OCR
Oxford Cambridge and RSA

F

Monday 15 June 2015 – 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	

Centre number						Candidate number				

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. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- 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 **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Jo works in a standards laboratory.

She tests a sample of climbing rope to check that it meets product standards.

Jo increases the weight hung from one end of the rope until it breaks.

(a) How is she loading the rope?

Put a (ring) around the correct answer.

compression **depression** **elevation** **tension**

[1]

(b) Here are Jo's results.

length of rope	2.5 m
diameter of rope	10 mm
maximum weight	40 000 N

The product standard requires a climbing rope to have a breaking strength of at least 300 N/mm^2.

Complete the calculations below to show that the rope meets this product standard.

(i) cross sectional area = $\frac{3.14}{4} \times (.....)^2 = 78.5\,mm^2$ **[1]**

(ii) breaking strength = $\frac{\text{maximum weight}}{\text{cross sectional area}} = \frac{.....}{78.5} = ...\ N/mm^2$ **[2]**

(c) Jo is testing the rope for **safety.** What other properties should she test?

Put a tick (✓) in the boxes next to **two** other safety properties of the rope required by its product standard.

price ☐

colour ☐

quality ☐

density ☐

consistency ☐

[2]

[Total: 6]

2 Greg tests his new skis.

(a) Greg's new skis are made of a **composite material** called carbon fibre.

(i) Name **one** other composite material.

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

(ii) Describe the construction of this composite material.

.....

.....

..... **[2]**

(b) Greg chose his new skis because they were cheap and looked good.

Suggest another property that he should have also considered when choosing his new skis.

Give a reason for your answer.

.....

.....

..... **[2]**

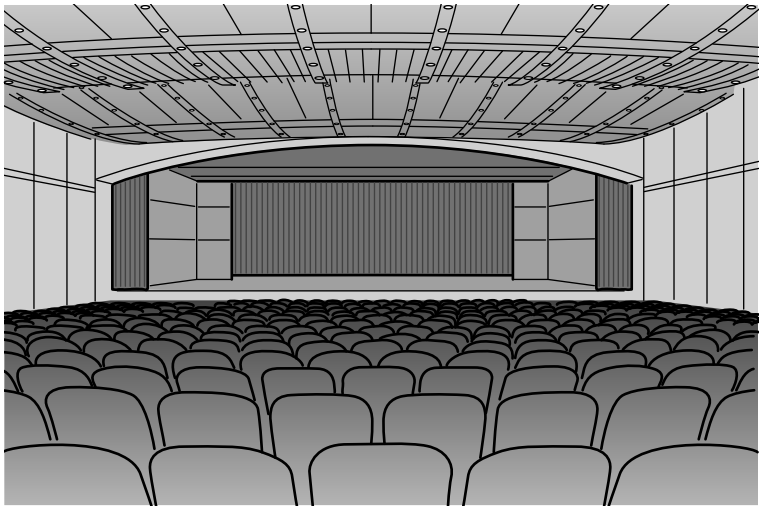
(c) Draw straight lines to link each **type of material** to its **material properties**.

type of material	material properties
metal	brittle and hard
polymer	strong and tough
ceramic	flexible and low density

[2]

[Total: 7]

3 The acoustic properties of a theatre are important.



This theatre has its stage walls and ceiling lined with wood.

The wood has a shiny smooth surface.

The other three walls are lined with polystyrene tiles.

The tiles are full of holes.

Explain what effect this construction has on the sound that the audience hears.

The quality of written communication will be assessed in your answer to this question.

.....

.....

.....

.....

.....

.....

.....

.....

.....

