

Technology and Design Department

AQA

**Design and Technology:
Resistant Materials Technology**

Unit 1: Plastics

7 (a) (iii)

Food storage boxes



Material
(2 marks)

Reason
.....
.....
(1 mark)

7 (a) (iv)

Tennis racket



Material
(2 marks)

Reason
.....
.....
(1 mark)

Toy digger



© Thinkstock

Material
(2 marks)

Reason
.....
.....
(1 mark)

Original source of the material
.....
(1 mark)

8

Complete the table below. The first one has been done for you.

Material	Property	Use
Shape memory alloys (SMA) 'Nitinol'	<i>This metal will return to its original shape when heat is applied to it.</i>	Spectacle frames
Thermochromatic plastic (2 marks) (1 mark)
Carbon fibre (2 marks) (1 mark)
'Polymorph' (2 marks) (1 mark)
Motion control gel 'Smart grease' (2 marks) (1 mark)

- 9 On the clock shown below, the acrylic numbers have been glued to the wooden clock face.



- 9 (a) Name the adhesive you would use to glue the acrylic numbers on to the wooden clock face.

.....
(1 mark)

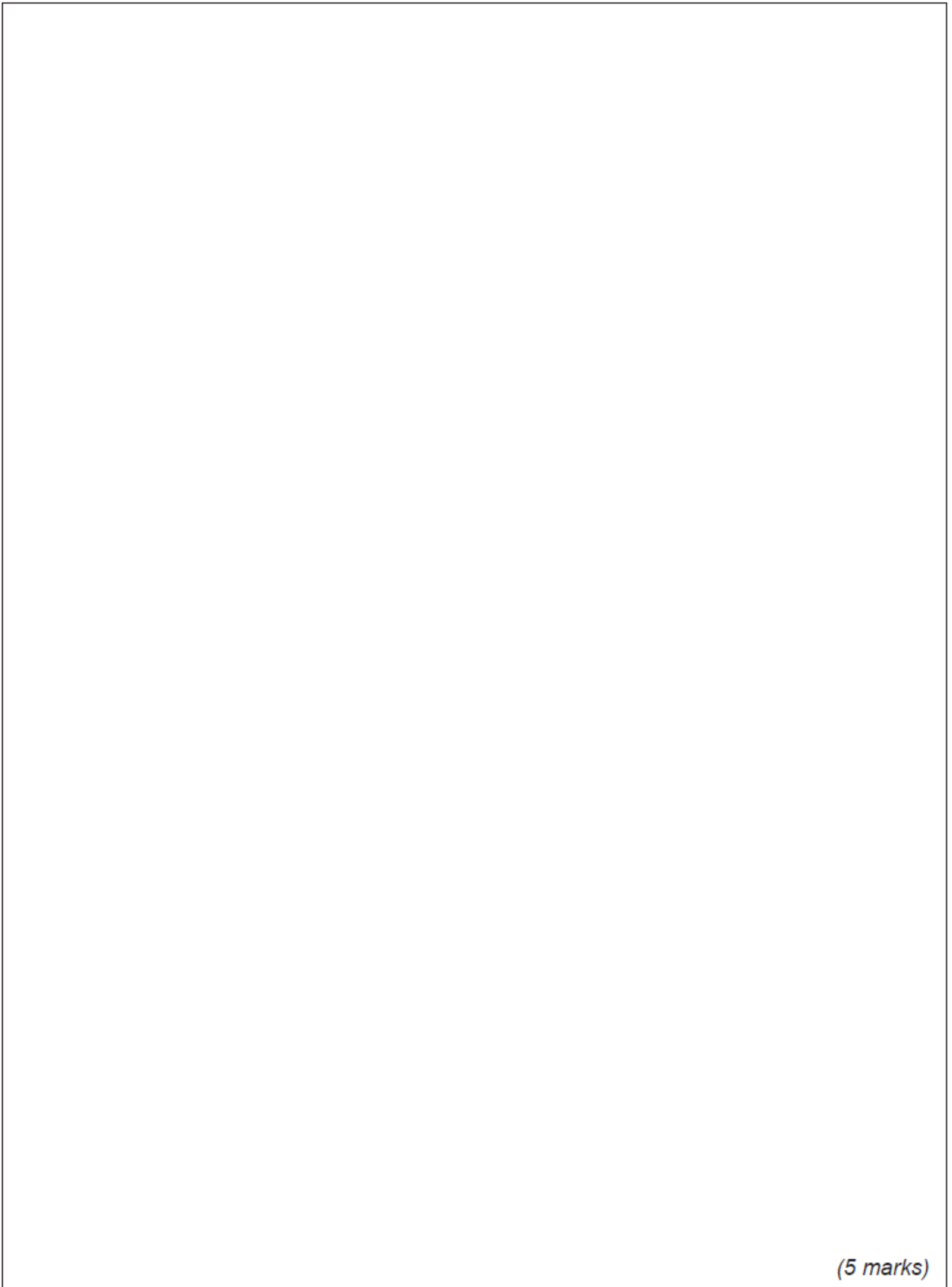
- 9 (b) Explain why you have chosen this adhesive.

