



Surname _____

Forename(s) _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

A-level

**DESIGN AND TECHNOLOGY:
PRODUCT DESIGN**

Paper 1 Technical Principles

7552/1

Wednesday 5 June 2024 Afternoon

Time allowed: 2 hours 30 minutes

At the top of the page, write your surname and forename(s), your centre number, your candidate number and add your signature.

[Turn over]



J U N 2 4 7 5 5 2 1 0 1

MATERIALS

For this paper you must have:

- **normal writing and drawing instruments**
- **a scientific calculator.**

INSTRUCTIONS

- **Use black ink or black ball-point pen. Use pencil only for drawing.**
- **Answer ALL questions.**
- **You must answer the questions in the spaces provided. Do not write on blank pages.**
- **If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).**
- **Do all rough work in this book. Cross through any work you do not want to be marked.**



INFORMATION

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 120.

DO NOT TURN OVER UNTIL TOLD TO DO SO



Answer ALL questions in the spaces provided.

0	1
---	---

Give THREE reasons why cellulose acetate is used in packaging. [3 marks]

Reason 1 _____

Reason 2 _____

Reason 3 _____

3



0	2
---	---

Analyse and evaluate the suitability of using acrylonitrile butadiene styrene (ABS) for the manufacture of a construction worker's helmet shown in FIGURE 1. [6 marks]

FIGURE 1



[Turn over]



6

[Turn over]



0 3

Identify the polymer stock form used for the following manufacturing processes. [3 marks]

Injection Moulding _____

Vacuum Forming _____

Rotational Moulding _____

3



0	4
---	---

Explain why thermochromatic pigment has been used in the child's forehead thermometer shown in FIGURE 2.

[6 marks]

FIGURE 2



[Turn over]



0	5	.	1
---	---	---	---

**A sheet of plywood today costs £85.
It has increased in price by 38% over the
past year.**

**Calculate the original price of the
plywood sheet.**

Show your working. [3 marks]

[Turn over]



Answer £ _____

0	5	.	2
---	---	---	---

I have a budget of £850 which allows me to buy 10 sheets of plywood.

Calculate how many sheets I would have been able to buy last year with £850.

Show your working. [2 marks]



0	6
---	---

Describe the process used to create the laser-cut plywood coaster shown in FIGURE 3. [6 marks]

