Please check the examination details below before entering your candidate information

Candidate surname					
Other names					
Centre Number					
Candidate Number					

Pearson Edexcel

Level 1/Level 2 GCSE (9-1)

Friday 24 May 2019

Afternoon (Time: 1 hour 45 minutes plus your additional time allowance)

Paper Reference 1DT0/1C

Design and Technology

Component 1: Polymers

V59664A

Pearson

YOU MUST HAVE: Calculator, ruler, HB pencil, protractor, compass A diagram booklet	Total Marks

INSTRUCTIONS

- **Use BLACK ink, ball-point pen or your usual method.**

- **FILL IN THE BOXES at the top of the previous 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.

- **Calculators may be used.**

- **Any diagrams may NOT be accurately drawn, unless otherwise indicated.**

- **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.**

SECTION A – CORE

ANSWER ALL QUESTIONS. WRITE YOUR ANSWERS IN THE SPACES PROVIDED.

1 (a) The materials that products are made from are chosen because of their properties.

Figure 1 in the diagram booklet shows a table of products.

For each of the products shown, give a property of the material it is made from that makes the material suitable for the product.

The first one has been done for you.

1 (b) Figure 2 in the diagram booklet shows a table with the number of plastic bags given away in England.

Calculate the percentage reduction in the number of plastic bags given away between 2014 and 2015.

Give your answer to the nearest whole number. (2)

Percentage reduction _____

1 (c) In 2015 charging for carrier bags was introduced resulting in a reduction in the number of bags being manufactured.

Explain ONE negative effect of this reduction for the manufacturer. (2)

(TOTAL FOR QUESTION 1 = 8 MARKS)

2 Figure 3 in the diagram booklet shows a drawing of a fabric play cube for young children.

The fabric play cube has a side length of 60 mm.

(a) Name the communication technique that has been used to produce the drawing shown in Figure 3. (1)

_____

_____

2 (b) A prototype play cube was made from calico.

Explain ONE reason for using calico for the prototype play cube.

(2)

2 (c) The pattern for the prototype play cube was made from a single net.

Draw a net for the play cube on the grid provided in the diagram booklet.

Do not include any seam allowance.

Use a thick dashed line - - - - - - to show where the net would be folded.

(4)

2 (d) Tracing paper was used to design the prototype play cube.

Explain ONE reason why designers use tracing paper. (2)

(TOTAL FOR QUESTION 2 = 9 MARKS)

3 Figure 4 in the diagram booklet shows part of a solar powered garden light.

The outer case is made from acrylic.

(a) Give ONE property of acrylic that makes it an appropriate material from which to make the outer case.

(1)

_____

_____

3 (b) The solar powered garden light is held off the ground by a stainless steel support.

Explain ONE reason for using stainless steel for the support. (2)

3 (c) The manufacturer of the solar powered garden light wants to reduce its carbon footprint.

Explain ONE way new and emerging technologies could be used to reduce the manufacturer's carbon footprint. (2)

3 (d) The solar cell used in the solar powered garden light costs 1/12th of the total cost of the product.

Calculate the cost of the solar cell if each light costs £4.97 to make.

Give your answer to two significant figures. (2)

£ _____

3 (e) The manufacturer of the solar powered garden light employs different groups of people including apprentices.

Explain TWO ways that the use of new and emerging technologies could affect the apprentices. (4)

1. _____

_____

_____

_____

_____

_____

_____

_____

continued on the following page

2. _____

_____

_____

_____

_____

_____

_____

_____

(TOTAL FOR QUESTION 3 = 11 MARKS)

4 Figure 5 in the diagram booklet shows a drawing of a jewellery box made from mahogany.

The electronic component shown in Figure 6 in the diagram booklet is used in the jewellery box.

(a)(i) Name the electronic component shown in Figure 6. (1)

4 (a)(ii)

The jewellery box uses a programmable component to turn on a musical tune when the lid is opened, that stays on until the lid is closed.

Figure 7 in the diagram booklet shows a partly completed flowchart for the programmable component.

Correctly label the DECISION OUTPUTS and add the remaining LINES and ARROWS on the flowchart to show how the programmable component:

- **turns on the musical tune when the lid is opened**
- **turns off the musical tune when the lid is closed. (3)**

4 (b) Analyse the information in Figure 8 about the sources of mahogany.

FIGURE 8

SOURCES OF MAHOGANY	PERCENTAGE GROWN IN EACH AREA (%)
Native forests	7
National parks	30
Other	63

Complete the bar chart in the diagram booklet to show the percentage grown in each area.

