Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel Level 3 GCE

Centre Number | Candidate Number

Monday 13 May 2019

Afternoon (Time: 2 hours) | Paper Reference **8DT0/01**

Design and Technology (Product Design)

Advanced Subsidiary Component 1

You must have:
a calculator and a ruler.

Total Marks

Instructions

- Use **black** ink or ball-point pen (HB pencil may be used for questions that require drawing or sketching).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- For questions requiring mathematics, you must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

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P 5 8 3 2 4 A 0 1 2 4

Pearson

Answer ALL questions. Write your answers in the spaces provided.

1 An understanding of material properties is essential for designers.

(a) Explain the meaning of the term elasticity.

(2)

Figure 1 shows a paper punch. The handle of the paper punch has been made from mild steel.

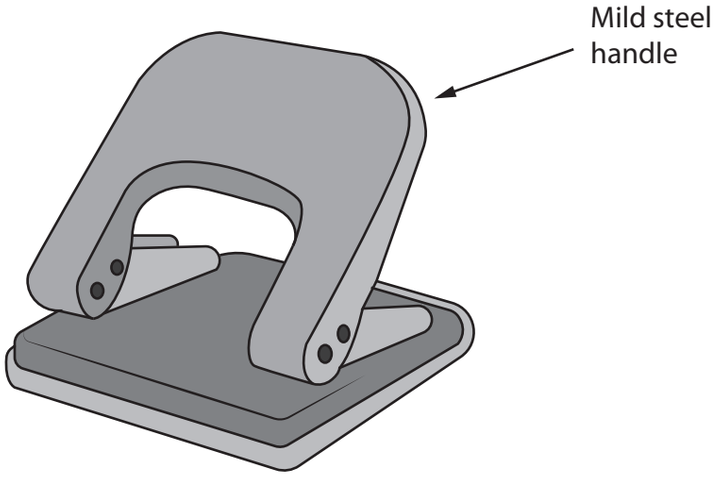

Figure 1

(b) Outline the working properties of mild steel that make it a suitable material from which to make the handle of the paper punch.

(4)

(c) The paper punch contains high carbon steel springs that have been hardened and tempered.

Describe the process of tempering high carbon steel.

(2)

(Total for Question 1 = 8 marks)

2 Figure 2 shows a calculator. The body of the calculator has been made using injection moulding.

Figure 2

(a) Describe the process of injection moulding.

Start your description after the hopper has been filled with polymer granules and finish it at the point of the moulding being ejected.

(6)

(b) Figure 3 shows a simplified image of one of the plastic buttons on the calculator.

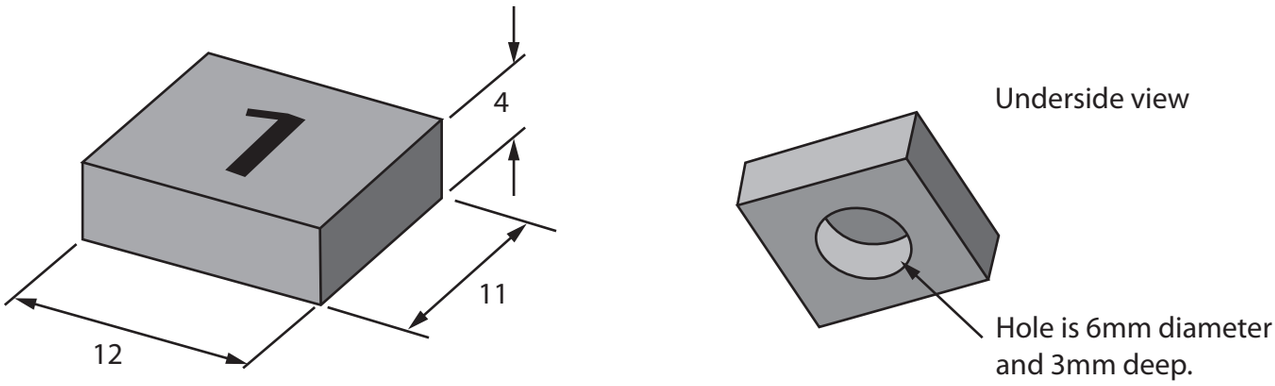

Diagram not to scale

All dimensions are shown in millimetres

Figure 3

Calculate the volume of material that would be needed in order to injection mould one button. Ignore any moulding runners.