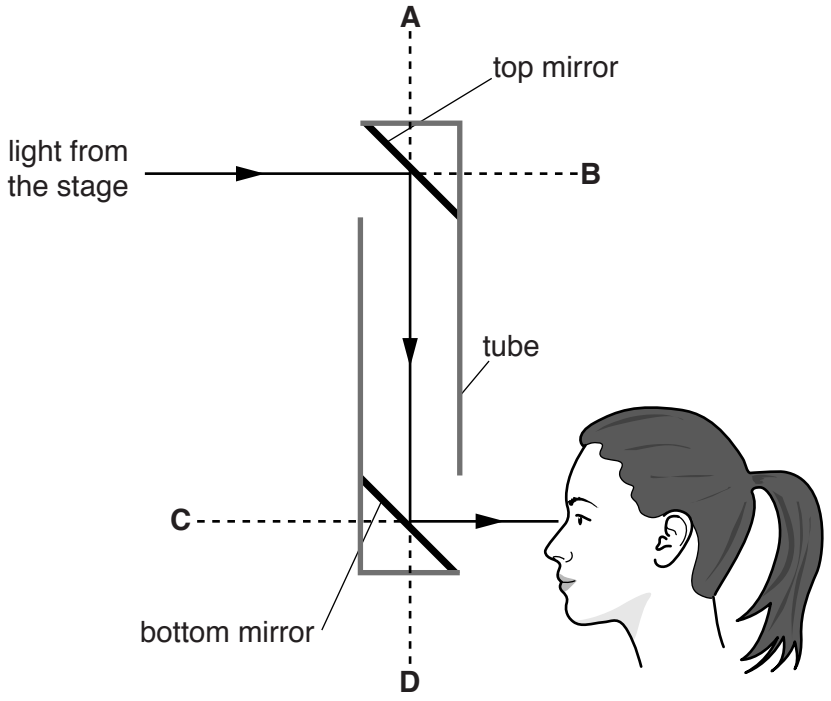
..... **[6]**

[Total: 6]

4 Julie and Mike go to an open-air music festival.

(a) Julie can't see the stage because of the people in front of her.

She uses this arrangement of mirrors (a periscope) to see over their heads.



(i) Julie looks into the bottom mirror.

Four directions are labelled (**A**, **B**, **C** and **D**) on the diagram.

Where does she see the image of the stage?

Put a (ring) around the correct direction, **A**, **B**, **C** or **D**, on the diagram. **[1]**

(ii) The tube which holds the mirrors is stiff so that Julie can hold it.

Suggest another important property that the tube should have.

Give a reason for your answer.

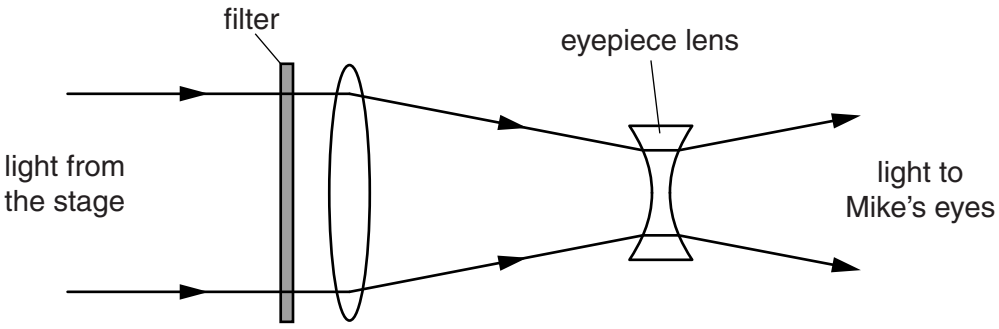
.....

.....

.....

..... **[2]**

(b) Mike uses this arrangement of lenses (a telescope) to view the stage.



(i) The telescope has two lenses made of plastic.

State the **type** of lens used for the eyepiece.

Give a reason for your answer.

.....

.....

.....

..... **[2]**

(ii) The telescope contains a filter with these characteristics.

Light colour	Percentage transmitted
red	90%
green	90%
blue	10%

Explain why the filter makes the stage appear yellow.

.....

