

**Monday 20 June 2016 – Morning**

**GCSE ADDITIONAL APPLIED SCIENCE**

**A192/01** Science of Materials and Production (Foundation Tier)

Candidates answer on the Question Paper.

**OCR supplied materials:**  
None

**Other materials required:**

- Pencil
- Ruler (cm/mm)
- Calculator

**Duration:** 1 hour



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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### INSTRUCTIONS TO CANDIDATES

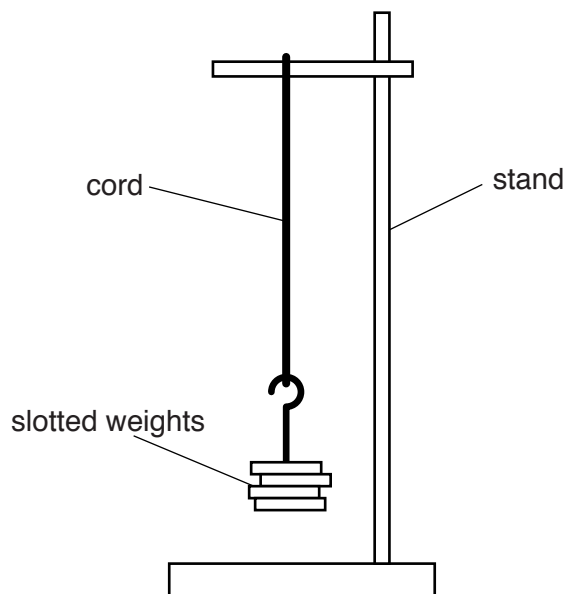
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the bar codes.

### INFORMATION FOR CANDIDATES

- Your quality of written communication is assessed in questions marked with a pencil (✎).
- 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 **50**.
- This document consists of **16** pages. Any blank pages are indicated.

Answer **all** the questions.

- 1 Jasmin uses this apparatus to investigate the stiffness of a sample of bungee-jump cord.



Jasmin measures the length of the cord for different numbers of slotted weights hung from its end.

- (a) Suggest a suitable instrument for measuring the length of the cord.

..... [1]

- (b) Here are some of her results.

Weight in N	Length in mm
10	240
15	255

Jasmin predicts that when she hangs 25 N from the end of the cord it will be 285 mm long.

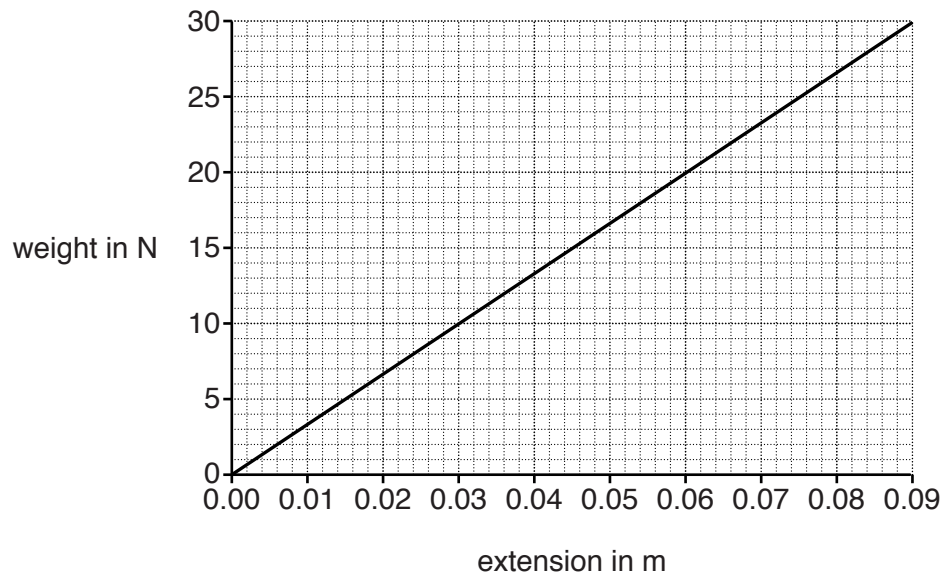
Complete this calculation to show that her prediction is correct.

Increasing the weight by 5 N increases the length by ..... mm.

So, increasing the weight by 10 N increases the length by ..... mm.

[2]

(c) Here is a graph of her results.



Use calculations to show that the cord stores 0.94J of energy when it supports 25 N from its end.

Show clearly how you work out your answer.

