



Oxford Cambridge and RSA

Thursday 9 January 2020 – Afternoon

**Level 1/2 Cambridge National In Engineering
Manufacture**

R109/01 Engineering materials, processes and production

Time allowed: 1 hour



No extra materials are needed.



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. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. You can use extra paper if you need to, but you must clearly show your candidate number, centre number and the question numbers.
- Answer **all** the questions.

INFORMATION

- The total mark for this paper is **60**.
- The marks for each question are shown in brackets [].
- Quality of written communication will be assessed in questions marked with an asterisk (*).
- This document has **12** pages.

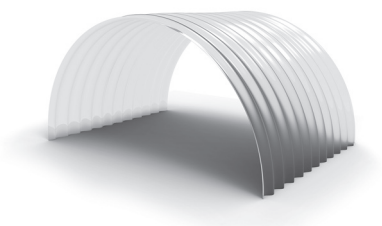



ADVICE

- Read each question carefully before you start your answer.

Answer **all** the questions.

- 1 (a) The table below shows four manufactured items.

Complete the table by selecting a material from the list that is suitable for each item **and** give one reason for your selection.

	Aluminium alloy	Copper	Polyvinyl Chloride (PVC)	
	Polycarbonate	High Speed Steel	Polyethylene	
			Brass	
Item	Suitable material			Reason for selection
 <p>Curved corrugated roof panel</p>				
 <p>Wheel rim</p>				
 <p>Plumbing pipe fitting</p>				
 <p>Twist drill</p>				

(b) Explain why tungsten carbide is used in engineering.

.....

.....

.....

..... [2]

- 2 (a) Complete the table by stating the material group that each material belongs to. The first one has been completed for you.

Material	Material Group
Brass	Non-Ferrous metal
Polypropylene	
Carbon Steel	
Epoxy Resin	
Carbon Fibre	
Glass	

[5]

- (b) (i) Describe what is meant by the term 'shape-memory alloy'.

.....

 [2]

- (ii) Give **one** example of a use for a shape-memory alloy.

..... [1]

- (iii) Name **two** other smart materials.

1
 2 [2]

3 Fig. 1 shows a plastic bottle which has been formed by blow moulding.



Fig. 1

(a) The table below shows the processes used to form the bottle.

Stage	Process
A	A split die the shape of the bottle is closed
B	Mould is cooled, opened and bottle removed
C	Plastic granules are fed into a hopper
D	Plastic takes the shape of the bottle
E	Air is forced into mould
F	Plastic is heated and fed into the mould

Put the processes in the correct order. Two have been completed for you.

A					B
---	--	--	--	--	---

[3]

(b) (i) State why urea-formaldehyde is an unsuitable material for the body of the bottle.

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

(ii) State **one** forming process suitable to make the plastic screw cap used with the bottle.

..... [1]

(c) State **two** safety precautions, other than Personal Protective Equipment (PPE), that must be observed when carrying out heat forming processes on thermoplastics.

1

.....

2

.....

[2]

(d) Explain the benefits of using plastic to produce bottles.

.....

.....

.....

.....

.....

.....

..... [3]

