

**GCSE
ENGINEERING (DOUBLE AWARD)**

4868

UNIT 3: Application of Technology
TUESDAY 16 JANUARY 2007

Morning

Time: 1 hour 30 minutes

Candidates answer on the question paper.
No additional materials are required.



Candidate
Name

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Show all working for calculations.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- Marks will be awarded for the use of correct conventions.
- The total number of marks for this paper is **100**.
- Dimensions are in mm unless stated otherwise.
- Please note that the instruction 'discuss' denotes that you should:
 - identify **three** relevant issues/points raised by the question;
 - explain why you consider **two** of these issues to be relevant; and
 - use **one** specific example or piece of evidence to support your answer.

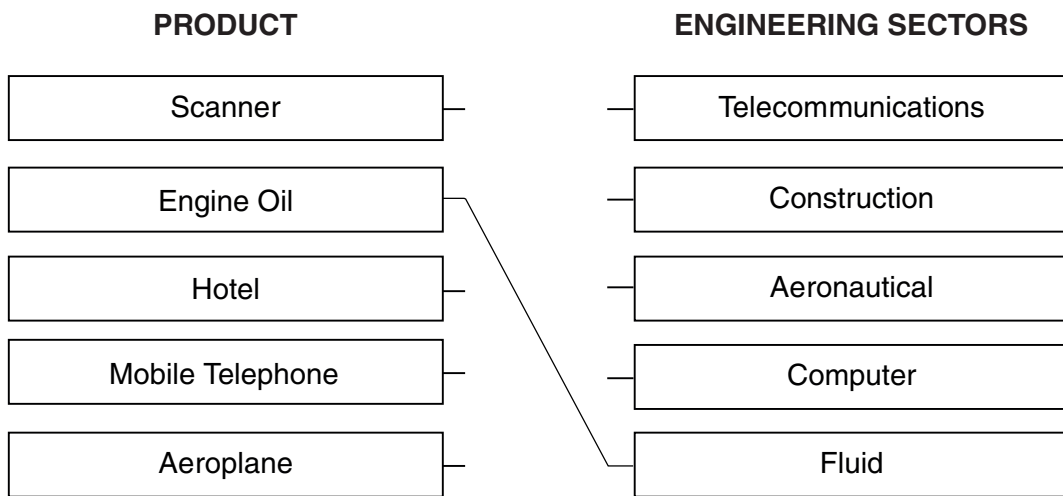
FOR EXAMINER'S USE	
Question 1	
Question 2	
Question 3	
Question 4	
Question 5	
Question 6	
Question 7	
Question 8	
TOTAL	

This document consists of **12** printed pages.

1 (a) Engineering sectors produce different products.

Complete the links below to identify the sector which makes the products listed.

One has been done for you.



[4]

- (b) For **three** of the products listed in part (a) identify:
- a modern technology used by each product; and
 - the technology it replaces.

An example has been done for you.