FIGURE 3

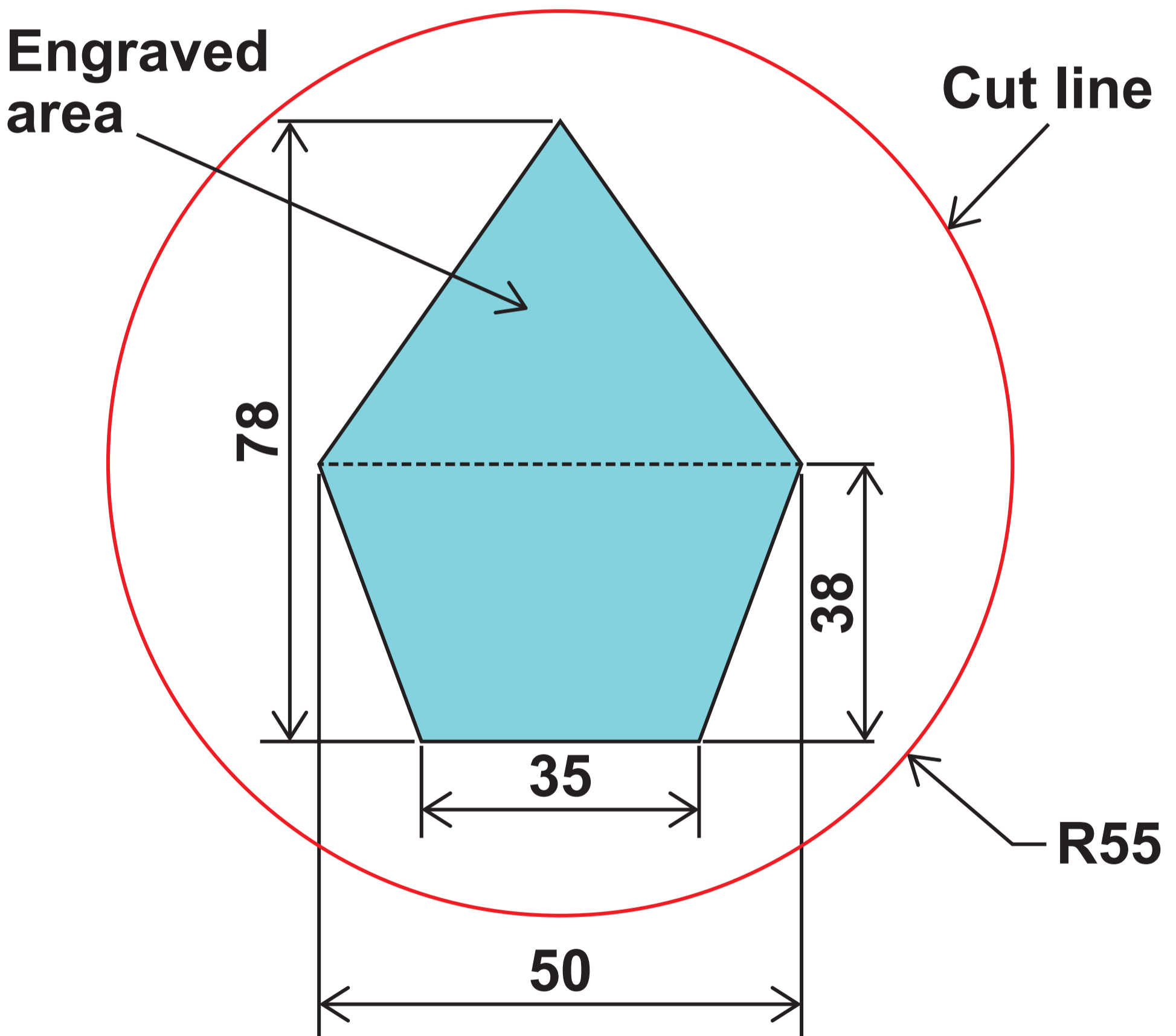




07

FIGURE 4 shows a representation of a laser-engraved coaster.

FIGURE 4



Not drawn to scale
All dimensions in mm



LASER CUTTER SETTINGS	
Cutting speed	8 mm per second
Engraving speed	59 mm² per second

0 7 . 1

Calculate the total area of the shaded part of the coaster.

Show your working. [3 marks]

[Turn over]



Answer _____ mm²

0	7	.	2
---	---	---	---

Calculate the total time taken to engrave the shaded part of the coaster and to cut the circumference.

Show your working. [4 marks]



Answer _____ seconds

7

[Turn over]



6

[Turn over]



0	9
---	---

**Explain why Plastazote foam is an appropriate material for the manufacture of the exercise mat shown in FIGURE 5.
[6 marks]**

FIGURE 5



6



BLANK PAGE

[Turn over]



1	0
---	---

Compare the following joining methods for attaching two thin sheets of aluminium:

- **pop rivets**
- **nuts and bolts.**

[6 marks]



1	2
---	---

FIGURE 6 shows a torch body and battery.

