

Write your name here

Surname

Other names

**Pearson Edexcel
Level 3 GCE**

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--

Design and Technology (Product Design)

Component 1

Sample assessment material for first teaching
September 2017
Time: 2 hours 30 minutes

Paper Reference

9DT0/01

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 120.
- 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.

Turn over ►

S59784A

©2018 Pearson Education Ltd.

1/1/1/1/1




Pearson

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

- 1 Figure 1 shows a two-part mobile phone case.

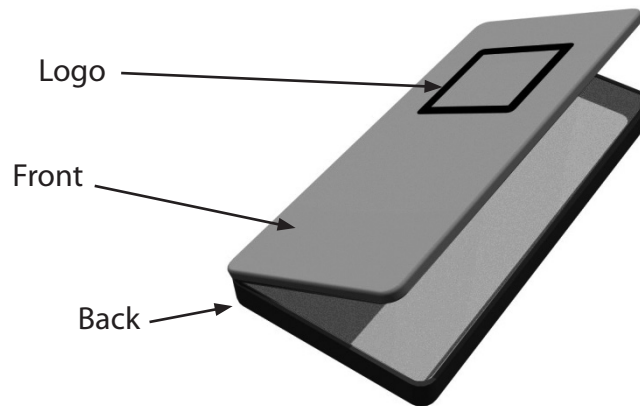


Figure 1

The front is made from a single piece of 3mm thick Medium Density Fibre Board (MDF) and has a resin filled logo. The logo is machined into the front using a CNC router before being filled with resin.

- (a) Give **two** CNC router settings, other than feed rate, that need to be selected prior to machining the logo into the 3mm MDF.

(2)

1

2

- (b) MDF is a cost effective material.

Give **two** further benefits of using MDF rather than solid wood for the front of the phone case.

(2)

1

2



(c) Explain **one** advantage of using paint to finish the front of the MDF phone case rather than leaving it unfinished.

(3)

.....

.....

.....

.....

.....

.....



S 5 9 7 8 4 A 0 3 2 4

- (d) Figure 2 shows the front of the mobile phone case with the routed logo and the dimensions of the logo.

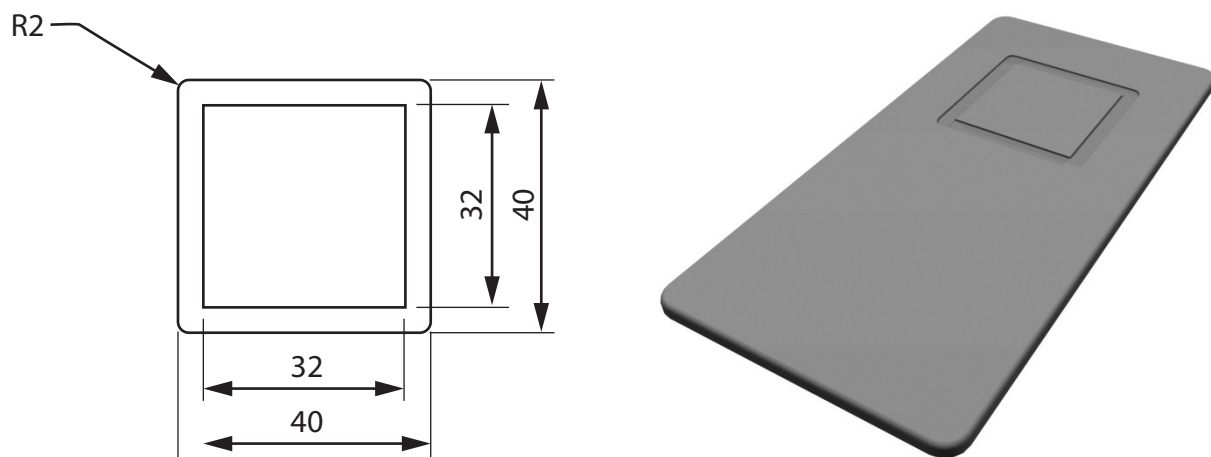


Figure 2

Calculate the total volume of resin that is required to fill the logo. The logo is 0.5mm deep.

Give your answer in mm^3 and correct to **four** significant figures.

Show all of your workings.

(7)

Answer

(Total for Question 1 = 14 marks)



2 Injection moulding is a process used for producing thermoplastic products.

- (a) Explain **one** property that makes polypropylene a suitable material for injection moulding.

(2)

.....

.....

.....

.....

- (b) The injection moulding process involves heating a polymer.

