

[2]

(c) When setting up the CNC laser cutter, the position of the blank and the material to be used should be considered.

State **two** other considerations when setting up the CNC laser cutter.

1 .....

2 .....

[2]

(d) A similar door number plate is to be made from metal.

Name **two** different CNC processes that could be used to produce the item.

1 .....

2 .....

[2]

5 Temporary fastenings are often used when developing and trialling new engineered products.

(a) An example of a temporary fastening is shown in Fig. 6.

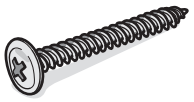

Fig. 6

(i) Name the component shown in Fig. 6.

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

(ii) State **one** use for the component shown in Fig. 6.

.....

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

(b) Name **two** other types of threaded fastener.

1 .....

2 .....

[2]

(c) Explain why temporary fastenings may be preferred to permanent fastenings.

.....

.....

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

(d) Explain how digital communications can be used to support research and development of new engineered products.

.....

.....

.....

.....

.....

.....

.....

..... **[4]**

6 A delivery system for materials and components is described as JIT.

(a) State what JIT means.

J ..... I ..... T ..... **[1]**

(b) Explain why JIT delivery helps to keep production costs low.

.....

.....

.....

.....

.....

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

(c)* Discuss the statement, 'Globalisation is good for engineering companies but has a major impact on local industry.'

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.....

.....

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

END OF QUESTION PAPER

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