Give your answer correct to two significant figures.

Show all of your workings.

(6)

Answer .....

(c) The screen on the calculator is a liquid crystal display (LCD).

Explain **three** characteristics of LCDs that make them suitable for use in calculators.

(6)

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(Total for Question 2 = 18 marks)

3 Figure 4 shows a desk manufactured from laminated chipboard.

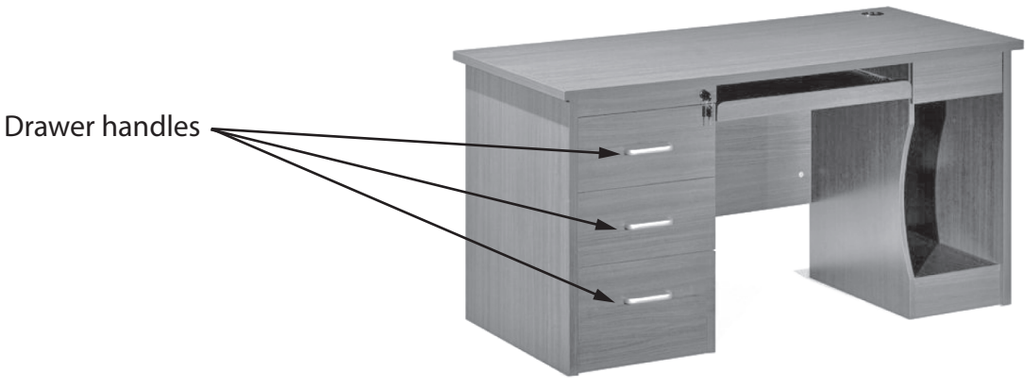

Figure 4

One reason laminated chipboard was selected in preference to solid wood for the desk is that it is a more stable material.

(a) Explain **one** reason why chipboard is a more stable material than solid wood.

(2)

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(b) The steel handles on the desk drawers have been electro-plated with brass.

Explain **two** reasons why the handles would be electro-plated with brass.

(4)

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(c) The desk has been designed with knock-down fittings for self-assembly by the customer.

Explain **three** reasons why it is cheaper for the manufacturer to supply self-assembly rather than pre-assembled furniture.

(6)

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(Total for Question 3 = 12 marks)

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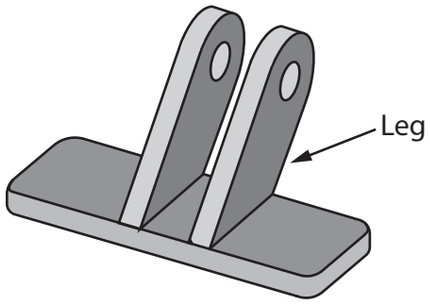
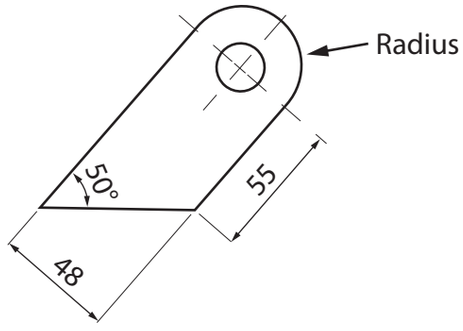
QUESTION 4 BEGINS ON THE NEXT PAGE.

4 Figure 5 shows a component and a dimensioned drawing of one of its legs.





All dimensions are shown in millimetres

Figure 5

The leg is to be made from a length of steel strip that is 48mm wide.

(a) A steel rule and scriber could be used to mark out the leg.

Name **two** further marking out tools that could be used to mark out the centre point of the radius.

(2)

1 .....

2 .....

(b) Calculate the length of the steel strip needed for one leg.

Give your answer correct to one decimal place.

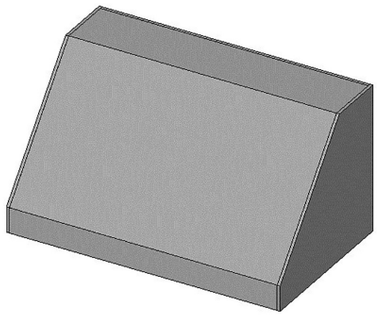
Show all of your workings.