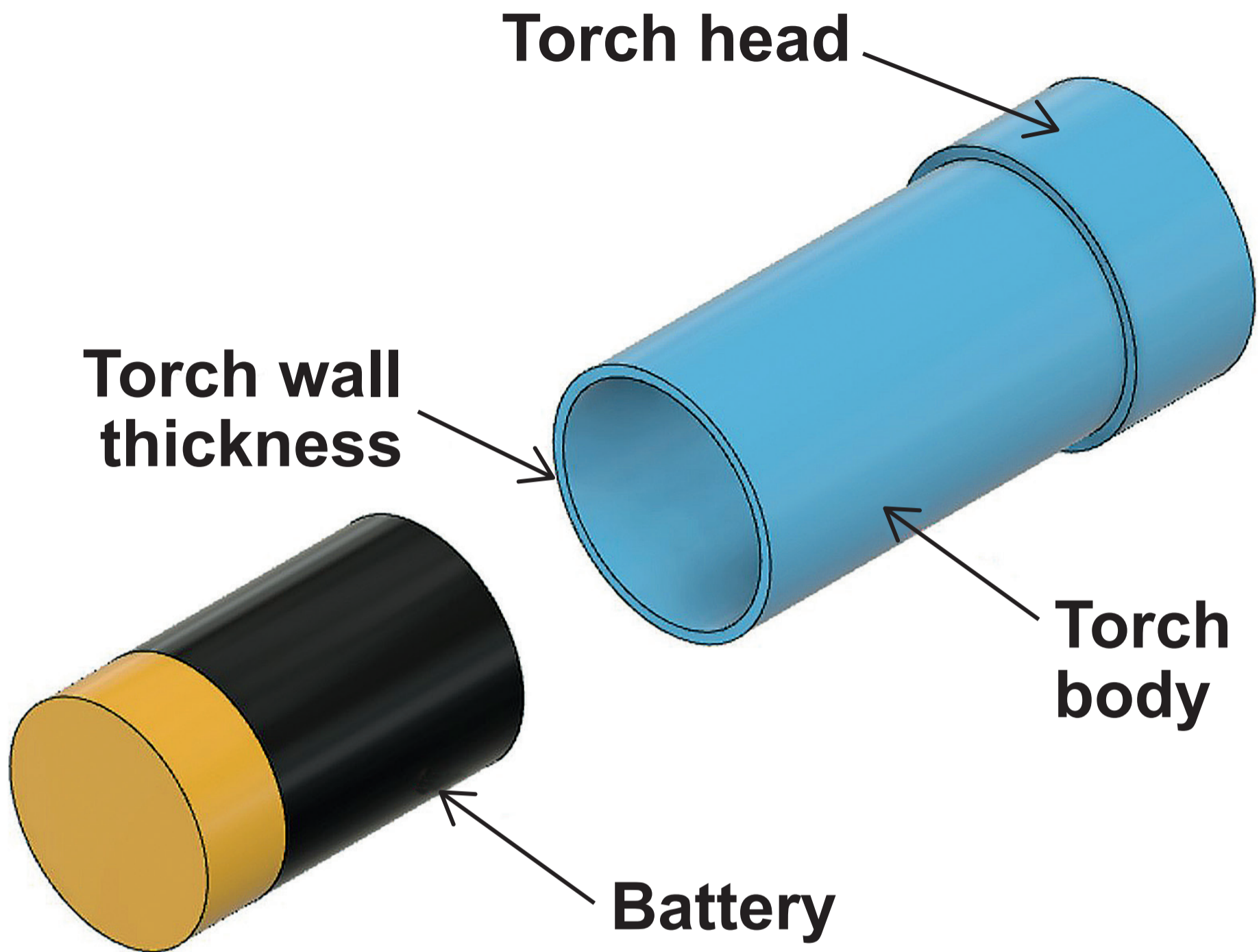
The volume of the battery is 30 772 mm³

The length of the battery is 50 mm

The wall thickness of the torch body is 3 mm



FIGURE 6



Not drawn to scale

[Turn over]



Answer _____ mm

4

[Turn over]



1	3
---	---

FIGURE 7 and FIGURE 8 show dishwashing accessories.

FIGURE 7



FIGURE 8



[Turn over]



	FIGURE 7	FIGURE 8
Method of manufacture	Injection moulded	Blow moulded
Handle texture	Over moulded with a Thermoplastic Elastomer (TPE)	Integrated during the moulding process

**Analyse and evaluate the method of manufacture used to create each of the textured surfaces on the two handles.
[6 marks]**



6

[Turn over]



1	5
---	---

FIGURE 9 shows a pie chart that gives information about consumer activities relating to sustainability.

The number of people who said that they **REUSE** a product is 350.