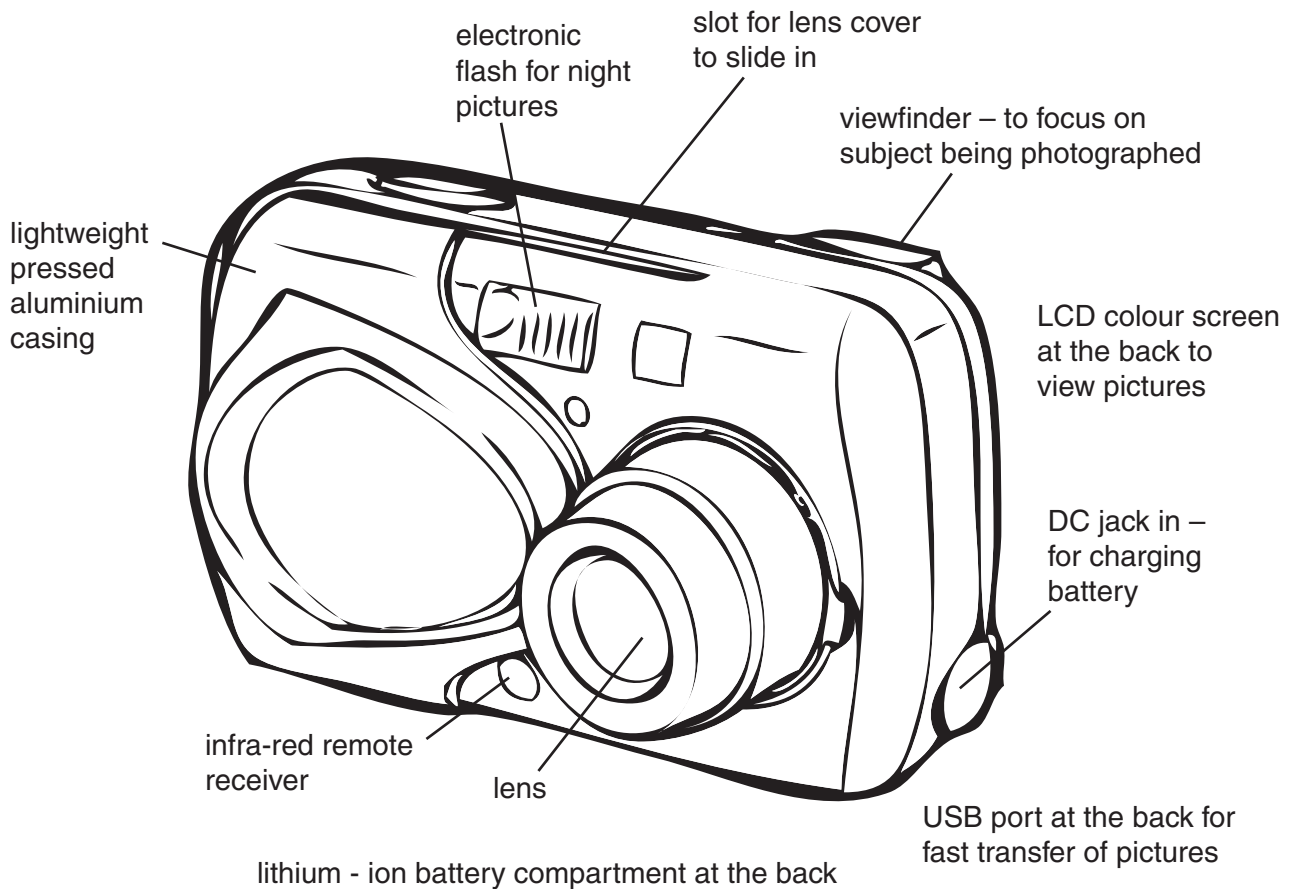
Product	Modern Technology	Technology Replaced
Engine Oil	Synthetic Oil with additives	Refined crude oil
	[1]	[1]
	[1]	[1]
	[1]	[1]

- (c) Give **two** reasons why engineering products are classified into different sectors.

- 1[1]
- 2[1]

- 2 The sketch and notes below explain how technology and materials are used in the design and manufacture of a digital camera.

Example product: *Digital Camera*



Choose a **different** product and use sketches and notes to explain how technology and materials are used in its design and manufacture.

Your answer must include:

- the technologies used; [4]
- how materials/components are used; and [4]
- the structure and form of the product. [4]

Use the example of the digital camera to help plan your answer.

Marks will NOT be given for information copied from the example or for repetition of points.

Your chosen product for **Question 2**

3 Modern materials have improved many products.

The use of modern materials can:

- reduce the weight of a product;
- make a product stronger;
- make a product easier to use; or
- make a product safer.

(a) State **one** example of a product that uses a modern material to reduce its **weight** and name the modern material used.

Product[1]

Modern material[1]

(b) State **one** example of a product that uses a modern material to make it **stronger** and name the modern material used.