Describe, using labelled sketches, the process of injection moulding after the polymer has been heated.

(4)



(c) Figure 3 shows a plastic bowl that has been injection moulded.

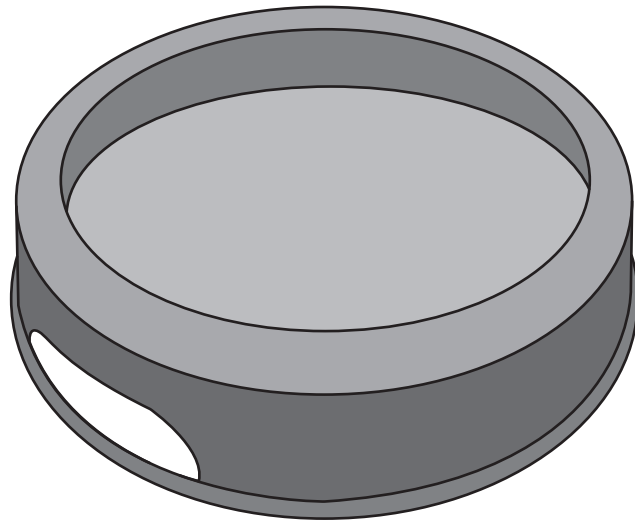


Figure 3

Explain **two** advantages of using injection moulding rather than vacuum forming to manufacture the bowl.

(6)

- 1
- 2

(Total for Question 2 = 12 marks)



- 3 Figure 4 shows a handmade card model of a Christmas tree made from 2mm thick mounting board.

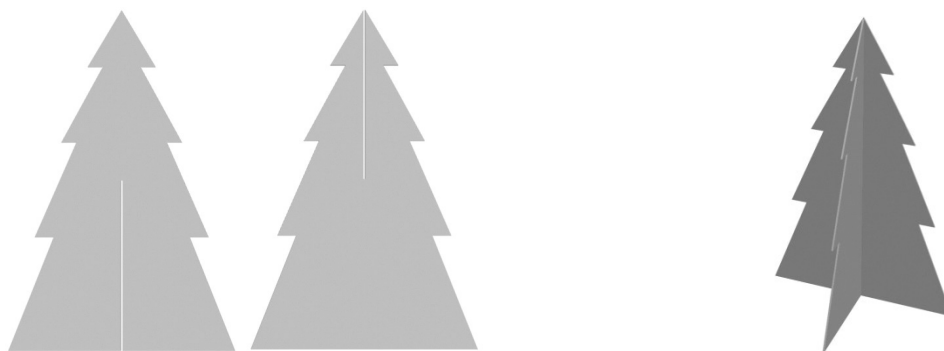


Figure 4

A ruler and pencil are two tools that could be used to mark out the shape of the two halves of the model.

- (a) Give **two** additional marking-out tools that could be used to draw out the two halves of the model.

(2)

- 1
- 2

A commercial batch of 50,000 Christmas tree models are to be made from folding box board. The surface of the models is to be printed with a decorative image.

- (b) Explain **two** reasons why offset lithography printing would be used, rather than screen printing, to produce the image on the surface of the models.

(4)

- 1
-
-
-
-
- 2
-
-
-
-



(c) Explain **two** reasons why a stamping out process would be used rather than laser cutting for producing a batch of 50,000 Christmas tree models.

(6)

1

.....

.....

.....

.....

.....

2

.....

.....

.....

.....

.....

(Total for Question 3 = 12 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



4 Figure 5 shows two button cells in blister packaging.

The blister packaging is made from two parts, a card backing and a clear polyvinyl chloride (PVC) front.

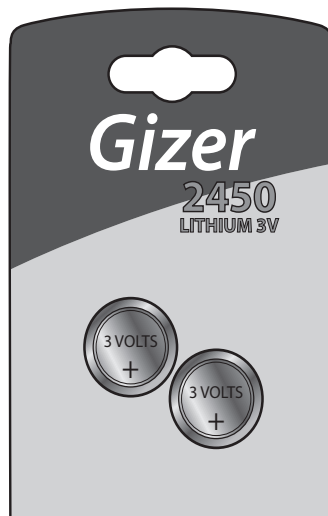


Figure 5

- (a) Explain **three** reasons why the vacuum forming process was chosen to manufacture the clear PVC part of the blister packaging.

(6)

1

2

3



(b) Explain **two** advantages of having a trademark name on a product.

(4)

1

2

(c) Give **two** benefits of internet marketing for the consumer.