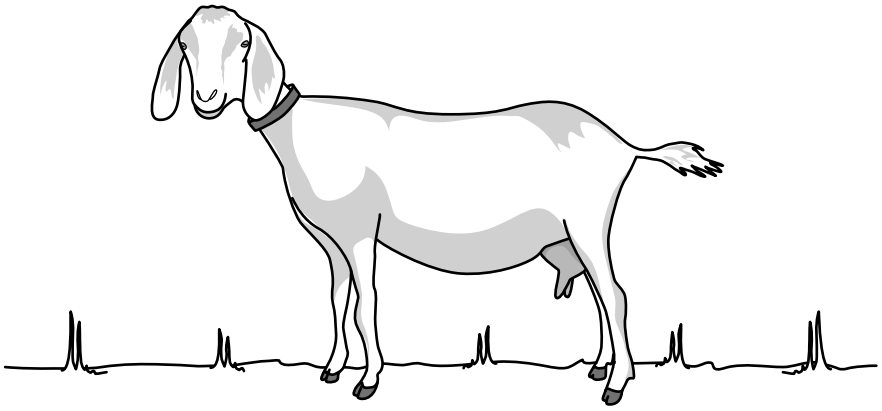
.....

.....

..... **[2]**

[Total: 7]

5 Some supermarkets sell goat's milk.



Describe the production chain of milk from goats to supermarkets.

The quality of written communication will be assessed in your answer to this question.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[6]**

[Total: 6]

6 James sprays his fruit trees with Bordeaux mixture. This stops fungal attack.

(a) James has 150 fruit trees on his farm.

The recommended rate of application of Bordeaux mixture is 1.0 litres for 5 trees.

How many litres of mixture will James need to spray his 150 fruit trees?

Put a (ring) around the answer.

5 litres **30 litres** **150 litres** **750 litres**

[1]

(b) Here is a formulation for Bordeaux mixture:

- Dissolve 50 g of copper sulfate crystals in 3 litres of hot water.
- Dissolve 25 g of powdered lime in 2 litres of cold water.
- Mix the solutions together, giving a total volume of 5 litres.

Calculate the mass of copper sulfate crystals that James will need for the Bordeaux mixture for all of his fruit trees.

mass of copper sulfate = ... g **[2]**

[Total: 3]

7 Small amounts of magnesium carbonate may be added to table salt to help it flow more easily. Magnesium carbonate is an insoluble salt, which can be made by mixing solutions of magnesium sulfate and sodium carbonate.

(a) Complete this word equation for the reaction of magnesium sulfate and sodium carbonate.

magnesium sulfate	+	sodium carbonate	→	....	+	....

[2]

(b) Give a detailed description and explanation of a procedure for making a dry sample of pure **insoluble** magnesium carbonate crystals from solutions of magnesium sulfate and sodium carbonate.

The quality of written communication will be assessed in your answer to this question.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[6]**

[Total: 8]

8 Jim is an Environmental Health Officer.

He investigates an outbreak of food poisoning in Smalltown.

Six people become very ill on the Saturday night and are rushed to hospital.

The doctor says that they all have food poisoning.

Jim asks the six people to list where they ate on Saturday.

Here are the results of his survey.

Where they ate on Saturday	Alice	Bert	Claudia	Dave	Elena	Fred
At home	✓	✓		✓	✓	
Fresh Fish Fryers			✓			
Best Pizza Parlour	✓	✓	✓		✓	✓
Hot Chilli Takeaway	✓			✓		✓
Quick Pasta Cafe				✓		

(a) Why can't Jim be completely sure where the poisoned food was eaten?

.....

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

(b) What might Jim conclude from his survey?

Use data from the survey to justify your answer.

.....

.....

.....

..... **[2]**

(c) Jim suspects that the food was poisoned by some bacteria in the food.

Bacteria are one type of microorganism.

Write down **two** other types of microorganism.

.....

..... **[2]**

(d) Microorganisms in food are not always harmful.

Describe **one** use of a microorganism to make a useful food product.

.....

.....

.....

..... **[2]**

[Total: 7]

END OF QUESTION PAPER