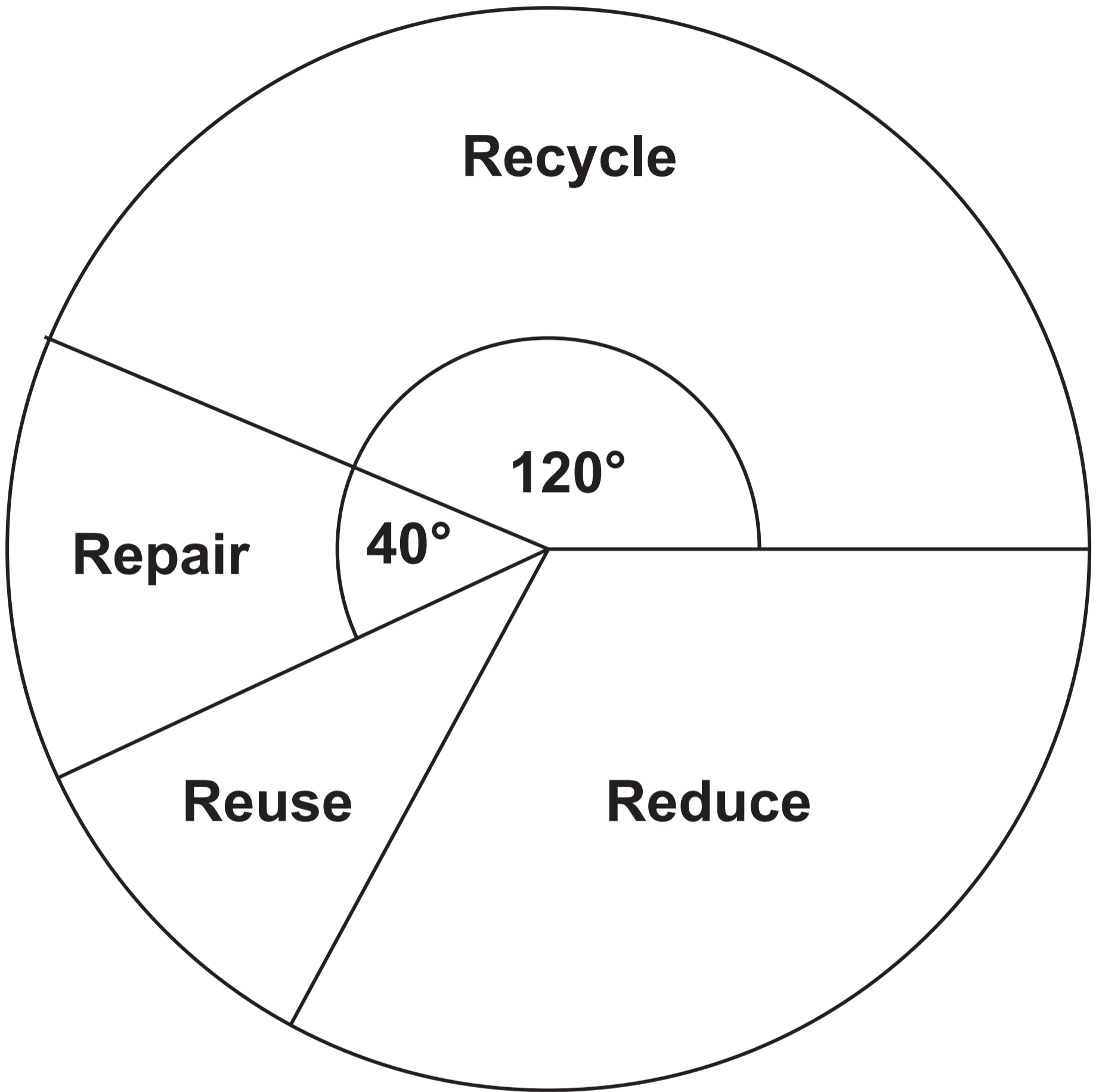
Three times as many people said that they have **REDUCED** their consumption compared with the number of people that **REUSE** a product.