(6)

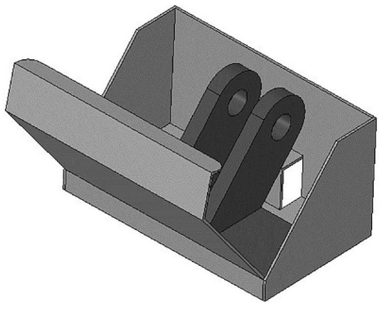
Answer .....

(c) A batch of 10,000 components is to be produced and packaged.

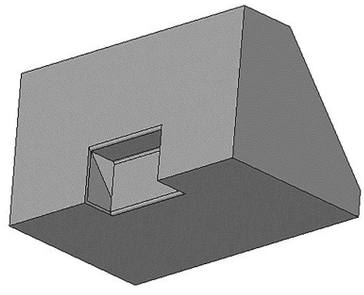
Figure 6 shows three images of the packaging for the component, which is to be made in card and printed with full colour photographs.



Closed box



Open box with component inside



Rear of closed box

Figure 6

Name **two** high volume commercial printing methods that could be used to produce the packaging with full colour photographs.

(2)

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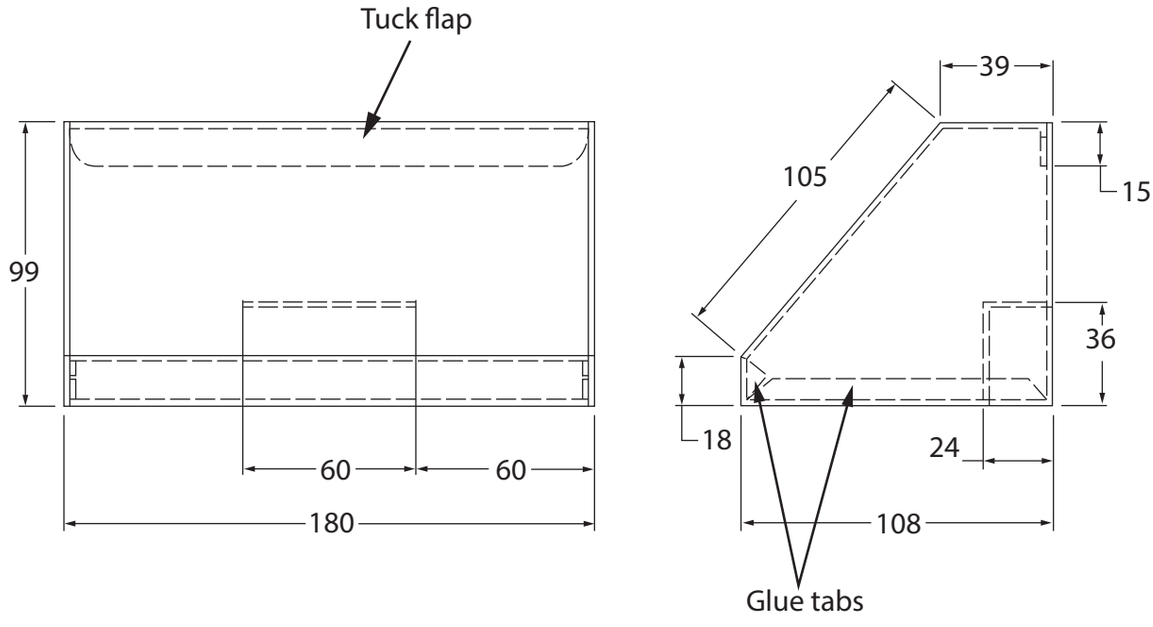
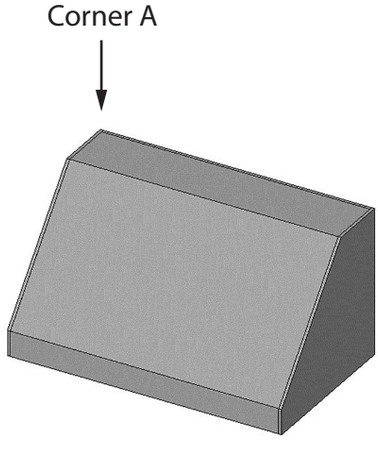
QUESTION 4 CONTINUES ON THE NEXT PAGE.

