

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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I declare this is my own work.

# A-level

## DESIGN AND TECHNOLOGY: PRODUCT DESIGN

Paper 2 Designing and Making Principles

Time allowed: 1 hour 30 minutes

### Materials

For this paper you must have:

- normal writing and drawing instruments
- a scientific calculator.

### Instructions

- Use black ink or black ball-point pen. Use pencil only for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

### Information

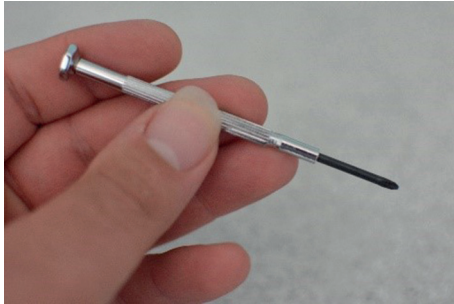
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- There are 30 marks for **Section A** and 50 marks for **Section B**.

For Examiner's Use	
Question	Mark
1	
2–3	
4	
5	
6	
7	
8	
9–10	
11	
12	
13	
14	
15	
16	
17	
<b>TOTAL</b>	



**Section A – Product Analysis**Answer **all** questions in this section.

0 1

**Figures 1 and 2** show two screwdrivers.**Figure 1****Jeweller's screwdriver****Figure 2****General purpose screwdriver**

	<b>Figure 1</b>	<b>Figure 2</b>
Handle material(s)	Aluminium	Thermoplastic and elastomer
Handle formed by	Casting	Injection moulding
Screwdriver tip	Fixed tip	Interchangeable magnetic attachment

Compare the two screwdrivers shown.

In your answer you should refer to:

- ergonomics
- material suitability
- product function.

**[12 marks]**



0 2

Explain how different prototyping methods may be used in the development of a screwdriver handle.

[4 marks]

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0 3

A screwdriver handle has a volume of 55 000 mm<sup>3</sup>

The handle is formed from two materials:

Material	Density	Percentage of handle
A	1.4 g/cm <sup>3</sup>	85%
B	1.1 g/cm <sup>3</sup>	15%

Calculate the mass of the handle in grams.

[4 marks]

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Answer \_\_\_\_\_ g

8





0	5
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Outline the concept of eco-labelling **and** the impact on customer buying preferences. **[4 marks]**

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4



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0 7

**Section B – Commercial Manufacture**

Answer **all** questions in this section.

**0 6**

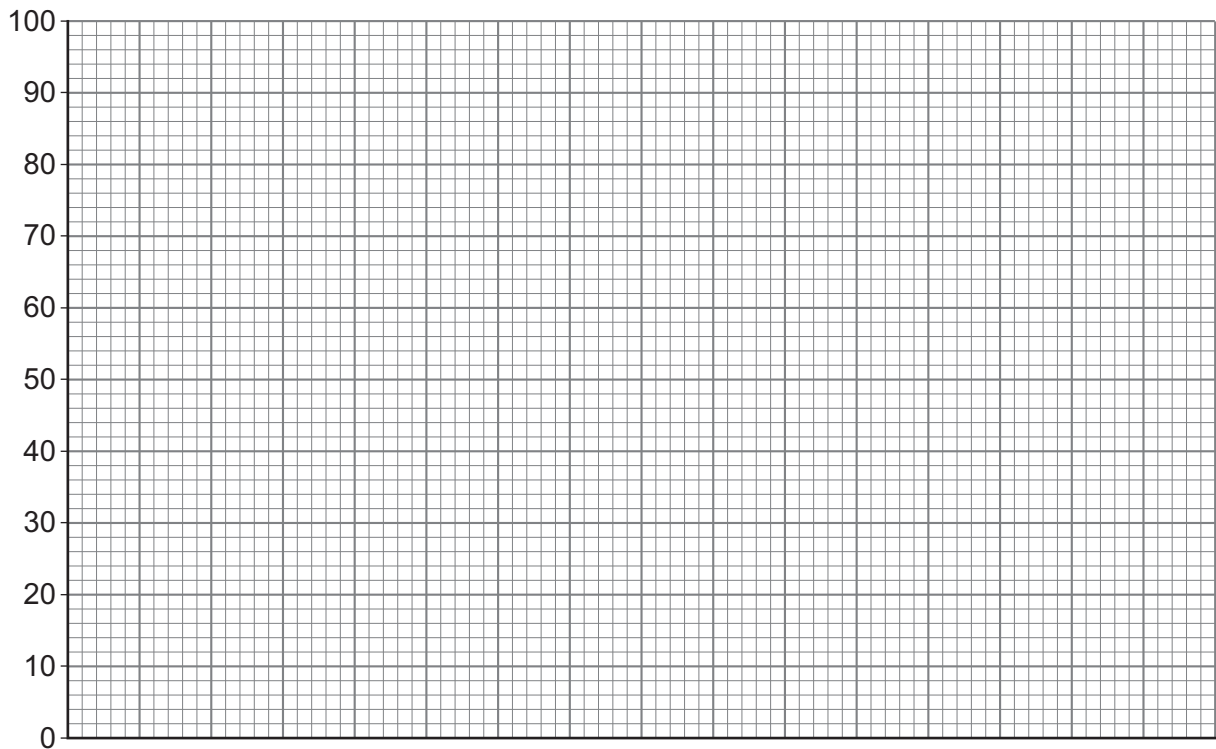
**Table 1** shows sales of new vehicles from 2016–2019