The first one has been done for you.

(2)

4 (c) A film company is considering launching a range of musical jewellery boxes based on its animated characters.

Discuss the different design strategies the company could use to generate initial ideas and to avoid design fixation. (6)

22

23

(TOTAL FOR QUESTION 4 = 12 MARKS)

TOTAL FOR SECTION A = 40 MARKS

SECTION B – POLYMERS

ANSWER ALL QUESTIONS. WRITE YOUR ANSWERS IN THE SPACES PROVIDED.

5 **Figure 9 in the diagram booklet shows a design solution for a charity collection box together with some additional information.**

(a) **The charity collection box needs to be improved to include the following specification points.**

continued on the following page

The charity collection box must:

- **allow different charity postcards to be displayed and changed**
- **provide a method to allow bigger coins to be put in and kept inside without someone being able to shake them out**
- **provide a secure method that allows the coins inside the box to be removed without causing any damage to the box.**

Use notes and sketches, on the outline in the diagram booklet, to show how the charity collection box could be modified to include these specification points.

You will be marked on how you apply your understanding of design and technology, not your graphical skills. (6)

5 (b) **Figure 10 in the diagram booklet shows an expanded polystyrene retail display unit for a pair of glasses.**

Explain TWO ways that the retail display unit meets, or fails to meet, the criteria of providing a secure way to display the glasses. (4)

1. _____

_____

_____

2.

(TOTAL FOR QUESTION 5 = 10 MARKS)

6 Figure 11 in the diagram booklet shows some kitchen knives. The handles are made from a sustainable polymer.

(a) Explain TWO advantages of manufacturing the kitchen knife handles from a sustainable polymer.

(4)

1. _____

continued on the following page

2.

6 (b) Figure 12 in the diagram booklet shows part of a kitchen knife storage holder that will be joined to other parts using bolts.

Use notes and sketches, in the space on the following page, to show how to cut a screw thread through one of the holes in the 10 mm acrylic.

You will be marked on how you apply your understanding of design and technology, not your graphical skills.

(4)

6 (c) Explain ONE reason for using coloured polymers for the knife handles. (2)

6 (d) Figure 13 in the diagram booklet shows the top part of the kitchen knife storage holder.

The top part is to be manufactured from 6 mm thick acrylic in a batch of 1000.

Name TWO different techniques that could be used to batch produce the top part of the kitchen knife storage holder.

continued on the following page

Explain ONE advantage of using each technique. (6)

Technique 1

Explanation

continued on the following page

Technique 2

Explanation

(TOTAL FOR QUESTION 6 = 16 MARKS)

7 Figure 14 in the diagram booklet shows a piece from a child's puzzle made from high impact polystyrene (HIPS).

(a) Name ONE surface finish or surface treatment that could be used to create the word 'BLUE' on the puzzle piece. (1)

7 (b) The peg has been cut from a 600 mm length of stock material.

The stock material is 6 mm diameter rod.

Explain TWO reasons for using a stock-sized rod. (4)

1. _____

_____

_____

_____

_____

_____

continued on the following page

2. _____

_____

_____

_____

_____

_____

_____

7 (c) Figure 15 in the diagram booklet shows the dimensions for the body of the puzzle piece.

Calculate the maximum number of whole puzzle piece bodies that can be cut from a length of polymer measuring 181 cm long by 4 cm wide.
Ignore the width of any cuts. (5)

Answer _____ whole bodies

7 (d) Explain TWO working properties of HIPS that make it an appropriate choice of material for the body of the puzzle piece. (6)

1.

continued on the following page

2. _____

(TOTAL FOR QUESTION 7 = 16 MARKS)

8 Figure 16 in the diagram booklet shows a window frame manufactured from polyvinyl chloride (PVC).

(a)(i) Explain ONE reason for introducing additives into the PVC.

(2)

8 (a)(ii)

Explain ONE working property of PVC that makes it suitable for the window frame. (3)

8 (b) Explain TWO negative effects on the global environment of using PVC for the window frame. (4)

1. _____

continued on the following page

2. _____

8 (c) The window frames are manufactured in Europe and transported worldwide.

Figure 17 in the diagram booklet shows a table with information about the window frames.

Analyse the information in Figure 17.

Evaluate the window frames with reference to their social footprint including:

- trend forecasting
- impact of extraction and material production on the environment
- ease and difficulty of recycling and disposal. (9)

48

49

50

(TOTAL FOR QUESTION 8 = 18 MARKS)

TOTAL FOR SECTION B = 60 MARKS

TOTAL FOR PAPER = 100 MARKS