Candidate forename		Candidate surname	

Centre number						Candidate number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

GCSE

A336/02

TWENTY FIRST CENTURY SCIENCE ADDITIONAL APPLIED SCIENCE A

Materials and Performance (Higher Tier)

WEDNESDAY 1 FEBRUARY 2012: Afternoon
DURATION: 45 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Pencil
Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

DC (NF/SW) 12MPE01162 56917/1

INSTRUCTIONS TO CANDIDATES

- **Write your name, centre number and candidate number in the boxes on the first page. 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).**

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.**

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Question 1 begins on page 4

Answer ALL the questions.

1 Jo works for an airport. She measures sound intensity in homes near the airport.

(a) Jo uses the decibel (dB) scale to show sound intensity.

The graph opposite shows sound level in decibels plotted against sound intensity.

Complete the graph by drawing a line of best fit through the points.

(b) (i) Near the airport, Jo measures a sound level of 90 dB.

She says the sound level should be reduced.

Give a reason why the sound level should be reduced.

_____

_____ **[1]**

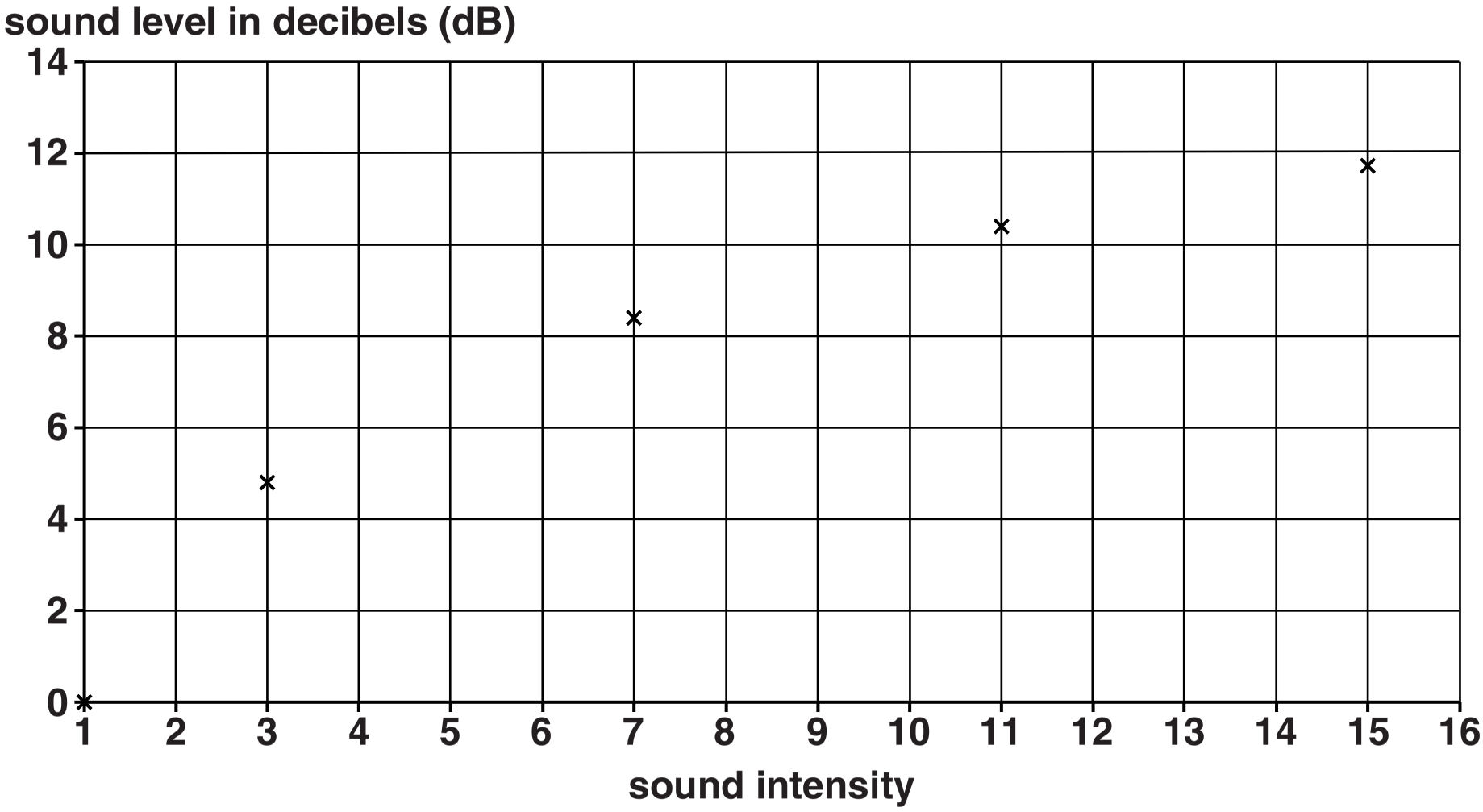
(ii) Jo is concerned that the sound level may reach 130 dB.