(2)

1

2

(d) Explain **one** reason why a company would carry out market analysis for their product.

(3)

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Figure 6 shows a handheld remote control that is made from rubber.

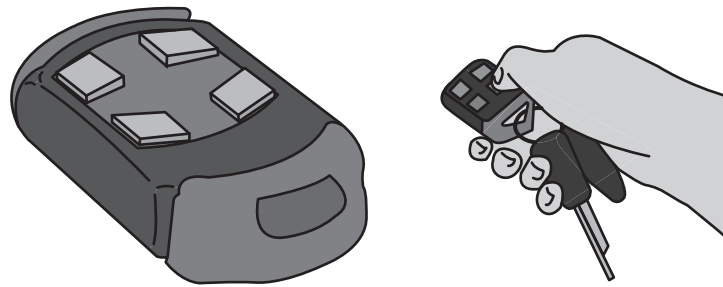


Figure 6

(e) Evaluate the decision to use rubber for the body of the remote control.

(9)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (f) Each time the remote is used it drains the batteries, which will eventually need changing. The table below gives details of the battery usage.

Batteries required	Uses per day	Average use time (in seconds) per press	% of battery used per second
1	4	2	0.02

Calculate how many days one battery will last.

(2)

Show all of your workings.

Answer

(Total for Question 4 = 26 marks)



5 Figure 7 shows a children's toy train.

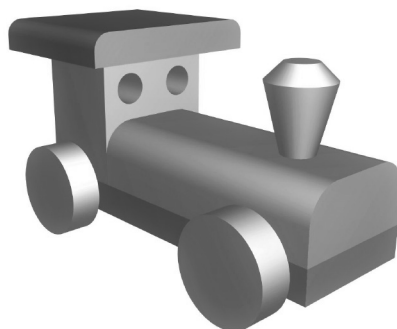


Figure 7

- (a) The manufacturer has decided to use beech rather than another timber to make a number of toy trains. The various parts of the trains are painted or varnished.

Explain **two** characteristics of beech which make it a suitable timber for the toy train.

(4)

1

2



(b) Once the trains have manufactured, they need distributing to shops.

Discuss the factors that need to be considered for the distribution of the toys.

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Figure 8 shows an isometric drawing of the train and each of its components.