4 Fig. 2 shows a pedestal grinder.

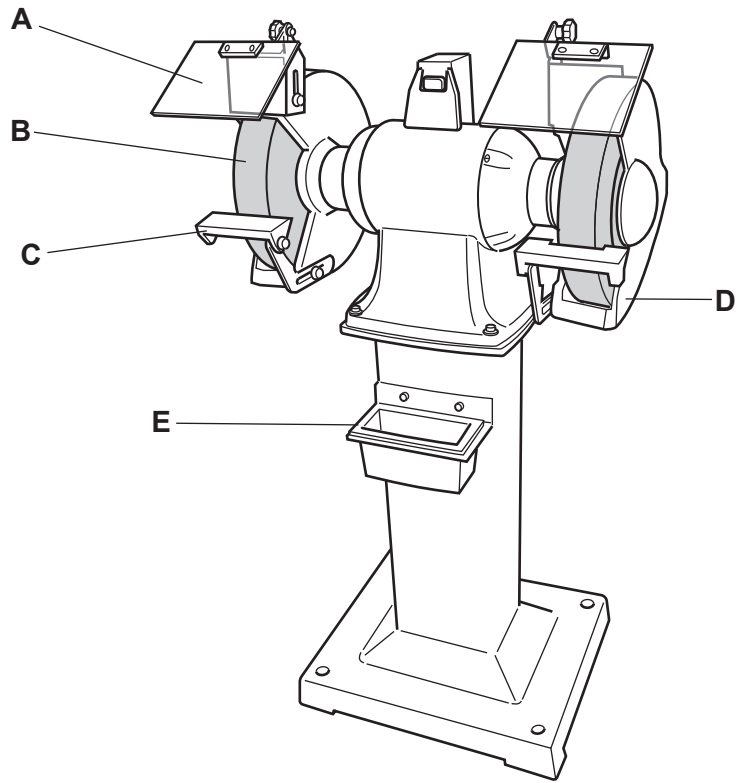


Fig. 2

(a) Using the list below, name the **five** parts that have been labelled in Fig. 2.

- | | | | |
|-----------------|--------------|------------|-------------|
| Spark deflector | Wheel | Stand | Spindle |
| Tool rest | Water trough | Eye shield | Wheel guard |

A

B

C

D

E

[5]

(b) State **one** use of a grinding wheel.

..... [1]

(c) State **two** items of Personal Protective Equipment (PPE) that should be worn when operating a grinding machine.

1

2

[2]

(d) Grinding is classified as a material removal process.
Name **two** other material removal processes.

1

2

[2]

5 Fig. 3 shows a metal plate being cut using a water jet cutter.

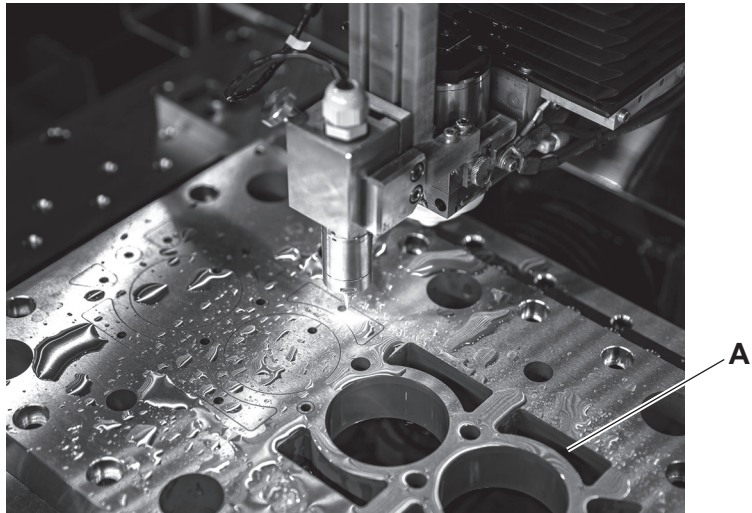


Fig. 3

(a) Explain the benefits of water jet cutting as a method of production.

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

(b) Name **one** other process that could be used to cut out hole **A** shown in Fig. 3.

..... [1]

(c) (i) Explain what is meant by the term 'global manufacturing'.

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

(ii) State **two** benefits of global manufacturing.

1

.....

2

.....

[2]

(iii) State **two** ways that ideas can be shared between global companies.

1

.....

2

.....

[2]

- 6 (a) Fig. 4 shows an aluminium key ring blank that has been stamped using a Computer Numerical Control (CNC) punching machine.



Fig. 4

- (i) Name **two** processes that could be used to manually produce the shape.

1

2

[2]

- (ii) Explain why using the CNC punching machine is a more suitable method of producing the shape than manually.

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

