

GCSE

ADDITIONAL APPLIED SCIENCE A

AP6 Materials and Performance

Specimen Paper

Candidates answer on the question paper:

Additional materials: ruler (cm/mm), calculator

H **A336/02**
45 mins

Candidate
Name

--

Centre
Number

--	--	--	--	--

Candidate
Number

--	--	--	--

TIME 45 mins

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers on the dotted lines unless the question says otherwise.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- There is a space after most questions. Use it to do your working. In many questions marks will be given for a correct method even if the answer is incorrect.
- Do not write in the bar code. Do not write in the grey area between the pages.
- **DO NOT WRITE IN THE AREA OUTSIDE THE BOX BORDERING EACH PAGE. ANY WRITING IN THIS AREA WILL NOT BE MARKED.**

INFORMATION FOR CANDIDATES

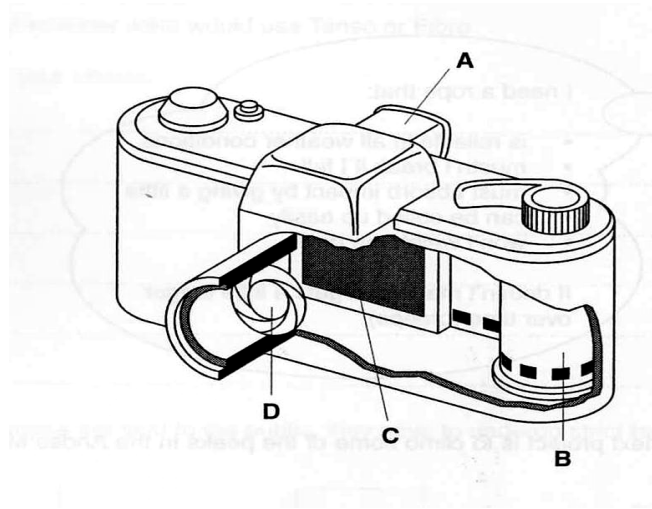
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **36**.

This specimen paper consists of 16 printed pages.

BLANK PAGE

Answer all questions.

1. Below is a simplified diagram of a camera. The lens is missing.



(a) Finish the table by writing the correct letter, **A**, **B**, **C** or **D**, next to the camera part.

camera part	letter
aperture	
shutter	
viewfinder	

[3]

(b) A **converging** lens is used inside a camera.

(i) Explain why this type of lens is chosen. Use your ideas about how lenses work.

.....

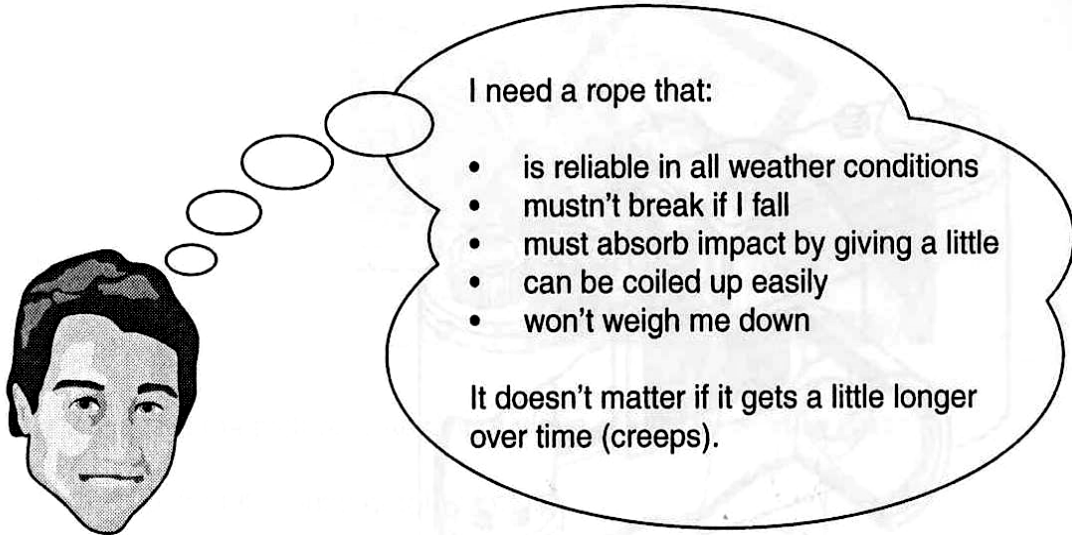
[2]

(ii) Write down **three** properties of the image produced with a converging lens.