Calculate the number of consumers that **RECYCLE** on a regular basis.

Show your working. [4 marks]



FIGURE 9



Not drawn to scale

[Turn over]



Answer _____ **consumers**

4

[Turn over]



1 6

State FOUR measures that an employer may consider to ensure that they are meeting the Health and Safety at Work Act 1974. [4 marks]

1 _____

2 _____



3

4

4

[Turn over]



17

**FIGURE 10 and FIGURE 11 show
cookbook stands.**

FIGURE 10

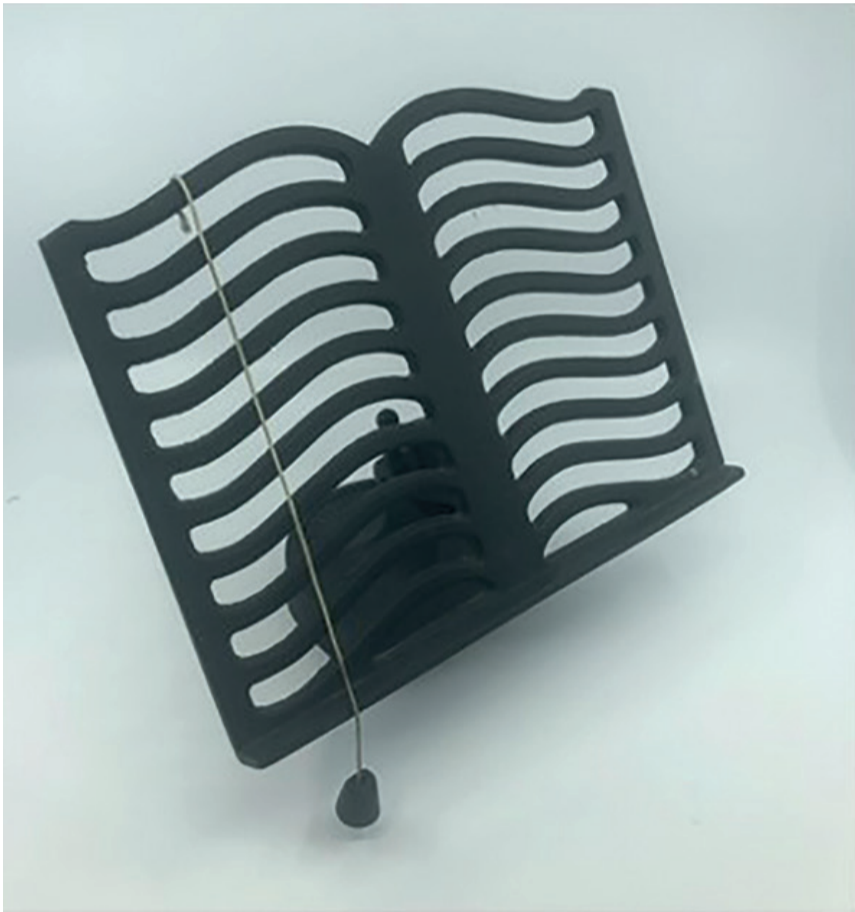


FIGURE 11



	FIGURE 10	FIGURE 11
Material	Cast Iron	Medium Density Fibreboard (MDF) and Beech
Method of manufacture	Sand Casting	CNC router and hand fabrication

[Turn over]



[Turn over]



9

[Turn over]