Why is a sound level of 130 dB unacceptable?

_____

_____ **[1]**

5


sound level in decibels (dB)
14
12
10
8
6
4
2
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
sound intensity

[1]

(iii) Prolonged exposure to loud sounds can cause tinnitus.

Describe what tinnitus means.

_____ **[1]**

(c) Jo says that windows should be double-glazed to increase the reflection of sound from outside the house. This reduces the sound levels inside.

Describe another method of reducing sound levels inside a house.

Your answer should include

- **the material used**
- **how this material affects sound energy.**

_____

_____

_____ **[2]**

[Total: 6]

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Question 2 begins on page 8

2 Sam is playing with a toy train. It is moving on a circular track.

(a) Its SPEED is not the same as its VELOCITY.

Which sentence, A, B, C or D, describes the velocity of the train?

A The time the train takes to go once round the track.

B The speed of the train in a particular direction.

C The distance the train travels in one minute.

D The maximum speed of the train.

answer _____ [1]

(b) (i) Sam has a red train and a blue train.

The mass of the red train is three times the mass of the blue train.

Choose the words from this list to complete the sentence below.

ONE-THIRD

HALF

THREE TIMES

FOUR TIMES

NINE TIMES

When they go at the SAME speed, the momentum of the red train is

_____ the momentum of the blue train. [1]

(ii) Sam uses a force to change the momentum of the train.

In what direction, A, B, C or D, does the momentum change?

A at right angles to the force

B downwards

C in the same direction as the force

D in the opposite direction to the force

answer _____ [1]

(c) Real trains must have a crumple zone at the front of the train for safety.

Explain how a crumple zone makes a vehicle safer.

Use ideas about time, momentum and force in your answer.

_____

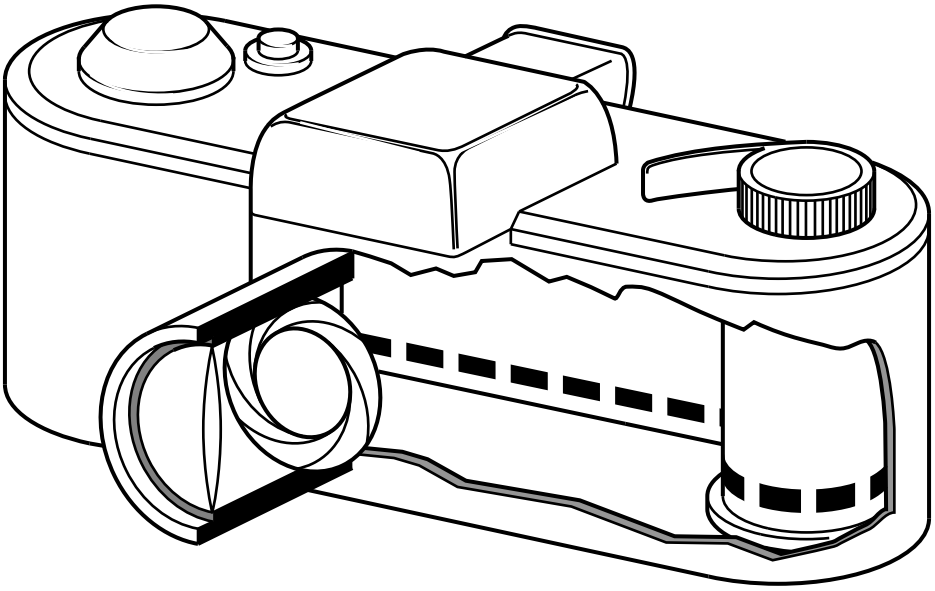
_____

_____ **[2]**

[Total: 5]

3 (a) Chris looks at an old camera which records images onto film. He learns how it works.

(i) Label the VIEWFINDER and the FOCAL PLANE on the diagram.



[2]

(ii) The camera lens has a special coating.