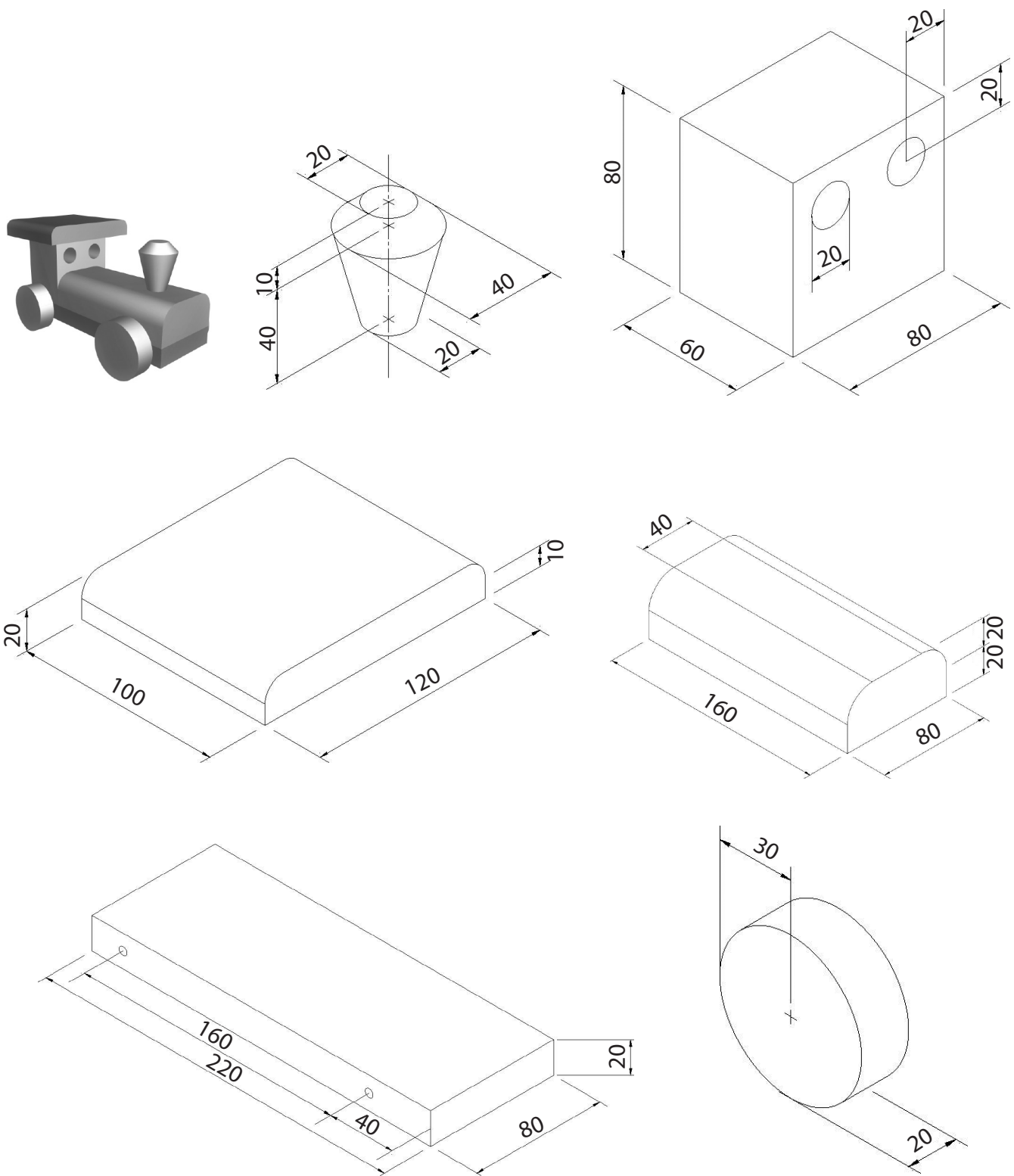


Figure 8



S 5 9 7 8 4 A 0 1 5 2 4

- (c) Draw an accurate third angle orthographic projection of the train, to a scale of 1:2, on the grid provided.

The wheels and the chimney of the train have already been drawn for the front elevation. The roof of the cab is centered on the cab.

Dimensioning of the drawing is **not** required.

Do **not** show hidden detail.

(8)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA





DO NOT WRITE IN THIS AREA

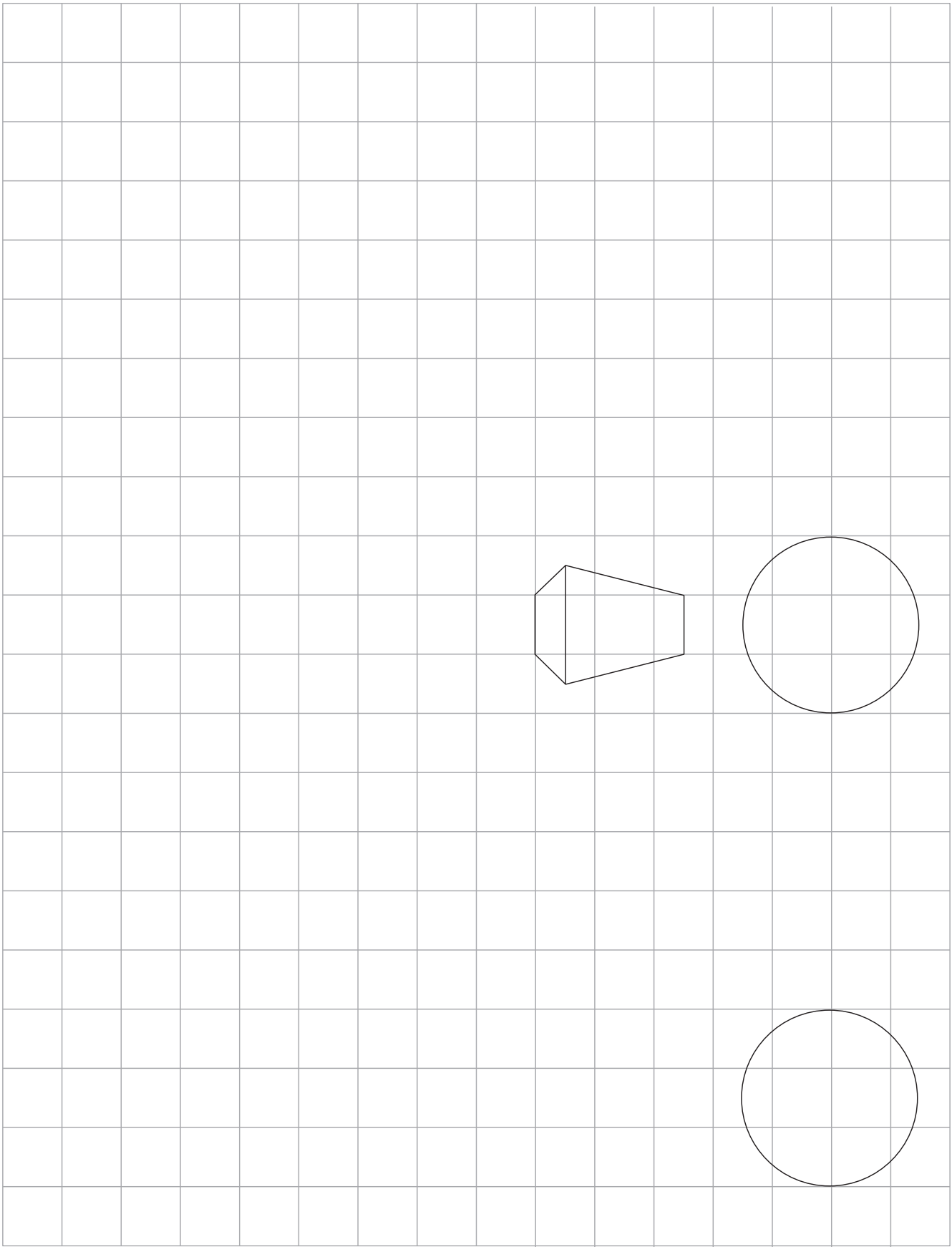
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



