Write your name here

Surname	Other names

Pearson Edexcel Level 3 GCE

Centre Number | | | | | |

Candidate Number | | | | |

Design and Technology (Product Design)

Advanced Subsidiary
Paper 1

Monday 14 May 2018 – Afternoon
Time: 2 hours

Paper Reference
8DT0/01

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 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.

Turn over ▶

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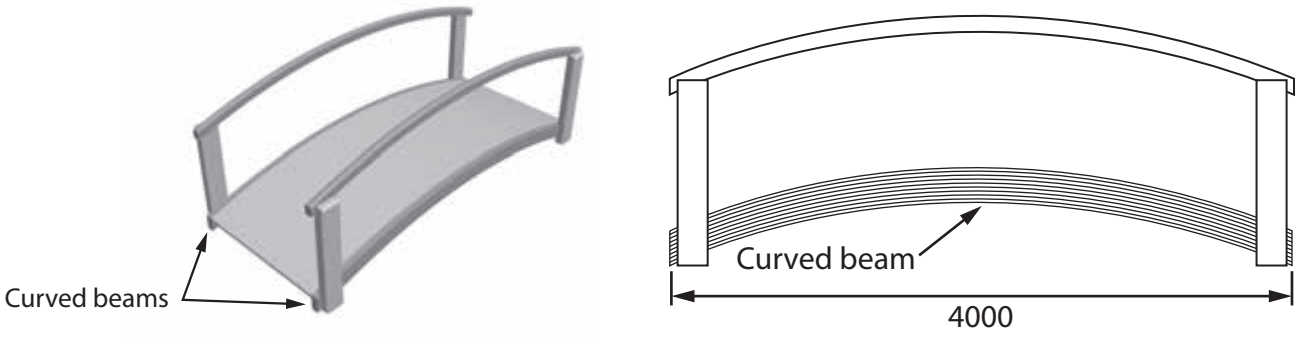
P 5 7 8 6 1 A 0 1 2 4

Pearson

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

1 Figure 1 shows two views of a prototype of a bridge.



(All dimensions are in mm)

Figure 1

The curved beam has been produced by laminating.

(a) Give **two** benefits of using lamination to manufacture the curved beam.

(2)

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The curved beam was laminated using an adhesive.

(b) Explain **two** reasons why PVA (polyvinyl acetate) adhesive was used.

(4)

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(c) Figure 2 shows a prototype of a flat wooden bridge. 'I-beams' have been constructed for the main rails from solid wood flanges and a composite wood web.

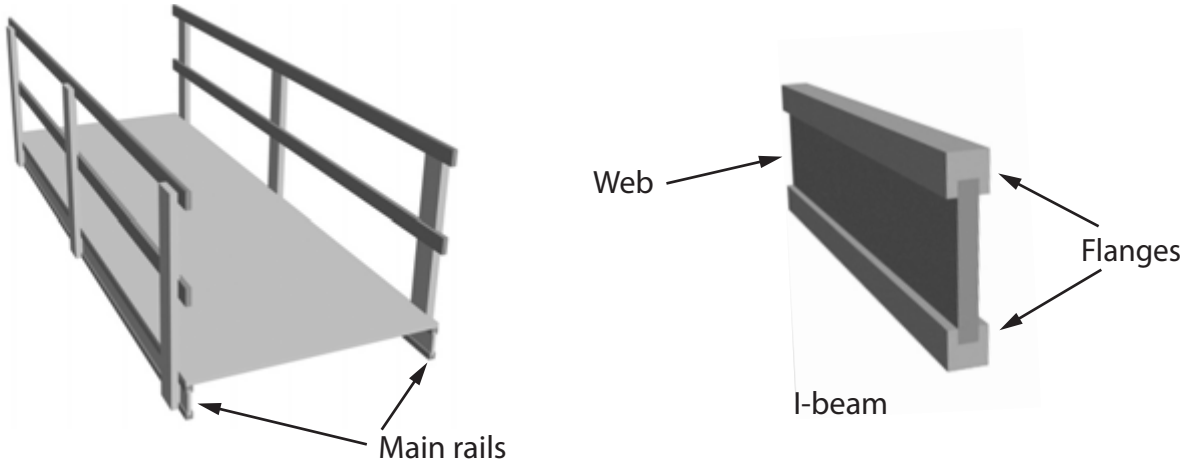

Figure 2

Name **two** suitable wood composite materials that could be used for the web.