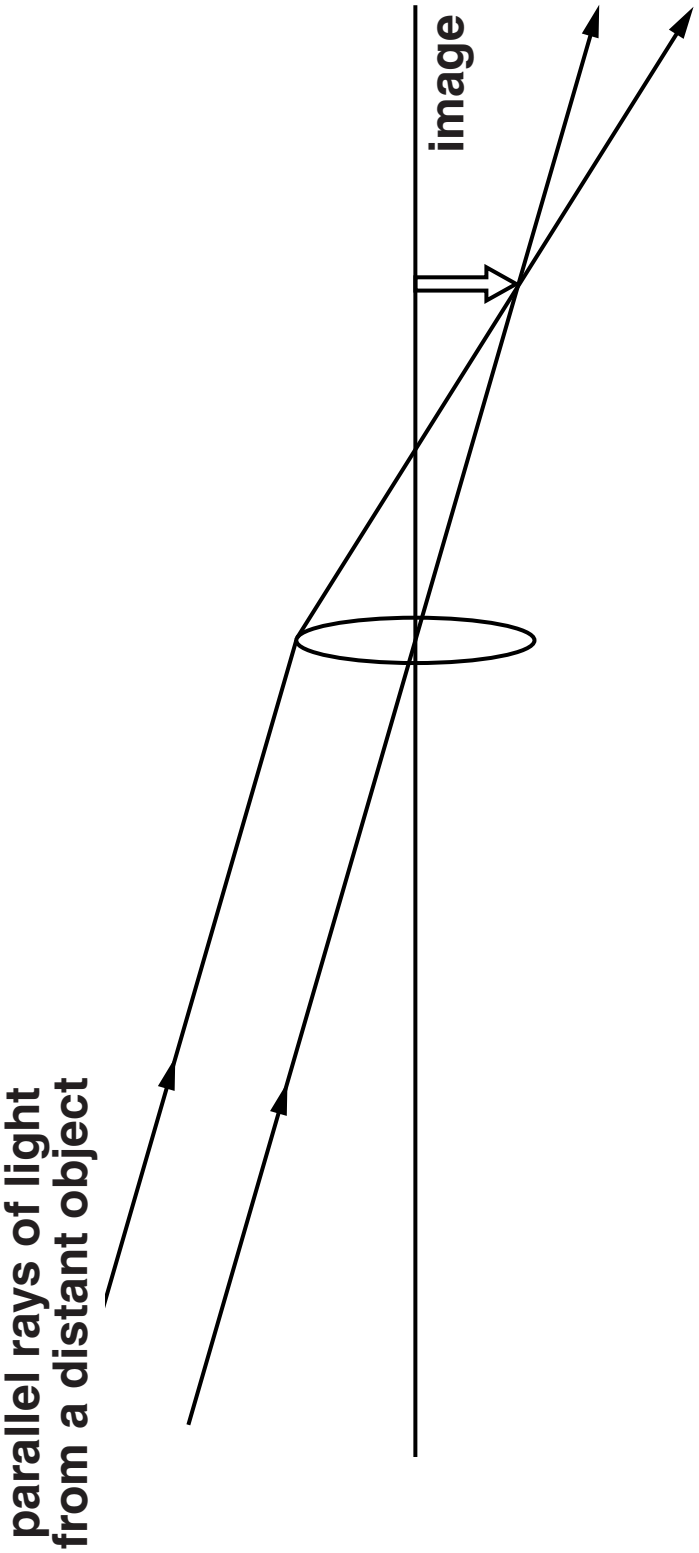
Explain why the lens has a coating.

_____

_____

_____ **[1]**

(b) The diagram shows how the lens in the camera produces an image.



Describe what these words mean. You may use the diagram to help with your answer.

focus _____

_____

focal length _____

_____

power _____

_____ **[3]**

(c) Chris takes two photographs of a car as it approaches him. The first photograph is in focus.

He does not have time to adjust his camera as the car approaches.

(i) Describe TWO ways the second photograph is different from the first.

difference 1 _____

_____

difference 2 _____

_____ **[2]**

(ii) Chris adjusts the camera for close-up photographs of the car.

Describe how he should adjust the camera for an object which moves closer to the lens.

_____

_____ **[1]**

[Total: 9]

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Question 4 begins on page 16

4 Builders need to understand the mechanical properties of the materials they use.

(a) The graph opposite shows how a narrow strip of uPVC stretches when a force is applied to it.

F=kx links the force and the extension.

(i) Use data from the graph for a force of 20 N to find the value of k for uPVC.

