

Please write clearly, in block capitals.

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

Surname

Forename(s)

Candidate signature

GCSE

DESIGN AND TECHNOLOGY

Additional sample

Morning

Time allowed: 2 hours

Materials

For this paper you must have:

- normal writing and drawing instruments
- a calculator
- a protractor.

Instructions

- Use black ink or black ball-point pen. Use pencil only for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 100.
- There are 20 marks for Section A, 30 marks for Section B and 50 marks for Section C.

SECTION A – Core Technical Principles

Questions **1–10** are multiple choice questions. For multiple choice questions you should shade in **one** lozenge. If you make a mistake, cross through the incorrect answer and shade the correct response.

1 Identify which energy source is finite.

[1 mark]

- | | | |
|----------|-------|-----------------------|
| A | Coal | <input type="radio"/> |
| B | Solar | <input type="radio"/> |
| C | Tidal | <input type="radio"/> |
| D | Wind | <input type="radio"/> |

2 Identify the **correct** definition of a composite material.

[1 mark]

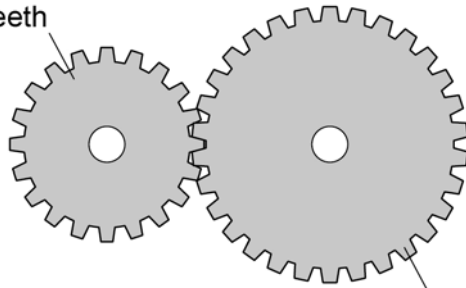
- | | | |
|----------|-----------------------------------------------------------------|-----------------------|
| A | A combination of two or more different materials | <input type="radio"/> |
| B | A material that changes its properties when exposed to sunlight | <input type="radio"/> |
| C | A naturally occurring renewable material | <input type="radio"/> |
| D | A polymer material that can be injection moulded | <input type="radio"/> |
-

3

If gear A rotates **three** times, how many times would gear B rotate?

[1 mark]

Gear A – 20 teeth



Gear B – 30 teeth

A One rotation

☐

B Two rotations

☐

C Three rotations

☐

D Four rotations

☐

4

Which of the following textile based materials comes from a sustainable source?

[1 mark]

A Denim

☐

B Elastane

☐

C Kevlar

☐

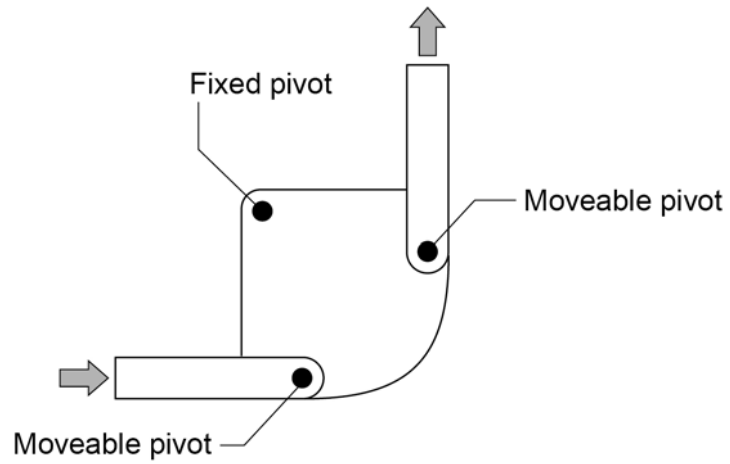
D Polyester

☐

5

What is the correct name of the mechanism shown below?

[1 mark]

**A** Bell crank linkage☐**B** First order lever☐**C** Push/pull linkage☐**D** Third order lever☐

6

Which of the following timbers is a naturally occurring hardwood?

[1 mark]

A Larch☐**B** Oak☐**C** Pine☐**D** Spruce☐

7

A method of raising money from lots of people to launch a new design is called:

[1 mark]

A A co-operative

☐

B Crowd funding

☐

C Fair trade

☐

D Virtual marketing

☐

8

Which **one** of the following statements is true?