(2)

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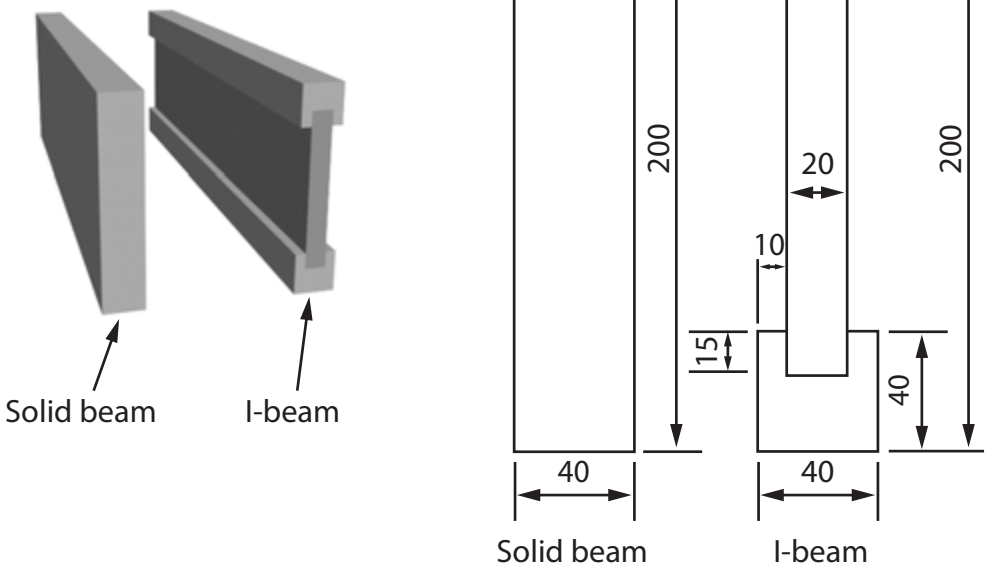
(d) Figure 3 shows a solid wood beam and a manufactured 'I-beam'.



(All dimensions are in mm)

Figure 3

Both beams are 600mm long.

Calculate the difference in the volume of material in the two beams.

Show all of your workings.

Give your answer in cm^3.

(4)

Answer .....

(Total for Question 1 = 12 marks)

2 Figure 4 shows a game that has been manufactured using a CNC router to form the base from a single piece of oak.

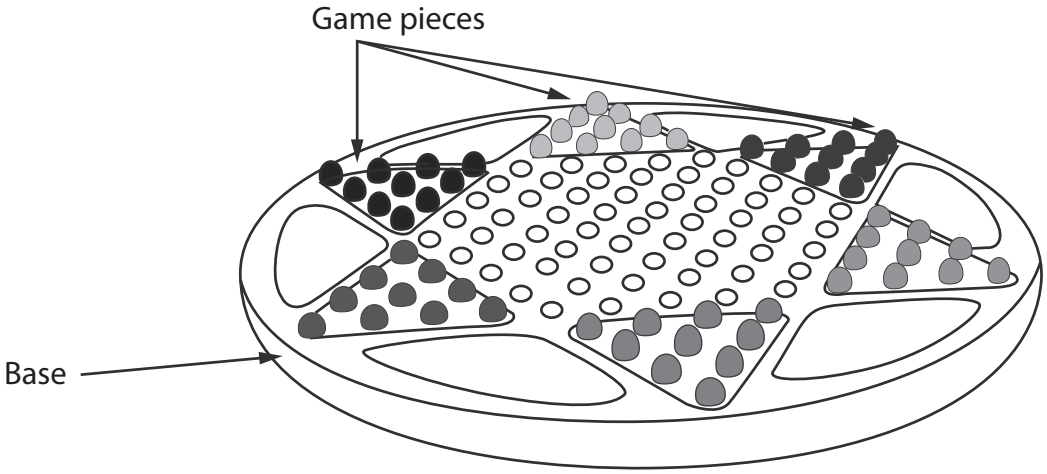


Figure 4

The computer-aided design drawing has already been produced.

(a) Outline the process of setting up and cutting the base using a CNC router.

(6)

(b) Explain **three** performance characteristics that make oak a suitable timber from which to manufacture the base of the game.

(6)

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A travel version of the game base could be made from a polymer using the rotational moulding process.

(c) Name **two** suitable materials that could be used to rotationally mould the base of the game.

(2)

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(d) Explain **two** benefits of using rotational moulding in preference to injection moulding when producing the base of the game.