1.....
 2.....
 3.....[3]

[Total: 8]

2. Knott's Rope Company produces rope for all purposes.



John is a climber. His next project is to climb some of the peaks in the Andes Mountains of Peru.

In the table, you will find two of the company's rope products, Tenso and Fibro.

	Tenso	Fibro
strength	high	high
weight	medium	low
stretch behaviour	no elongation	slight elongation
flexibility	low	high
impact toughness	medium	high
creep resistance	high	low

(a) Suggest whether John would use Tenso or Fibro.

Use John's statement and the table to help you with your answer.

Explain your choice.

.....

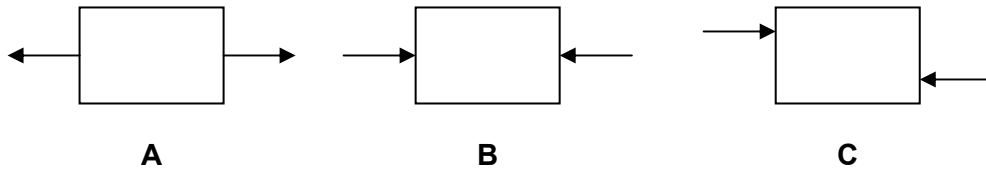
.....

.....

.....

.....[4]

(b) Before ropes are sold to the public, they have to undergo strict **tension** stress testing.



Which of the diagrams above show **tension** forces in a material?

Put a ring around the correct answer.

[1]

[Total: 5]

3.

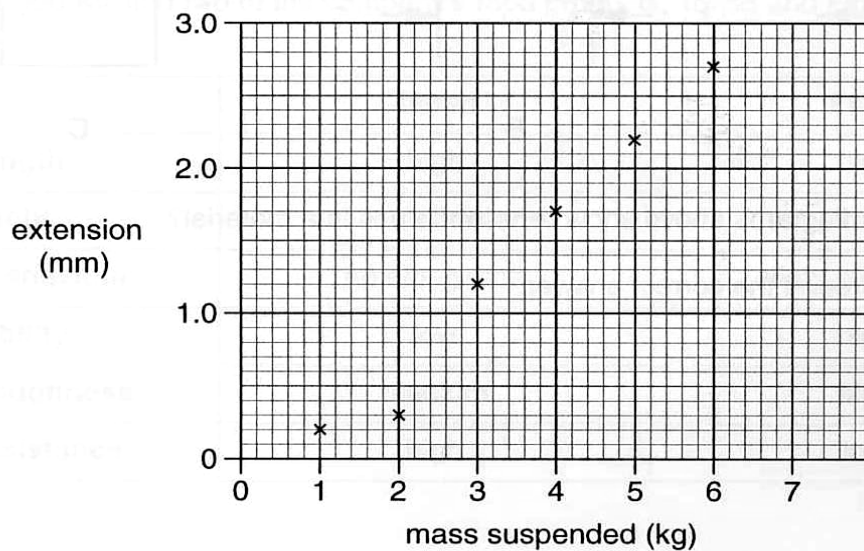


MAXIMILIAN STOCK LTD / SCIENCE PHOTO LIBRARY

- (a) A company does independent testing and inspection. The technician in the photograph is testing fishing line for tensile strength.

She will also find out how far the line will stretch (extend) under tension.

- (i) The graph below shows her results for Satin Synergy fishing line.
Draw the best line through the points.