(d) Figure 7 shows a 3rd angle orthographic drawing of the packaging.

Any dimensions not shown should be estimated.





All dimensions are shown in millimetres

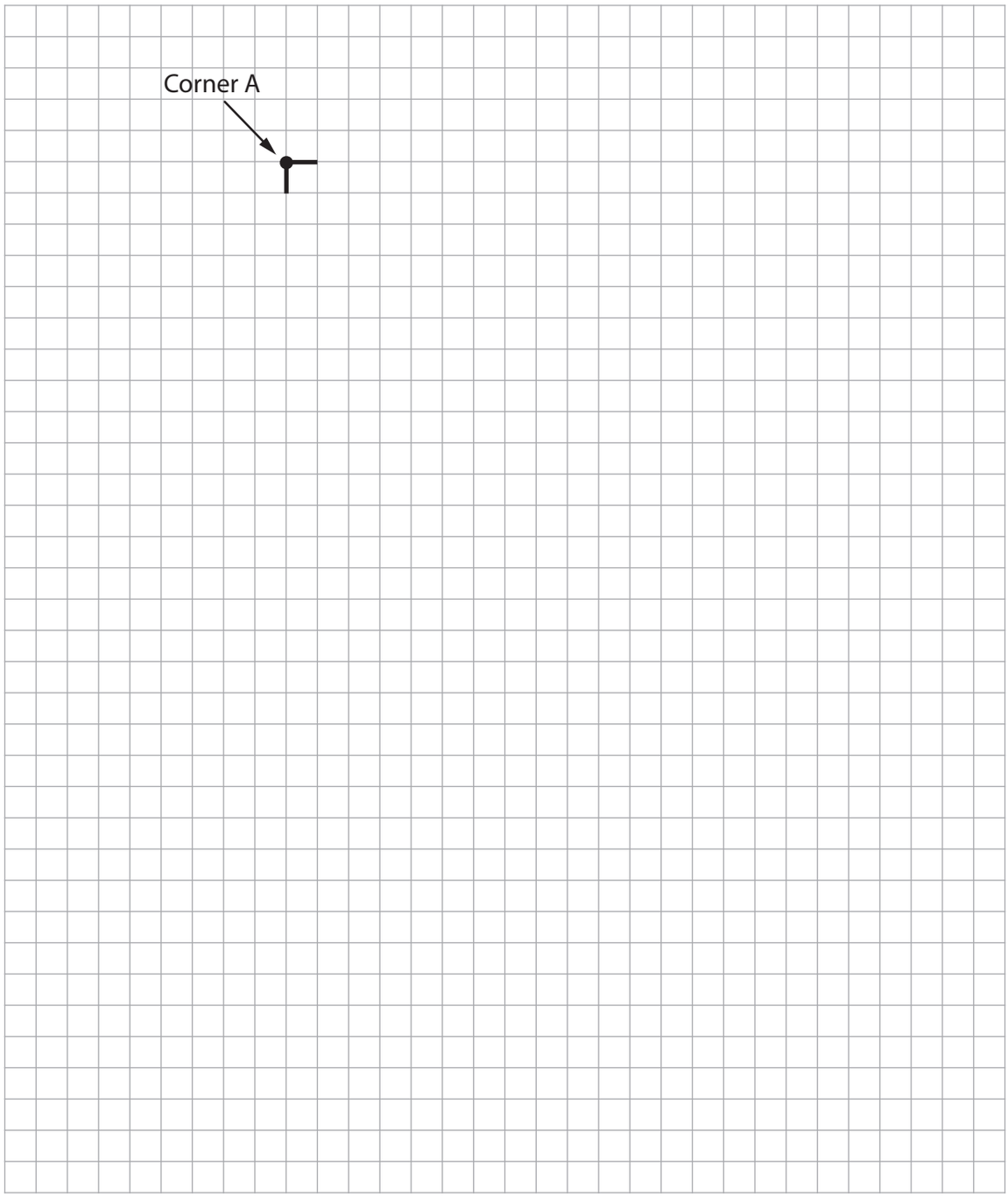
Figure 7

On the 5mm grid below, construct a 1:3 scale drawing of the net of the packaging.