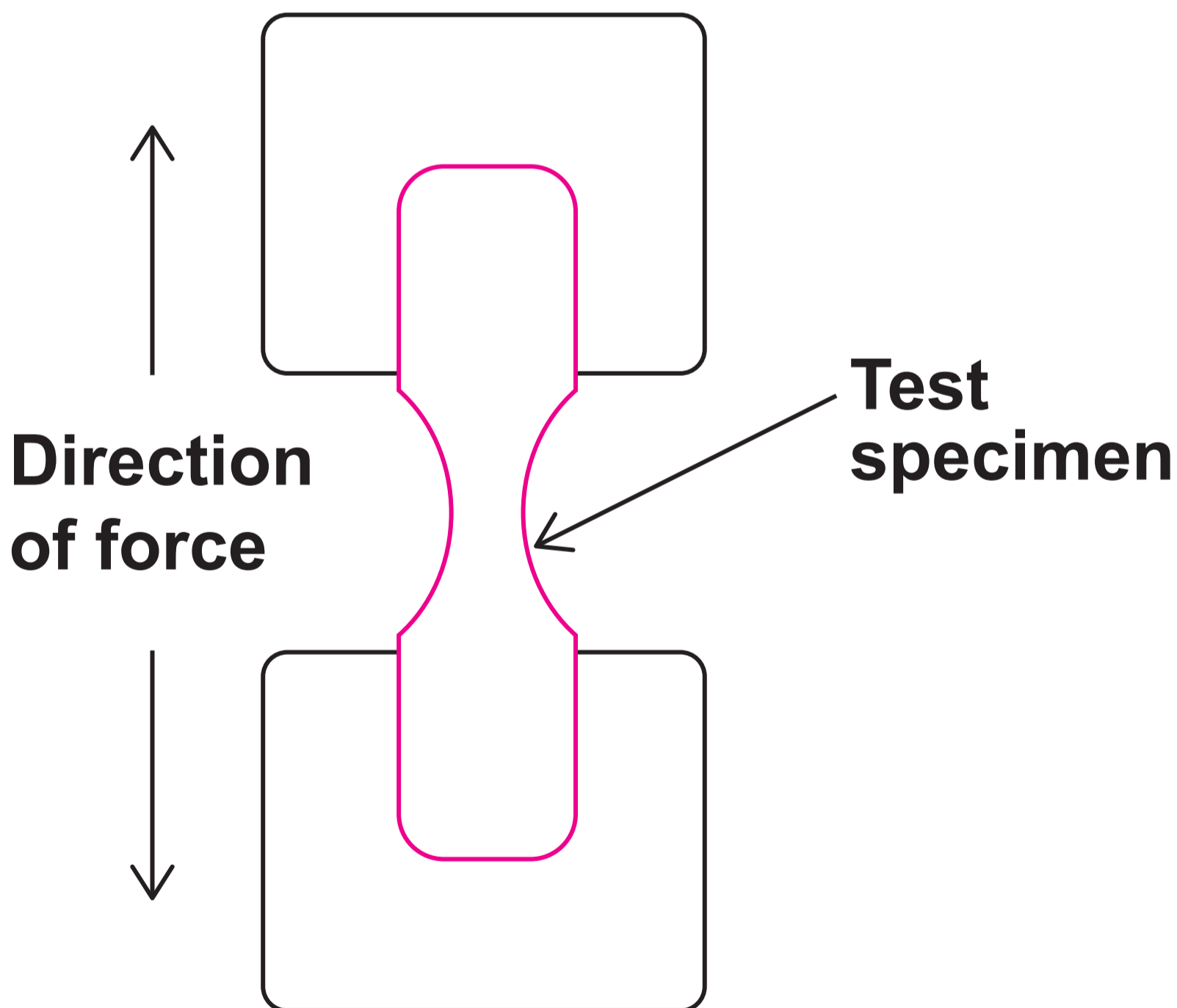


1 **9** . **1**

FIGURE 12 below and **FIGURES 13** and **14** on pages 58 and 59, show graphical representations of material testing processes.

For each testing process, identify the material property being tested.