[1 mark]

A Carbon fibre is a natural material used in model making

☐

B Low carbon steel is a non-ferrous metal used in damp environments

☐

C Medium density fibreboard is a man-made material used in the manufacture of flat pack furniture

☐

D Nylon is a conductive material used in electronics

☐

9

A tough material is commonly described as:

[1 mark]

A A material that can withstand repeated impacts

☐

B A material that is hard to scratch

☐

C A material that is possible to stretch into a different shape

☐

D A material that takes a long time to decompose

☐

10

What form of motion takes place when the swing below is being used?

[1 mark]**A** Linear☐**B** Oscillating☐**C** Reciprocating☐**D** Rotary☐**11**Give **two** advantages of portable energy storage systems.**[2 marks]**

1. _____

2. _____

12

Give **two** reasons why programmable microcontrollers are used in electronic products.

[2 marks]

1.

2.

13

Explain the term 'planned obsolescence'.






Give an example in your answer.

[3 marks]

14

Different products use different materials and components to make them fit for purpose.

Consider the images below.

				
Food container A	Jumper B	PCB C	Child's toy train D	Hand whisk E

Complete the table below by matching the main material or component to the product.

You may only use each product once.

An example has been completed for you.

[3 marks]

Main material or component	Product
Beech	D
Bevel gear	
Foil lined board	
Glass reinforced polymer	
Polyester	

SECTION B – Specialist Technical Principles**15**

When discussing sustainability we refer to the six Rs.

Three of the six Rs are given below.

Explain the meaning of each.

[3 x 2 marks]**Reduce**

Reuse

Refuse

[!!]

Describe how aesthetics influence the selection and choice of materials and components in manufactured products.

Give an example in your answer.

[3 marks]

17 . 1 Materials frequently need to be surface treated or have a finishing technique applied.

Name **two** different surface treatments or finishes applied to materials.

[2 marks]

1. _____

2. _____

17 . 2 Explain why materials may need a surface treatment or finish applied.

[3 marks]

18Select **one** product in the table below.

Explain why the given commercial process is used in its manufacture.

[3 marks]

Product	Toy car	Tea towel	Toothbrush	Pop up card	Wooden fruit bowl	House alarm
Commercial process	Casting	Printing	Injection moulding	Die cutting	Turning	Flow soldering

My chosen product is _____

The process is used because _____

19

Materials can have their properties modified for specific purposes.

Select **one** material category below. **Circle** your choice.

Explain how and why it needs to be modified.

Give an example in your answer.

Timbers	Metals	Papers and boards	Textiles	Polymers
---------	--------	-------------------	----------	----------

[3 marks]

Turn over for the next question

20

You are manufacturing 700 sports bags. Each bag has two zips.

The table below shows the cost of purchasing zips in packs of 100, 500 or 1000.

Zip quantity	Unit price
100	£0.50
500	£0.45
1000	£0.30

Calculate the most cost effective way of purchasing the zips you require.

Show your working in the space below.

[2 marks]

[8 marks]

[illegible]

SECTION C – Designing and Making Principles

22

Explain why designers research and compare products from other manufacturers before starting to design new products.

[6 marks]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

23

The product below is a traditional cotton tent used during camping activities.

Figure 1



***Diagram not drawn to scale**

Specification

- Two person tent
- Cotton fabric
- Button fastening
- Telescopic aluminium poles
- Shower proof
- Separate polymer base/groundsheet

Analyse the information provided and evaluate the tent in terms of its suitability for:

23 . 1 a family holiday

[4 marks]

23 . 2 use in a natural disaster

[4 marks]

23	.	3
----	---	---

 a festival**[4 marks]**

Turn over for the next question

23 . 4 You are making one tent as shown in **Figure 1 on page 17**.

Assume no material is wasted when cutting and that the material used will be purchased to the nearest full metre.