[1]

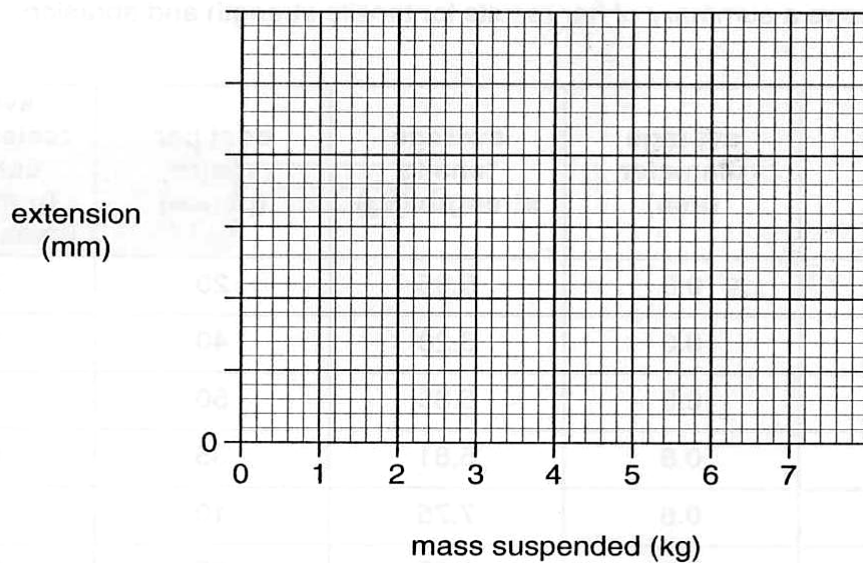
(ii) The table shows her results for Fine Fibre fishing line.

Fine Fibre

mass suspended (kg)	extension (mm)
1	0.5
2	1.0
3	1.7
4	2.7
5	4.9
6	it breaks

[2]

Plot the points for Fine Fibre on the grid.



(iii) Finish the graph by drawing the best curve.

[1]

(iv) Compare the behaviour of each fishing line when loaded.

Use the graphs and your knowledge of Hooke's Law to help you answer.

.....

[4]

(b) The technician uses a standard procedure to test for resistance to abrasion. She counts the number of times that the line is rubbed against a rough surface before breaking.

The table shows a summary of her results for tensile strength and abrasion.

type of line	average diameter (mm)	average tensile strength (kg)	cost per metre (pence)	average resistance to abrasion (number of times rubbed)
Pro Plus	0.8	5.95	20	703
Carpbuster	0.8	6.20	40	160
Megahook	0.8	5.85	50	162
Fine Fibre	0.8	5.81	35	662
Tuff Guppy	0.8	7.75	10	149
Satin Synergy	0.8	6.25	30	905

Using the information from the table, state and explain which fishing line has the best combinations of properties.

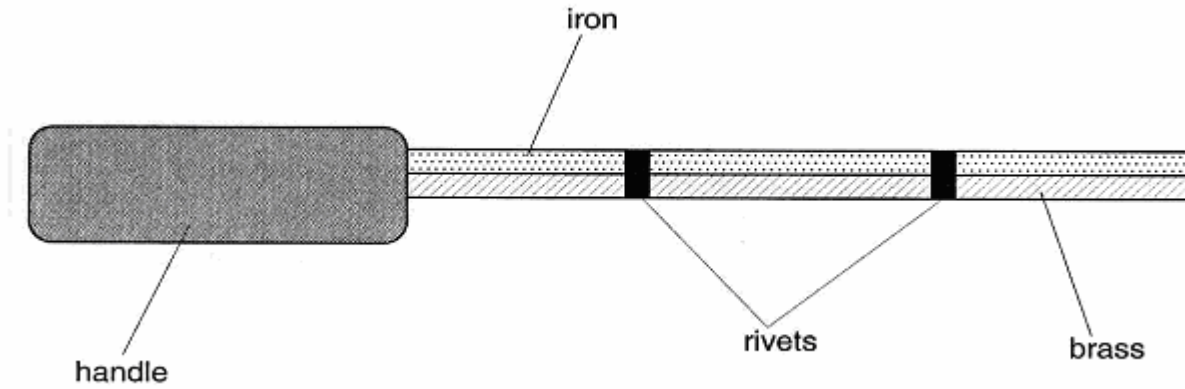
.....