[2]

[Total: 5]

2 Jake uses this camera to take photos of people at weddings.



(a) Draw **two** straight lines below to join each **camera part** with its required **optical property**.

camera part	optical property
lens	opaque
body	reflective
	translucent
	transparent

[2]

(b) Sometimes Jake uses incandescent lamps to light the people in his photos. He always puts an IR filter in front of the lamp.

Explain why he uses an IR filter.

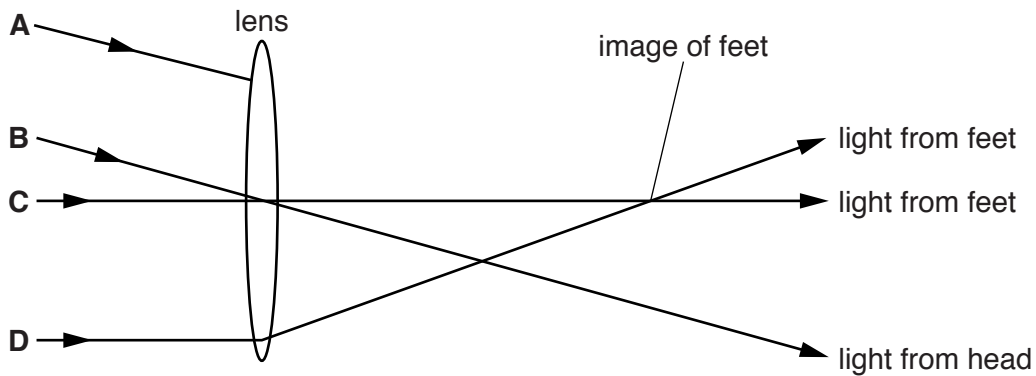
.....

.....

.....

..... [2]

(c) The diagram shows the lens forming an image of a person who is a long way from the camera.



- (i) The rays labelled **C** and **D** come from the person's feet.  
The diagram shows the position of the image of the feet formed by the lens.  
The rays labelled **A** and **B** come from the person's head.

Complete the diagram by:

- continuing ray **A**
- labelling where the image of the head is formed.

[2]

- (ii) Where in the camera are the images of the head and feet?

Put a ring around the correct answer.

aperture

focal plane

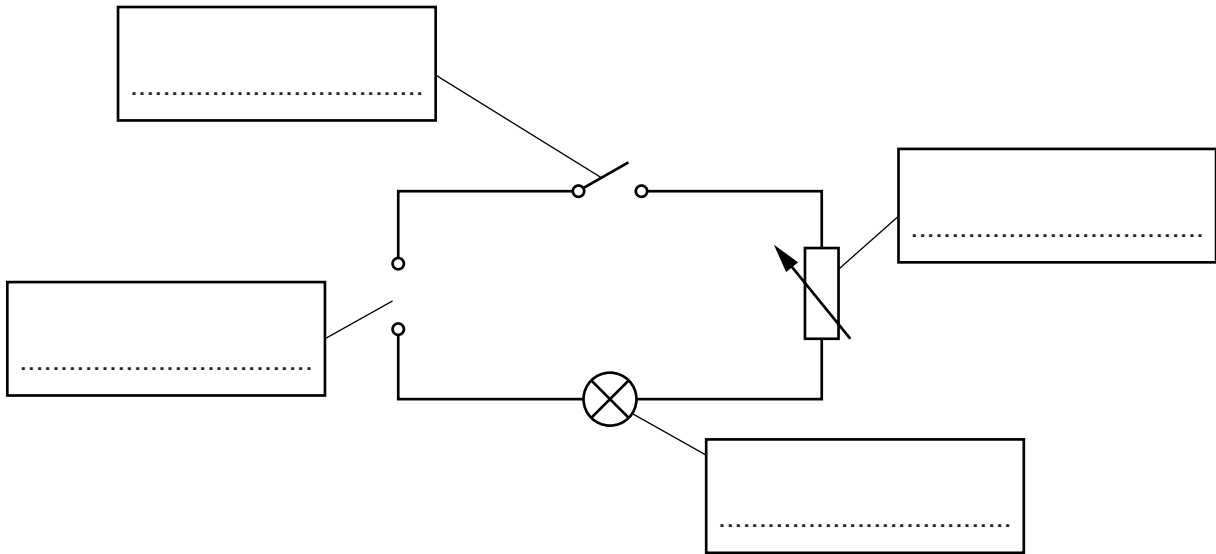
lens

shutter

[1]

[Total: 7]

3 Zoe is a lighting technician in a theatre. She uses circuits like this to control the lamps.



(a) Complete the labels of the circuit. Choose words from this list.

