

Design and Technology
COMPONENT 1: Textiles

Total Marks

Tuesday 18 June 2024 – Morning

Time: 1 hour 45 minutes

In the boxes below, write your name, centre number and candidate number.

Surname					
Other names					
Centre Number					
Candidate Number					

YOU MUST HAVE

Calculator, ruler, writing and drawing equipment, protractor, pair of compasses

YOU WILL BE GIVEN

Diagram Booklet

INSTRUCTIONS

Answer ALL questions.

Answer the questions in the spaces provided in this Question Paper or in the separate Diagram Booklet – 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.

Turn over

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.**

Look at Figure 1 for Question 1(a) in the Diagram Booklet. It 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.
(4 marks)**

The first one has been done for you.

(continued on the next page)

Turn over

1 continued.

(b) (i) The frying pan is made from cast iron. Cast iron is hard, therefore it does not scratch easily.

**Explain ONE OTHER advantage of using cast iron for the frying pan.
(2 marks)**

(continued on the next page)

Turn over

1(b) continued.

(ii) Cast iron contains 2% carbon.

**The cast iron frying pan
weighs 3 kg**

**Calculate how many grams
of carbon are in the cast iron
frying pan.
(2 marks)**

Answer _____ grams

(Total for Question 1 = 8 marks)

Turn over

2 Look at Figure 2 for Question 2 in the Diagram Booklet. It shows a wooden sheep that is being threaded with a yarn.

**(a) Name ONE specific animal fibre that can be used to make the yarn being threaded in Figure 2.
(1 mark)**

(continued on the next page)

2 continued.

The wood that is used to manufacture the sheep is delivered to the manufacturer using vehicles powered by biofuels.

(b) Explain ONE advantage of using biofuels to power the delivery vehicles. (2 marks)

(continued on the next page)

Turn over

2 continued.

**(c) Explain ONE advantage of using computer-aided design (CAD) when producing the design ideas for the wooden sheep.
(2 marks)**

(continued on the next page)

Turn over

2 continued.

A new animal shape needs to be designed.

The designer has collected some data about the popularity of specific animals amongst young children.

Look at Figure 3 for Question 2(d)(i) in the Diagram Booklet. It is a table of data showing the popularity of specific animals amongst young children.

**(d) (i) Complete Figure 3 by calculating the TWO missing values.
(2 marks)**

Answer space continues on the next page.

Space for working

Turn over

2(d)(i) continued.

Number of votes for Rabbit _____

Number of votes for Mouse _____

(continued on the next page)

Turn over

2(d) continued.

Look at Figure 4 for Question 2(d)(ii) in the Diagram Booklet. It is a partly completed bar chart that shows the percentage of votes received for the Cat and the Dog.

- (ii) Complete the bar chart shown in Figure 4 to show the percentage of votes received for the Rabbit and the Mouse.
(2 marks)**

(Total for Question 2 = 9 marks)

3 Look at Figure 5 for Question 3 in the Diagram Booklet. It shows a pulley and pulley belt, a motor, and the cross section of the pulley belt used in a model boat drive system.

**(a) Name the type of pulley belt shown in the cross section in Figure 5.
(1 mark)**

(continued on the next page)

3 continued.

**(b) Explain ONE reason for
manufacturing the pulley from
aluminium rather than mild steel.
(2 marks)**

(continued on the next page)

3 continued.

Look at Figure 6 for Question 3(c) in the Diagram Booklet. It shows the pulley system for the model boat drive system.

(c) The pulley system has a velocity ratio of 5:1

The input speed is 2000 revolutions per minute (rpm).

Calculate the output speed of the pulley system.

Use the formula below to calculate the answer.

$$\text{Velocity ratio} = \frac{\text{input speed}}{\text{output speed}}$$

**Give your answer in rpm.
(2 marks)**

Answer space continues on the next page.

Turn over

3(c) continued.

Answer _____ rpm

(continued on the next page)

Turn over

3 continued.

Look at Figure 7 for Question 3(d) in the Diagram Booklet. It shows the motor for the model boat is powered by the solar cell.

The solar cell is 5 cm by 5 cm

**(d) Explain ONE disadvantage of using the solar cell to power the motor for the model boat.
(2 marks)**

(continued on the next page)

Turn over

3 continued.

Look at Figure 8 for Question 3(e) in the Diagram Booklet. It shows the frame for the model boat.

The model boat has been manufactured from balsa wood.

**(e) Explain TWO benefits of using balsa wood for the frame of the model boat.
(4 marks)**

Answer space continues on the next page.

1 _____

Turn over

3(e) continued.

2

(Total for Question 3 = 11 marks)

Turn over

- 4 (a) Explain TWO ways that conductive inks can be used in products.
(4 marks)

Answer space continues on the next page.

1 _____

2 _____

Turn over

4(a) continued.

(b) A small batch of conductive ink weighs 9 grams.

The ink contains 40% of hazardous material by weight.

**Calculate the weight of hazardous material present in the ink in grams.
(2 marks)**

Answer space continues on the next page.

4(b) continued.

Answer _____ grams

(continued on the next page)

Turn over

4 continued.

- (c) Discuss how designers can minimise the environmental impact of materials when developing new and emerging technologies.
(6 marks)**

Answer space continues on the next 4 pages.

Turn over

4(c) continued.

4(c) continued.

4(c) continued.

4(c) continued.

(Total for Question 4 = 12 marks)

TOTAL FOR SECTION A = 40 MARKS

Turn over

SECTION B

Textiles

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

- 5 Look at Figure 9 for Question 5 in the Diagram Booklet. It shows a design solution for a hairdresser's scissors pouch to hold two pairs of scissors, together with some additional information.**
- (a) The scissors pouch holds two pairs of scissors and needs to be improved to include the following specification points.**

The scissors pouch must:

- **be able to hold an additional two pairs of scissors and stop the handles of the scissors from moving as the pouch is carried around**

(continued on the next page)

Turn over

5(a) continued.