Locate corner A at the point indicated on the grid.

Ignore the thickness of the card.

(9)



(Total for Question 4 = 19 marks)

5 Figure 8 shows a garden strimmer and an enlarged view of its handle.

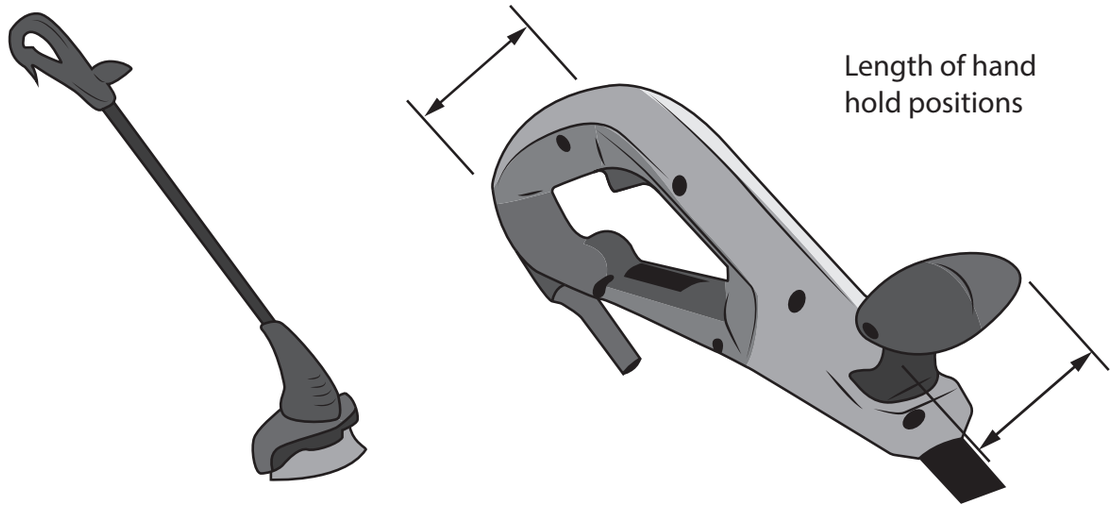


Figure 8

(a) One example of how anthropometrics has influenced the design of this handle can be seen in the length of the two hand hold positions. These lengths have been influenced by the width of the human hand.

Outline how other features of the strimmer handle have been influenced by anthropometrics.

(5)

(b) The strimmer is one of many products that are mass produced.

Explain **two** benefits that mass production has had on employment.

(6)

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(Total for Question 5 = 11 marks)

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6 Figure 9 shows an innovative design for an umbrella.

Figure 9

Nylon fabric was selected for the canopy of the umbrella as it is water resistant, sufficiently strong and lightweight.

(a) Explain **three** further reasons why nylon fabric is a suitable material from which to make the canopy.

(6)

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(b) The application of user centred design can lead to innovative products such as the umbrella shown in Figure 9.

Explain the concept of user centred design and how it may have influenced the design of the umbrella shown in Figure 9.

(6)

(Total for Question 6 = 12 marks)

7 Throughout history, design movements have influenced the development of products.

Discuss how the philosophy and design style of Art Deco have influenced the development of products.

(8)

(Total for Question 7 = 8 marks)

8 Figure 10 shows two desk lamps, one made from acrylonitrile butadiene styrene (ABS) and the other from brass. Three specification points for the lamps are also shown.

Figure 10

	ABS lamp	**Brass lamp**
1. Light source	Multi LED array	Single incandescent bulb
2. Light controls	On/off and dimmer touch controls embedded into the top surface of the base	On/off switch on the rear of base (Not visible)
3. Stem adjustment	Goose neck flexible stem	Screw locking stem joints

Evaluate which of the two desk lamps best meets the user requirements of illuminating a study desk in the home environment.

(12)

(Total for Question 8 = 12 marks)

TOTAL FOR PAPER = 100 MARKS

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