(4)

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(Total for Question 2 = 18 marks)

3 Figure 5 shows an aluminium component that has been machined as part of a small batch of 50 using a milling machine.

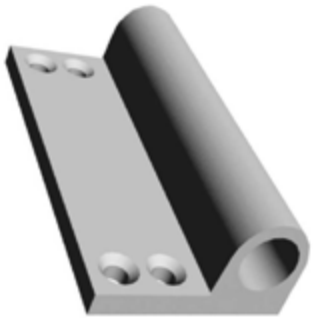

Figure 5

(a) Explain **two** advantages of milling the aluminium component shown in Figure 5 from a solid piece of material rather than making it from two separate pieces.

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(b) Figure 6 shows two parts that could be joined to make the component shown in Figure 5.

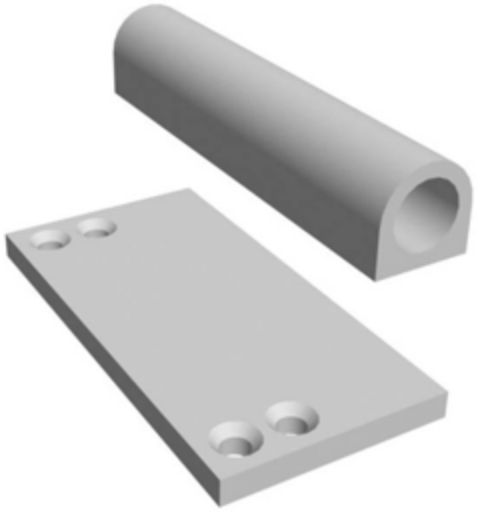

Figure 6

Give **two** advantages of making the component by joining two pieces together rather than machining it from one solid piece.

(2)

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(c) The finish specified for the component shown in Figure 5 is anodising.

Explain **two** advantages of anodising in preference to painting for the component shown in Figure 5.

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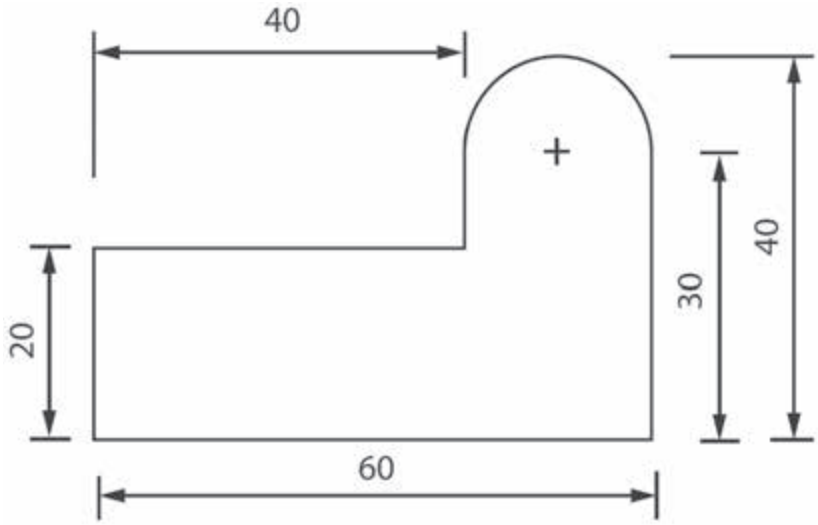
(d) Figure 7 shows the end view of a similar component to that shown in Figure 5 before any of the holes have been machined.



(All dimensions are in mm)

Figure 7

The component is 100mm in length.

Calculate the amount of waste material that is removed (excluding any holes) when the component is machined from a single piece of material that is 100 x 60 x 40mm.

Show all of your workings.

Give your answer in mm^3.

(6)

Answer .....

(Total for Question 3 = 16 marks)

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4 Figure 8 shows two toy building blocks made from acrylonitrile butadiene styrene (ABS).

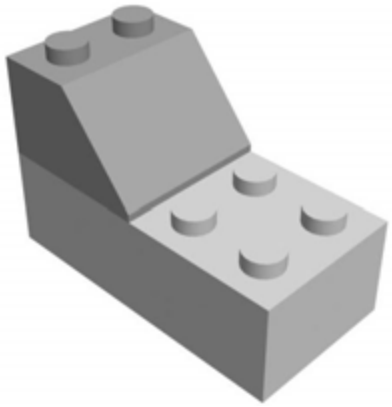

Figure 8

(a) Explain **two** characteristics of ABS that make it a suitable material for the toy building blocks.