FIGURE 12



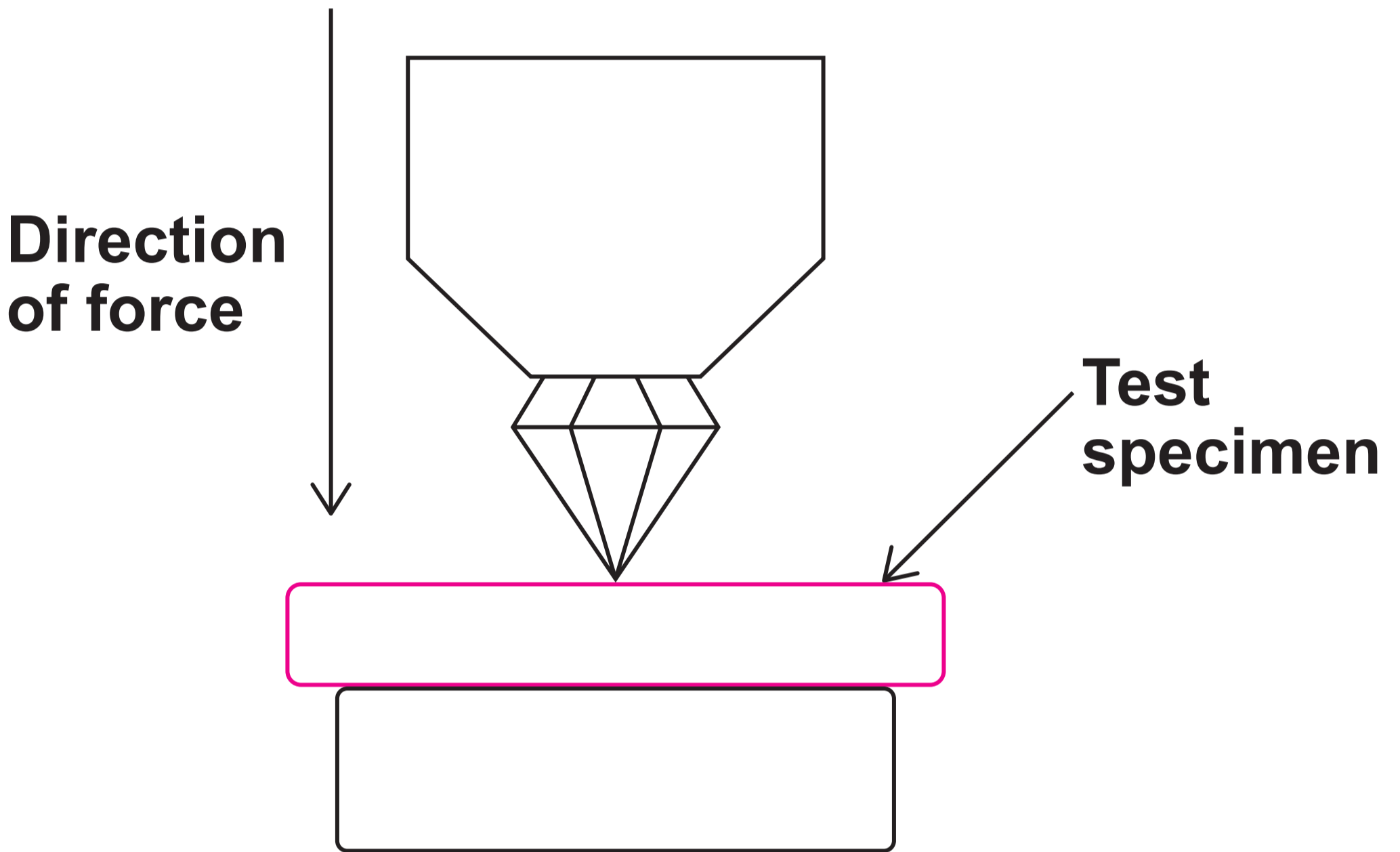
Material property being tested

[1 mark]

[Turn over]