Product[1]

Modern material[1]

(c) State **one** example of a product that uses a modern material to make it **easier to use** and name the modern material used.

Product[1]

Modern material[1]

(d) State **one** example of a product that uses a modern material to make it **safer** and name the modern material used.

Product[1]

Modern material[1]

(e) Describe **two** effects on the **workforce** when a company uses modern materials.

1
.....
.....[2]

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

4 Fig. 1 shows a domestic washing machine.

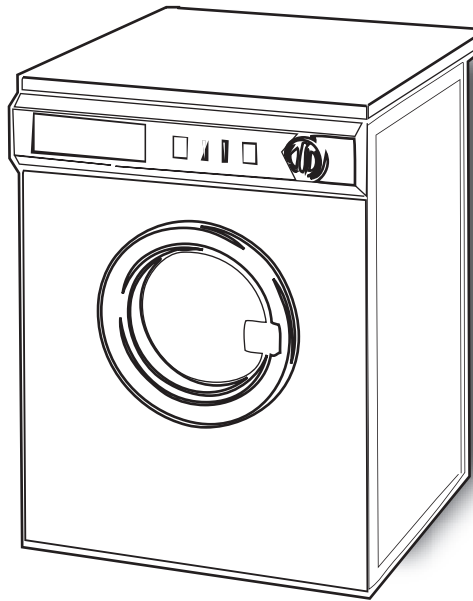


Fig. 1

(a) Give **two** examples of how ICT is used when **designing** a washing machine.

1[1]

2[1]

(b) Give **two** examples of how ICT is used when **marketing** washing machines.

1[1]

2[1]

(c) Describe the function of an **embedded system** in a washing machine.

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

(d) Describe how **automation** is used in the manufacture of a washing machine.

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

(e) Describe **one** benefit of modern technology **to users** of washing machines.

.....

[2]

(f) At the end of their useful lives, washing machines and refrigerators have to be disposed of. Describe **two** difficulties when disposing of washing machines or refrigerators.

Difficulty 1
[2]

Difficulty 2
[2]

5 (a) Engineering components are classified as either:

- Mechanical;
- Electrical/electronic; or
- Pneumatic/hydraulic.

Choose **four** of the engineering components listed below and put each of them in the correct column in the table.

- | | |
|---------------------|-------------|
| Cylinders | Springs |
| Flow control valves | Reservoirs |
| LEDs | Thermistors |
| Gear trains | |

An example has been done for you.

Mechanical	Electrical/electronic	Pneumatic/hydraulic
		<i>Cylinders</i>

[1]
 [1]
 [1]
 [1]

6 (a) A list of engineering processes is shown below.

- Material removal
- Shaping and manipulation
- Joining and assembly
- Heat and chemical treatment
- Surface finishing

Choose **two** engineering processes from the list which you have experienced during your course and:

- give **one** example of each chosen engineering process; and
- describe each example of the chosen engineering process.

Engineering process 1

Example of process

Description

.....[3]

Engineering process 2

Example of process

Description

.....[3]

(b) Give details of **one** quality control check needed during **one** of the processes you have described in part (a).

.....

.....[2]

(c) Explain the effects of an engineering component being 'out of tolerance'.

.....

.....[2]

(d) Explain why a production plan is important when undertaking a series of engineering activities.

.....

.....[2]

7 This question is about the application of Modern and Smart Materials and Components.

(a) Many modern products are made using polymers.

Explain, using **one** example, what is meant by the term polymer.

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

(b) An alloy is a mixture of metals.

Explain, using **one** example, the advantages of an alloy over a pure metal.

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

(c) Shape memory alloys are classed as smart materials.

Explain why a shape memory alloy is a smart material.

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

(d) Thermochromic inks are widely used in many products.

Explain, using **one** example, the features of thermochromic inks.

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

(e) Computers use different kinds of memory device.

Name **two** different memory devices and state a specific use for each.

Device 1[1]
Specific use[1]
Device 2[1]
Specific use[1]