Plot the data shown in the table to compare % sales of **each** fuel type from 2016–2019

**[4 marks]**

**Table 1**

Year	Petrol	Diesel	Electric Vehicles (all types)	Total Sales
2016	1 319 423	1 292 496	80 781	2 692 700
2017	1 371 924	1 067 052	101 624	2 540 600
2018	1 491 273	733 801	142 026	2 367 100
2019	1 502 215	623 997	184 888	2 311 100




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**4**







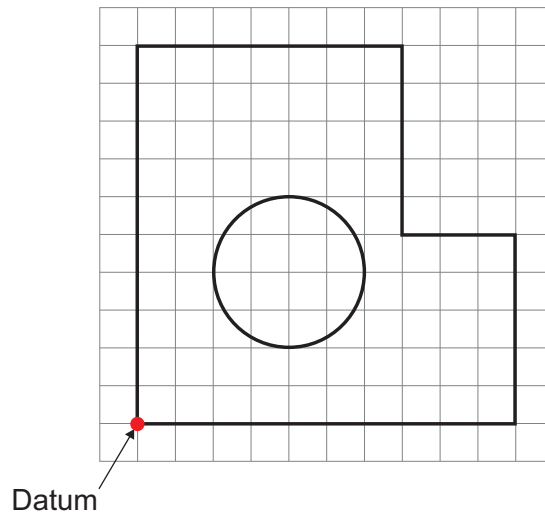
0	8
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Fully dimension the drawing shown in **Figure 3** to minimise dimensional inaccuracies.

Use the 5 mm grid and the datum labelled in red for your task.

**[4 marks]**

**Figure 3**



4



0 9

Outline the ways a design team can reduce the time from idea conception to product release.

[6 marks]

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1 0

State **four** of Dieter Rams' principles of good design.

[4 marks]

1 \_\_\_\_\_  
\_\_\_\_\_

2 \_\_\_\_\_  
\_\_\_\_\_

3 \_\_\_\_\_  
\_\_\_\_\_

4 \_\_\_\_\_  
\_\_\_\_\_

10

Turn over ►



1 1

Explain why utility furniture was introduced after the Second World War.

[4 marks]

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4

1 2

State **two** stages found on a product life cycle graph.

[2 marks]

1 \_\_\_\_\_

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2 \_\_\_\_\_

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2



1 3

Figures 4 and 5 show **two** different drawing types.

State the drawing type used in **each** figure.

[2 marks]

Figure 4

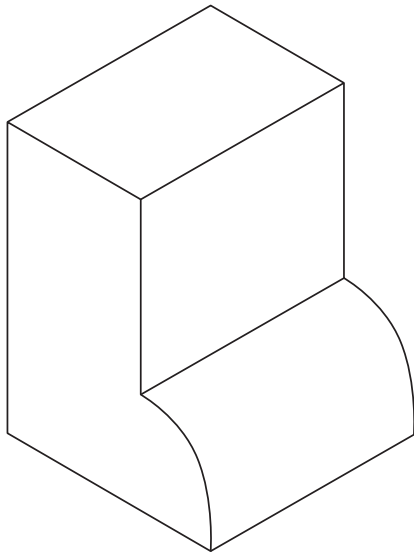
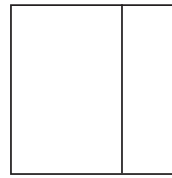
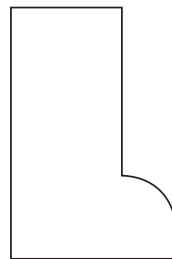
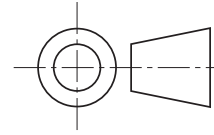


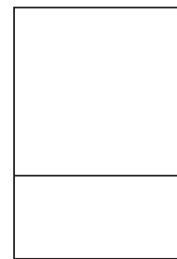
Figure 5



Plan view



Front view



Side view

Figure 4 \_\_\_\_\_  
\_\_\_\_\_

Figure 5 \_\_\_\_\_  
\_\_\_\_\_

2

1 4

Name **two** primary research methods.

[2 marks]

1 \_\_\_\_\_  
\_\_\_\_\_

2 \_\_\_\_\_  
\_\_\_\_\_

2

Turn over ►





1 6

Figure 8 shows a water pump used in an isolated village.

Figure 8



Feature	Description
Power	Hand-operated mechanical pump
Fabrication	Standardised nuts and bolts
Material	Low-carbon steel sheet
Design	Open-sourced
Finish	Galvanising

Analyse and evaluate the suitability of the water pump design for this isolated village. **[6 marks]**

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Explain the impact of a product recall on a manufacturer of electrical goods.

**[4 marks]**

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**END OF QUESTIONS**





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