S 5 9 7 8 4 A 0 1 7 2 4



(d) Figure 9 shows a front view of the chimney of the train.

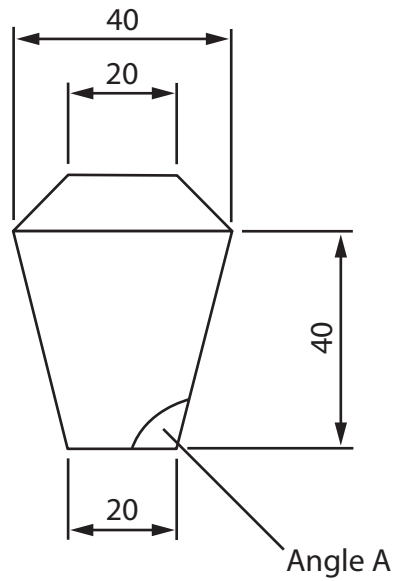


Figure 9

Calculate Angle A in degrees.

Give your answer to **three** significant figures.

Show all of your workings.

(5)

Answer

(Total for Question 5 = 23 marks)



6 Figure 10 shows a juicer designed by Philippe Starck.

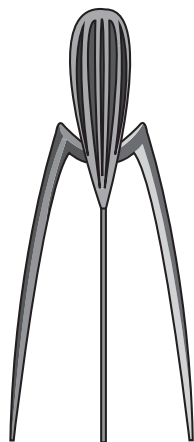


Figure 10

Discuss how Philippe Starck was influenced by Post-Modernist philosophies when designing the juicer shown in Figure 10.

(9)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....





DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total for Question 6 = 9 marks)



7 A manufacturer is considering two assembly options when setting-up a mass production line:

- manual labour
- automated robotic machinery.

(a) Discuss the factors that need to be considered before deciding which option to use on a mass production line.

(6)

Handwriting practice area with horizontal dotted lines.



S 5 9 7 8 4 A 0 2 1 2 4

(b) Explain **two** ways in which robots have had an impact on employment.

(6)

1

2

(Total for Question 7 = 12 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



8 Figure 11 shows a design for a laminated chair.

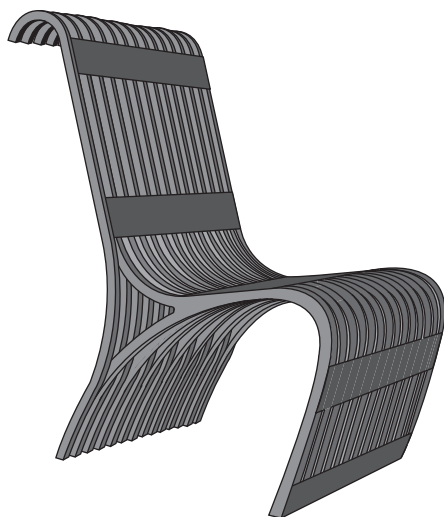


Figure 11

Evaluate the use of a batch production system rather than a one-off production system to manufacture 500 laminated wooden chairs.

(12)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total for Question 8 = 12 marks)

TOTAL FOR PAPER = 120 MARKS