**lamp**

**power supply**

**switch**

**variable resistor**

[2]

(b) Describe how Zoe uses **two** of the components to control the lamp.

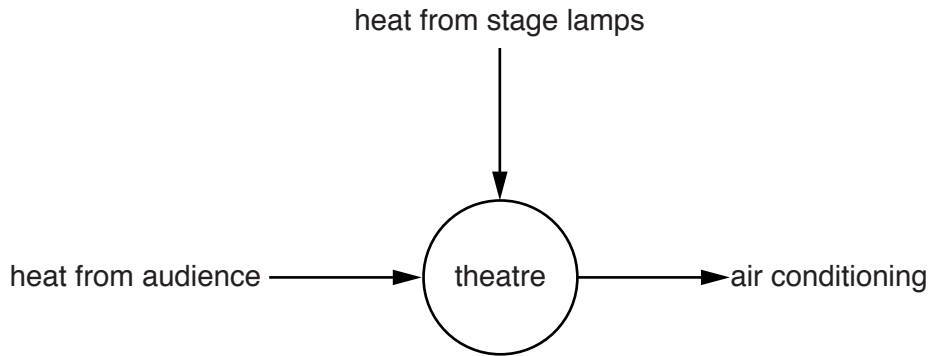
.....

.....

.....

..... [2]

- (c) The lamps put light and heat into the theatre.  
This heat is removed by air conditioning, as shown in this diagram.



- (i) The table gives data for the heating power of lamps and people seated in the theatre during one performance.

Heat source	Mean power in W	Maximum number
stage lamps	500	30
seated adult	100	750

Complete this calculation of the required power setting for the air conditioning.

$(500 \times \dots) + (100 \times \dots) = \dots \text{ W}$

[2]

- (ii) State what happens if the air conditioning power is set lower than your calculated value.

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

[Total: 7]







6 Some chemicals are made in bulk.  
They include ammonia, sulfuric acid and sodium hydroxide.

(a) Put a tick (✓) in the boxes next to the **two** reasons why these chemicals are made in bulk.

- They can be recycled easily.
- They are very easy to transport safely.
- They are cheap and very easy to make.
- Their raw materials are in plentiful supply.
- They can be used to make lots of useful chemicals.

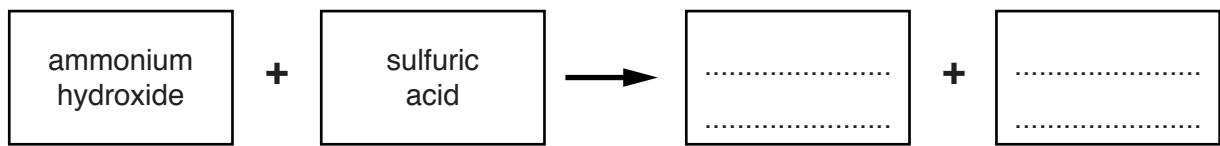
[2]

(b) Complete the table to show the raw materials used for making ammonia, sulfuric acid and sodium hydroxide. Choose words from the list.

	air	sodium chloride	sulfur
<b>Chemical</b>	<b>Raw materials</b>		
<b>Ammonia</b>	water and methane and .....		
<b>Sulfuric acid</b>	air and water and .....		
<b>Sodium hydroxide</b>	water and .....		

[2]

(c) Ammonium hydroxide and sulfuric acid can be reacted to make a useful fertiliser.  
Complete this word equation for the reaction.



[2]

[Total: 6]



8 Imran is designing a new tennis racket.



(a) The material used to make a good tennis racket frame should be durable and tough. This is so that it doesn't wear out too quickly.

Give **two** other properties that the frame's material should have, and explain why they are important.

1 .....

.....

2 .....

.....

[2]

(b) Imran finds this data for four different materials that he could use for the frame.

Material	Stiffness in GPa	Strength in MPa	Density in kg/m <sup>3</sup>
Aluminium	69	110	2700
Carbon fibre	150	1500	1800
Polycarbonate	3	60	600
Wood	9	40	800



**Imran:** I think that aluminium is the best material to use for the frame of my tennis racket.



**ADDITIONAL ANSWER SPACE**

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

A large area of lined paper for writing answers. It features a vertical margin line on the left side and horizontal dotted lines for writing. The lines are evenly spaced and extend across the width of the page.



A large rectangular area with a solid vertical line on the left side and horizontal dotted lines extending across the page, providing a space for writing answers.



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