1	9	.	2
---	---	---	---

FIGURE 13

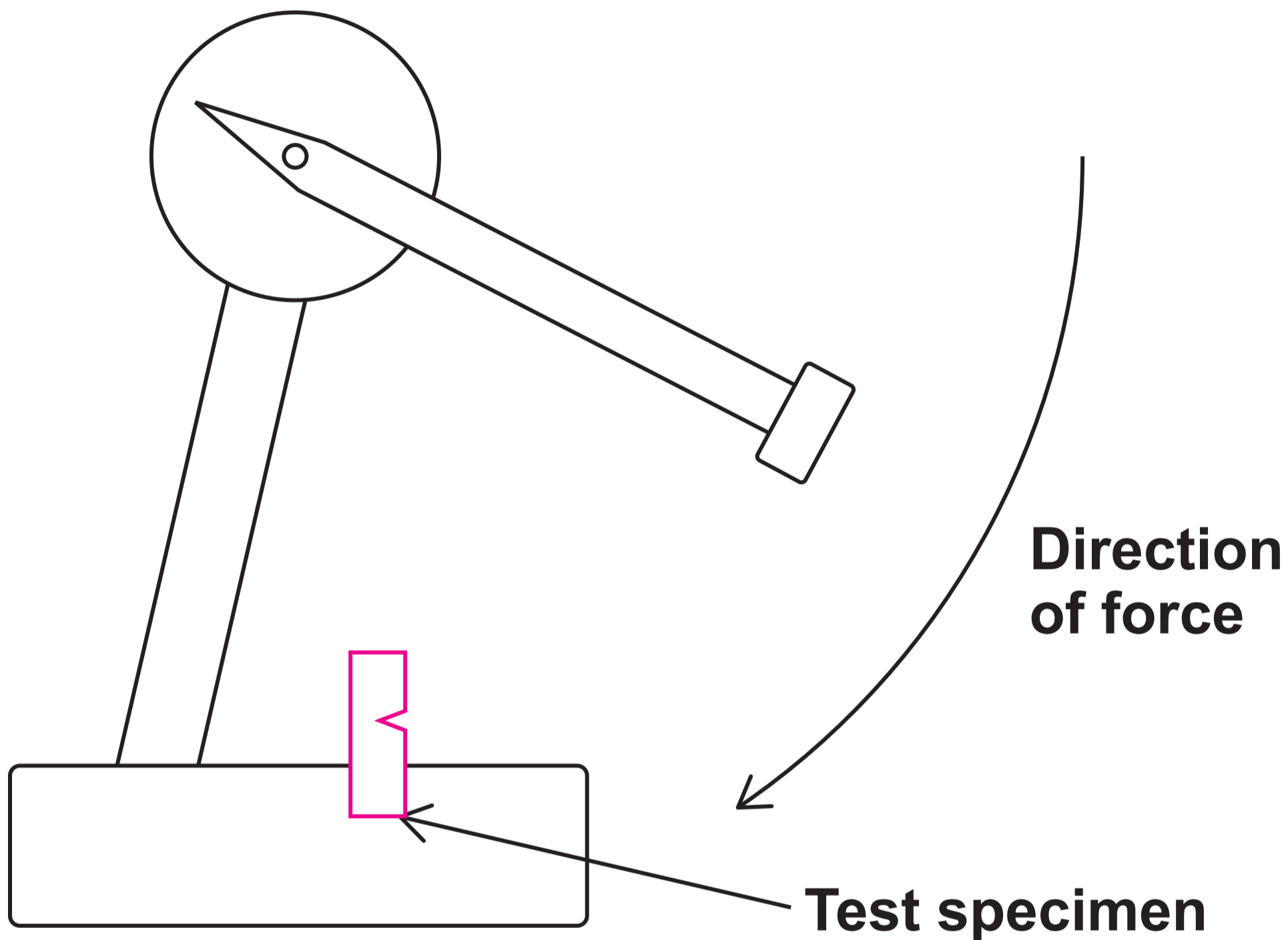
Material property being tested

[1 mark]



1 9 . 3

FIGURE 14



Material property being tested

[1 mark]

3

[Turn over]



6

[Turn over]

6

END OF QUESTIONS



BLANK PAGE

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
TOTAL	

Copyright information

For confidentiality purposes, all acknowledgements of third-party copyright material are published in a separate booklet. This booklet is published after each live examination series and is available for free download from www.aqa.org.uk.

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.

Copyright © 2024 AQA and its licensors. All rights reserved.

G/TI/Jun24/7552/1/E2

6 8



2 4 6 A 7 5 5 2 / 1