Cotton is sold by the metre length. The width of the materials is fixed but it can be cut at different lengths.

Stock form		
Material	Roll width	Cost per linear metre
Cotton	5 metres	£18

The table below shows the sizes of the material pieces to make **one** tent.

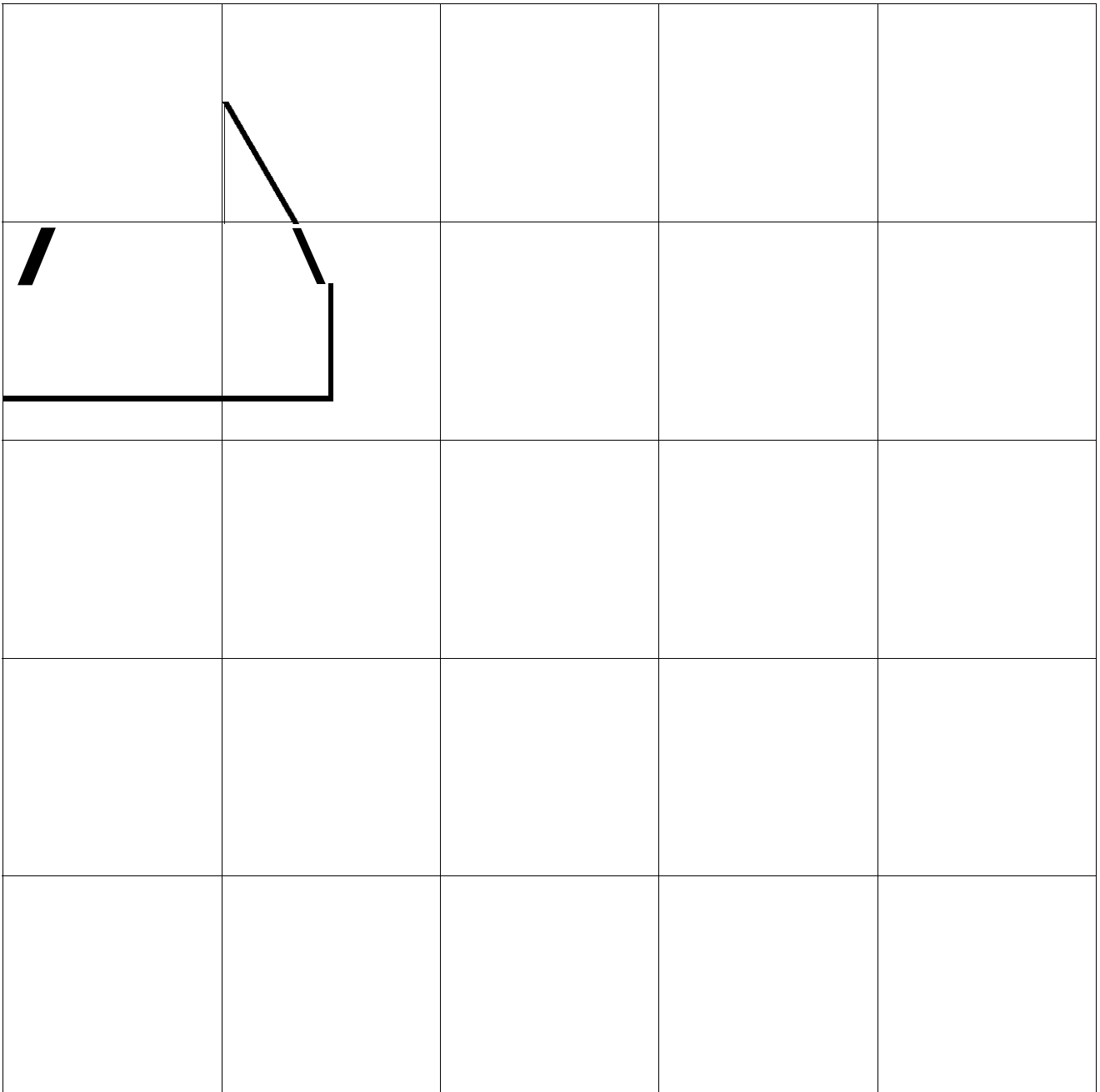
Cotton fabric required for one tent			
Part description	Pieces required	Length (m)	Width (m)
Tent roof	1	3.0	2.0
Tent front	1	1.8	1.5
Tent back	1	1.8	1.5
Tent sides	2	2.0	0.5