.....
.....
(1 mark)

- 9 (c) Give details of any safety precautions that you would need to take when using the adhesive you have named in part (a).

.....
.....
.....
.....
(2 marks)

9 (d) Use notes and sketches to describe the process of gluing the acrylic numbers to the wooden clock face with the adhesive you have named in part (a).



(5 marks)

5 (a) Complete the following table by matching each plastic (polymer) with its correct category.

The first one has been done for you.

Plastic (polymer)	Category	
	Thermoplastic	Thermosetting plastic
Acrylic (PMMA)	✓	
Urea formaldehyde (UF)		
Polyvinyl chloride (PVC)		
Polypropylene (PP)		
Polyethylene terephthalate (PET)		
Melamine formaldehyde (MF)		

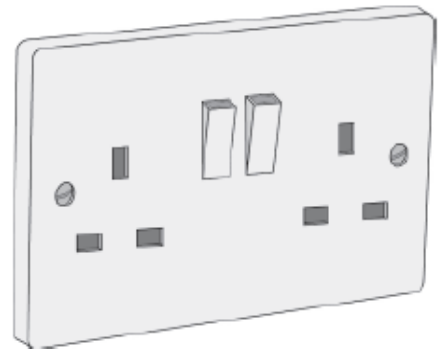
(5 marks)

5 (b)

Margarine tub



Electrical socket



5 (b) (i) Name the **category** of plastic that has been used to manufacture the **margarine tub**.

.....
(1 mark)

5 (b) (ii) Explain why this **category** of plastic has been chosen.

.....
.....
.....
.....
(2 marks)

5 (c) (i) Name the **category** of plastic that has been used to manufacture the **electrical socket**.

.....
(1 mark)

5 (c) (ii) Explain why this **category** of plastic has been chosen.

.....
.....
.....
.....
(2 marks)

7 (b) Discuss the possible environmental impact of using plastics (polymers) to manufacture products.

Include information from sourcing the raw material to the end of the product's life cycle.

Quality of Written Communication (QWC) will be assessed in this question.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(8 marks)

Plastic Practice Questions

1 Circle the correct options in the following sentences.

A **thermosetting / thermoplastic** material will not be affected by re-heating.

A **thermosetting / thermoplastic** material is ideal for post forming.

2 A non-flammable plastic is needed for an electric switch. What would be one possible plastic? Tick the correct option.

- | | | | |
|---------------------------|--------------------------|---------------|--------------------------|
| A High impact polystyrene | <input type="checkbox"/> | B Acrylic | <input type="checkbox"/> |
| C Urea formaldehyde | <input type="checkbox"/> | D Epoxy Resin | <input type="checkbox"/> |

3 Which of the following statements is **not** a valid reason for choosing a plastic for vacuum forming.

- | | |
|--|--------------------------|
| It should be recyclable | <input type="checkbox"/> |
| It should have a wide range of colours | <input type="checkbox"/> |
| Once formed it shouldn't change shape unless it is re-heated | <input type="checkbox"/> |
| It should be easy to bend when cold | <input type="checkbox"/> |

4 Give two properties of phenol formaldehyde.

_____ **B)** _____

5 Give two uses of polythene.

_____ **B)** _____

6 Give two properties of nylon.

_____ **B)** _____

7 What do the letters stand for in the following acronyms?

PVC _____ **B)** HIPS _____

C) HDPE _____

8 Describe A) the tools and the equipment, and B) the process used to achieve a high quality finish for the sawn edge of a 5mm piece of acrylic.

A)

B)

9 The table contains the names of six plastic forming methods. Match descriptions **A, B, C, D, E** and **F** with the methods **1-6** in the table. Enter the appropriate number in the boxes provided.

Plastic forming methods			
1	Vacuum forming	4	Extrusion
2	Yoke moulding	5	Compression moulding
3	Injection moulding	6	Rotational moulding

- A sheet of foamed PVC is heated in an oven and then pressed between a former and a shaped frame
- A thermosetting plastic powder slug is pressed into shape and heated in a mould.
- Polythene chips are placed in the mould which is then sealed, heated and turned round until the plastic has coated the inside. When cool the mould opens and the finished item is ejected.
- A sheet of polystyrene is held in place, heated and then shaped to a former by sucking out the air between the plastic and the former.
- Nylon granules are melted and then forced through a die in a continuous stream to form a pipe.
- Polypropylene granules are fed into a heated chamber and then pushed into a sealed mould where the moulding takes place.

10 What composite material would be suitable to be use for making foundations, walls and bridges? Tick the correct options.

- Brick
- Stainless steel
- Laminated wood
- Reinforced concrete

11 Choose the correct words from the options given to complete the following sentences.

Shape mould squeeze inject female male threader tap

To make a bolt from polystyrene, it's necessary to use a _____ and _____ hot plastic into the cavity. The matching _____ thread can be cut by using the correct _____.