(6)

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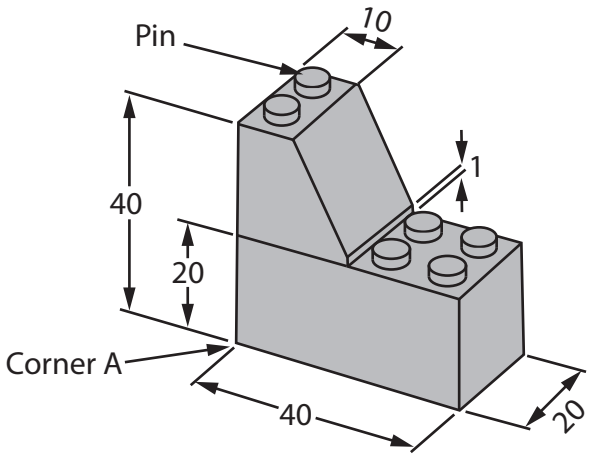
(b) Figure 9 shows an isometric view of the two blocks.



(All dimensions are in mm)

Figure 9

The dimensions of the pins are 6mm in diameter and 2mm in height. The centres of the pins are 5mm from the edges and they are equally spaced.

Draw a full size 3rd angle orthographic projection of the two joined blocks on the grid opposite. Each grid square is equivalent to 5mm.

Include both side views and a plan view. Corner A of the front view has been provided for you.

Dimensioning of the drawing is not required.

Do **not** show hidden detail.

(8)

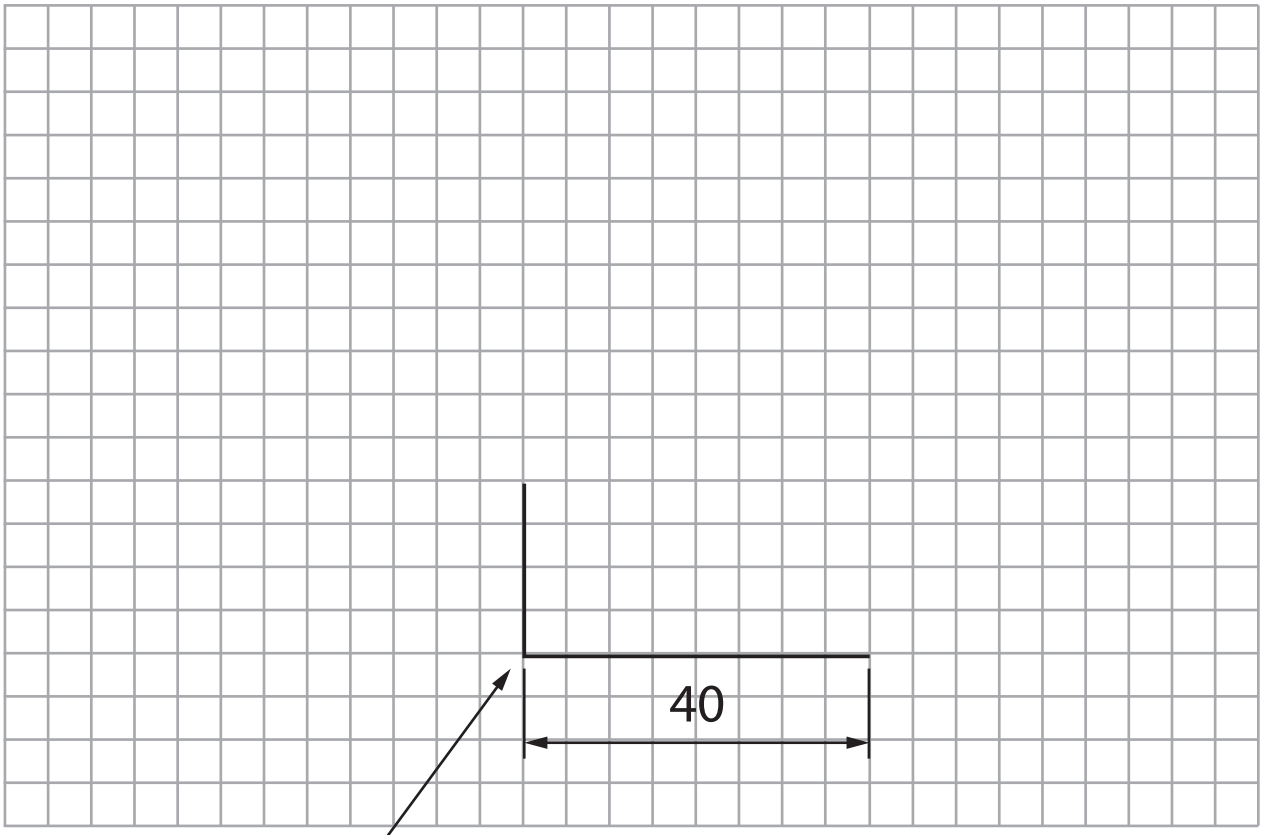


Figure 10 shows a solid version of a building block that is part of a key ring.
A batch of 5000 blocks is to be made from aluminium using a die casting process.