Using the diagram on the opposite page, show the position of each piece of the tent using the least amount of material as possible.

Do not include the groundsheet in your drawing.

The position of the front of the tent has been drawn to help you.

[5 marks]



Turn over for the next question

23 . **5** You find that 1.95 m^2 of the piece you have to buy is not actually used.

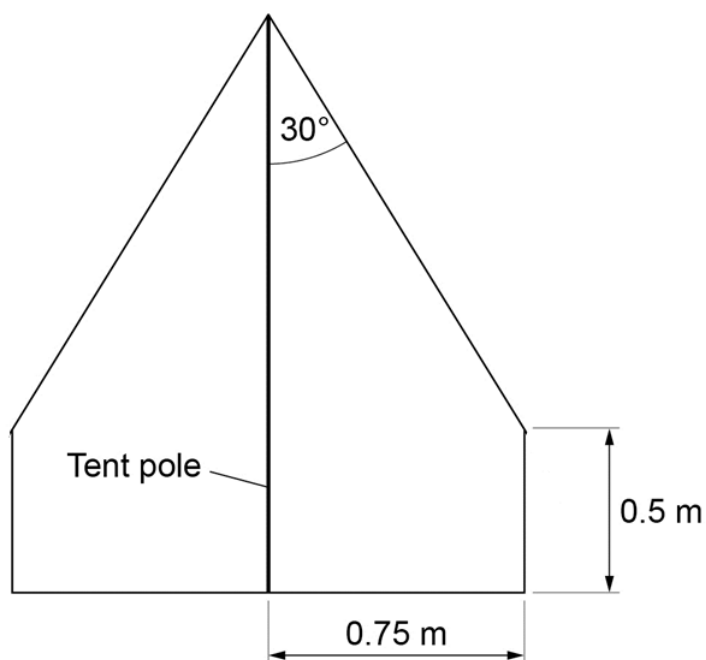
Calculate how much material is not used as a percentage.

[2 marks]

Turn over for the next question

There are no questions printed on this page

- 23 . 6** Using the diagram below, calculate the height of the tent poles required.