- **protect the user from potential cuts when carrying the pouch and have a surface finish that is easy to clean**
- **fit around a variety of waist sizes and be easily adjustable.**

Use notes and sketches to show how the scissors pouch could be modified to include these three specification points.

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

**Look at the outline diagram for Question 5(a) in the Diagram Booklet. Use the outline of the original design solution to show your modifications.
(6 marks)**

(continued on the next page)

Turn over

5 continued.

(b) Look at Figure 10 for Question 5(b) in the Diagram Booklet. It shows a food play set. The toy fruits are manufactured from a felt covered polymer.

**Explain TWO ways that the food play set meets, or fails to meet, the criterion of providing a method to educate young children about healthy eating.
(4 marks)**

Answer space continues on the next page.

1 _____

Turn over

5(b) continued.

2

(Total for Question 5 = 10 marks)

Turn over

6 Look at Figure 11 for Question 6 in the Diagram Booklet. It shows a denim shirt.

The shirt has been manufactured from a cotton twill fabric that has been treated using the biostoning process.

**(a) Explain TWO reasons for treating the denim shirt using the biostoning process.
(4 marks)**

Answer space continues on the next page.

1 _____

6(a) continued.

2 _____

(continued on the next page)

6 continued.

(b) Look at Figure 12 for Question 6(b) in the Diagram Booklet. It shows a close-up drawing of the shirt placket.

Use notes and sketches, in the space below, to show how the shirt placket would be stiffened with interfacing by fusing.

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

Answer space continues on the next page.

6(b) continued.

(continued on the next page)

Turn over

6 continued.

(c) Explain ONE physical characteristic of a twill woven fabric that makes it an ideal material for the denim shirt. (2 marks)

(continued on the next page)

Turn over

6 continued.

Look at Figure 13 for Question 6(d) in the Diagram Booklet. It shows a dimensioned drawing of the shirt pocket.

(d) Give TWO different manufacturing methods that could be used to cut out the shape of the shirt pocket from a sheet of cotton twill weave fabric.

**Explain ONE reason for using each manufacturing method.
(6 marks)**

Answer space continues on the next 2 pages.

Turn over

6(d) continued.

Method 1

Explanation

6(d) continued.

Method 2

Explanation

(Total for Question 6 = 16 marks)

Turn over

- 7 Look at Figure 14 for Question 7 in the Diagram Booklet. It shows a gardener's tunnel used to cover plants.**

The gardener's tunnel has been manufactured from a non-woven bonded fabric.

- (a) Name a specific reinforcement technique that has been used to support the non-woven fabric to create the roof curve.
(1 mark)**

(continued on the next page)

7 continued.

- (b) Explain TWO working properties of non-woven bonded fabric that make it an ideal material for the curved roof of the gardener's tunnel.
(4 marks)**

Answer space continues on the next page.

1 _____

Turn over

7(b) continued.

2 _____

(continued on the next page)

7 continued.

Look at Figure 15 for Question 7(c) in the Diagram Booklet. It shows a dimensioned drawing of one of the gardener's tunnels.

Circumference of a circle = πD

Use $\pi = 3.142$

(c) Calculate how many of the gardener's tunnels shown in Figure 15 can be cut from a large flat sheet of non-woven bonded fabric that measures 244 cm × 122 cm (5 marks)

Answer space continues on the next page.

7(c) continued.

Answer _____

(continued on the next page)

Turn over

7 continued.

(d) Look at Figure 16 for Question 7(d) in the Diagram Booklet. It shows the zipped front panel on the gardener's tunnel.

**Explain TWO benefits of using a zip on the front panel of the gardener's tunnel.
(6 marks)**

Answer space continues on the next page.

1 _____

Turn over

7(d) continued.

2

(Total for Question 7 = 16 marks)

Turn over

- 8 Look at Figure 17 for Question 8 in the Diagram Booklet. It shows a school jumper manufactured from a weft knitted acrylic fabric.**

Manufacturing school jumpers from weft knitted acrylic fabric is cost effective.

- (a) Explain ONE OTHER benefit of manufacturing the fabric of the school jumper from acrylic fibres.
(2 marks)**

(continued on the next page)

Turn over

8 continued.

**(b) Explain ONE advantage of using a regular denier acrylic yarn to form into the knitted fabric.
(3 marks)**

(continued on the next page)

Turn over

8 continued.

**(c) Explain TWO reasons why the embroidered badge has been manufactured as a sub-assembly.
(4 marks)**

Answer space continues on the next page.

1 _____

2 _____

Turn over

8(c) continued.

(continued on the next page)

8 continued.

(d) The school jumpers are manufactured in the United Kingdom and sold around the world.

Look at Figure 18 for Question 8(d) in the Diagram Booklet. It shows some additional information about the school jumpers.

Analyse the information in Figure 18.

Evaluate the school jumpers with reference to cost factors including:

- quality of material**
- manufacturing processes necessary**
- treatments.**

(9 marks)

Answer space continues on the next 4 pages.

Turn over

8(d) continued.

8(d) continued.

8(d) continued.

8(d) continued.

This image shows a single page from a notebook or ledger. It features ten evenly spaced, solid black horizontal lines running across the width of the page. The background is plain white, providing a clear space for writing or drawing. There are no margins, text, or other markings present on the page.

(Total for Question 8 = 18 marks)

TOTAL FOR SECTION B = 60 MARKS

TOTAL FOR PAPER = 100 MARKS

END OF PAPER