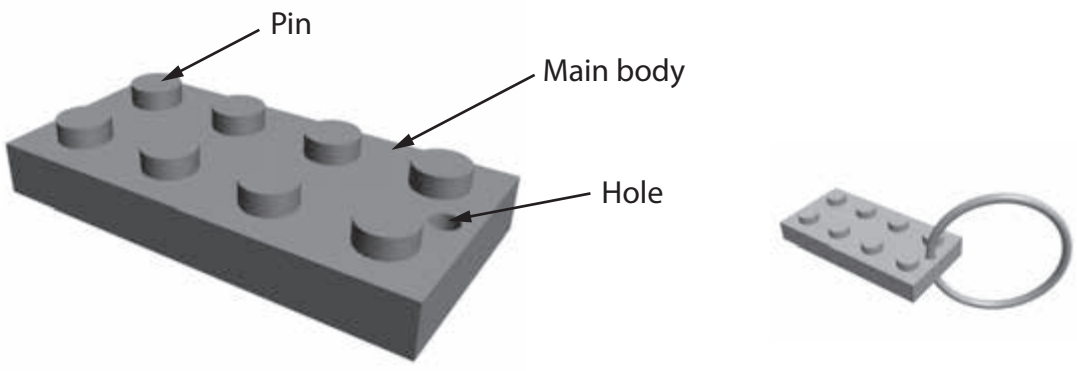


Figure 10

(c) Explain **two** reasons why die casting is the method chosen to make the batch of aluminium building blocks.

(4)

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(d) The table below shows the dimensions in millimetres (mm) of the aluminium building block that is to be die cast and used for the key ring.

	Length	Width	Thickness
Main body	40	20	4
Pins	6 diameter		2
Hole	3 diameter		

Calculate the amount of material necessary to make 5000 building blocks.

(6)

Show all of your workings.

Give your answer in mm^3.

Answer .....

(Total for Question 4 = 24 marks)

5 William Morris was an influential designer during the Arts and Crafts period. One of his views was that craftsmanship was an important part of the design and manufacture of products.

(a) Discuss how designers of the period were influenced by the principles of the Arts and Crafts movement.

(8)

William Morris believed that form should follow function.

Figure 11 shows a chair designed by William Morris.

Figure 11

(b) Explain **two** ways in which the chair in Figure 11 exhibits the philosophy that form should follow function.

(4)

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(Total for Question 5 = 12 marks)

6 Built-in obsolescence has had a number of varied effects on society.

Explain **two** positive effects built-in obsolescence has had for the consumer.

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(Total for Question 6 = 6 marks)

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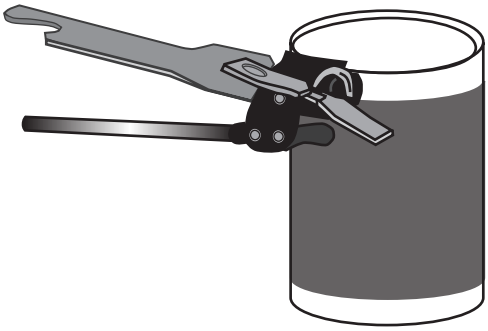
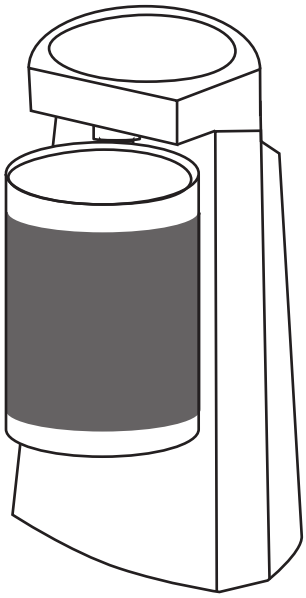
7 Figure 12 shows two tin openers and two specification points for each.



Manual tin opener



Electric tin opener

Figure 12

	Manual tin opener	Electric tin opener
Power	Hand	Battery
Weight	200 grams	1 kg

Evaluate the user requirements of the two tin openers with reference to everyday use in a family home.

(12)

(Total for Question 7 = 12 marks)

TOTAL FOR PAPER = 100 MARKS

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