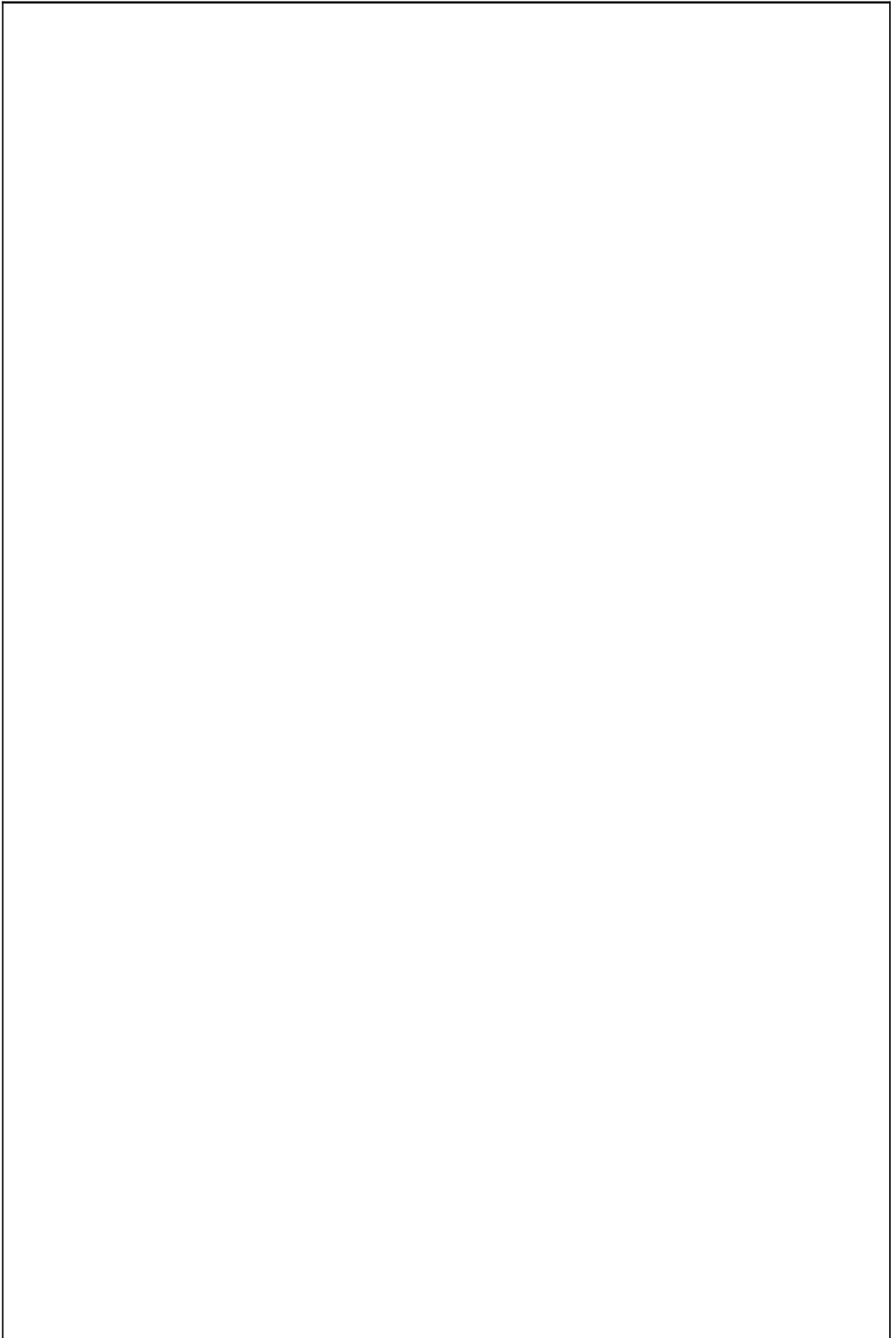


*Diagram not drawn to scale

Use the space below and the opposite page to show your calculation and working.

You may use **either** trigonometry or drawing in your answer.

[4 marks]



23	.	7
----	---	---

 Why is it important for the designer to consider ergonomics in the design of the tent?**[2 marks]**

24	.	1
----	---	---

 Name **one** designer you have studied as part of this course.

Name **one** specific product associated with your named designer.**[1 mark]**

[6 marks]

[illegible]

Designers use a variety of modelling techniques to develop their ideas.

Card modelling Toile Breadboard

Describe how your chosen modelling technique is used to develop products. **[6 marks]**

25	.	2
----	---	---

Discuss how a designer might use computer based tools in the development of a product.

[6 marks]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

END OF QUESTIONS

END OF QUESTIONS

There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

Copyright Information**Acknowledgement of copyright holders and publishers**

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team, AQA, Stag Hill House, Guildford, GU2 7XJ.

Copyright © 2018 AQA and its licensors. All rights reserved.

Question 14:	Food container	© istock.com/wragg
	Jumper	© istock.com/Grape_vein
	PCB	© istock.com/Bastar
	Child's toy train	© istock.com/redarrow81
	Hand whisk	© istock.com/1MoreCreative

END OF QUESTIONS

There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

END OF QUESTIONS

There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**