[3]

[Total: 11]

4. This diagram shows a bimetallic strip made of iron and brass.

Brass expands more than iron when it is heated.



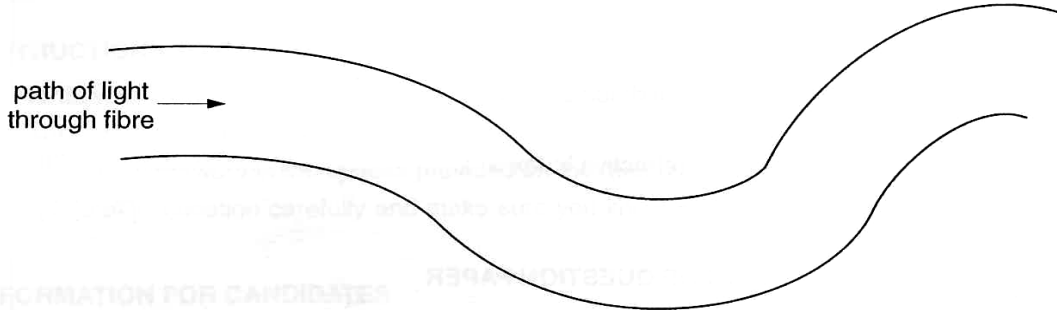
- (a) Finish the diagram to show the shape of the bimetallic strip after heating.



[1]

5. This question is about optical fibres.

(a) The diagram below shows a part of a single optical fibre.



Describe and explain the path of the light ray passing down the fibre.

You may draw on the diagram to help you to answer the question.

.....
.....
.....
.....[3]

(b) Impurities in the glass reduce the transparency of the fibre. What effect does this have on the light ray travelling along the fibre?

.....
.....[1]

(c) The glass used in optical fibres used for data transmission has to meet industrial standards.

Explain what this means

.....
.....
.....
.....[3]

[Total: 7]

BLANK PAGE



GCSE

ADDITIONAL APPLIED SCIENCE A

AP6 Materials and Performance

Specimen Mark Scheme

Maximum mark for this paper is [36]

H **A336/02**
45 mins

This specimen mark scheme consists of 4 printed pages.

Question Number	Answer	Max Mark
<p>1(a)</p> <p>1(b)i</p> <p>1(b)ii</p>	<p>Aperture = D Shutter = C Viewfinder = A</p> <p>Bends/refracts the light; So that it focuses on the film</p> <p>real; inverted/upside-down; diminished/smaller</p> <p style="text-align: right;">Total marks</p>	<p>[1] [1] [1] [1] [1] [1] [1] [8]</p>
<p>2(a)</p> <p>2(b)</p>	<p>more flexible; more lightweight; high impact toughness; elongates/stretches (slightly)</p> <p>A</p> <p style="text-align: right;">Total marks</p>	<p>[1] [1] [1] [1] [1] [5]</p>
<p>3(a)i</p> <p>3(a)ii</p> <p>3(a)iii</p> <p>3(a)iv</p> <p>3(b)</p>	<p>straight line, ignoring 2kg point as anomaly</p> <p>1 to 3 pts plotted correctly 4 to 5 pts plotted correctly</p> <p>straight line to 3 kg then curves upwards. (line must be curved – not ‘dot to dot’. (0,0) need not be plotted)</p> <p>Any four from: Satin is stronger; Satin obeys Hooke’s Law in region 3-5 kg; Satin extends linearly in region 3-5 kg; Fine Fibre is less stiff / extends more for same force; Fine Fibre’s breaking strength is between 5 & 6 kg</p> <p>Comment about strength; Comment about abrasion; Comment about price;</p> <p style="text-align: right;">Total marks</p>	<p>[1] [1] [1] [1] [4] [3] [11]</p>