Include the unit in your answer.

k = _____ unit _____ [3]

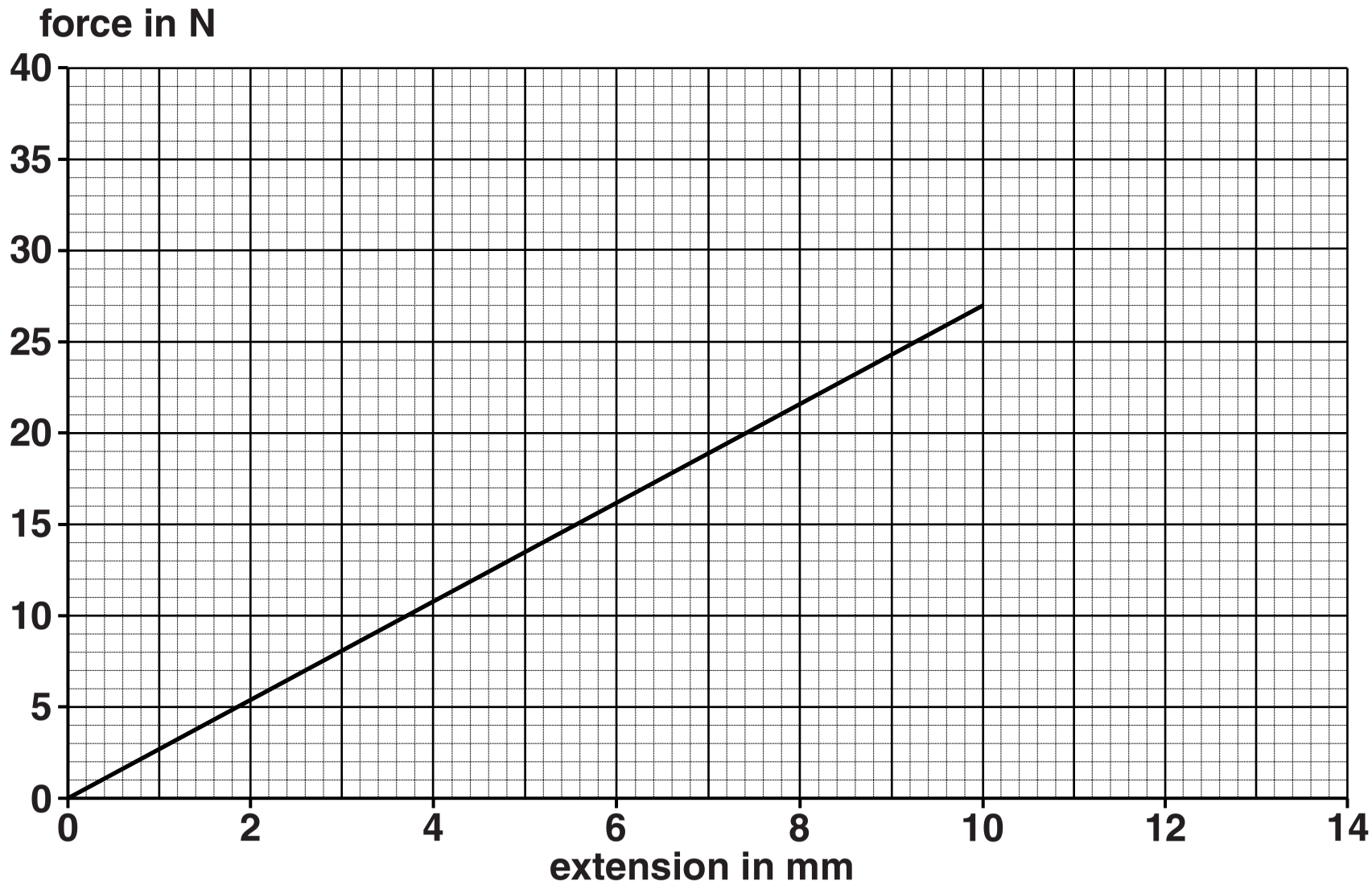
(ii) Predict the extension of the uPVC when a force of 34 N is applied.

answer _____ mm [1]

(iii) Give a reason why this prediction is not reliable.

_____

_____ **[1]**



17

(b) In some situations the mechanical behaviour of different materials must be the same.

For example, in a wall, the strength of the bricks and the mortar must be the same.

Give ANOTHER example of a situation in which two materials must be used together and need to have similar mechanical behaviour.

Your answer should include the situation, the materials and the mechanical behaviour.

_____

_____

_____

_____ **[3]**

[Total: 8]

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Question 5 begins on page 20

5 Byron is designing a cap for the car radiator of a new model of car.

When the car has been running the radiator is full of very hot water and steam.

It is important not to remove the cap when the radiator is very hot.

Opposite is a diagram of the radiator cap when cold.

Explain the properties required of materials A, B and C to prevent the cap being removed when the radiator is hot but to allow it to be removed when the radiator cools.

_____

_____

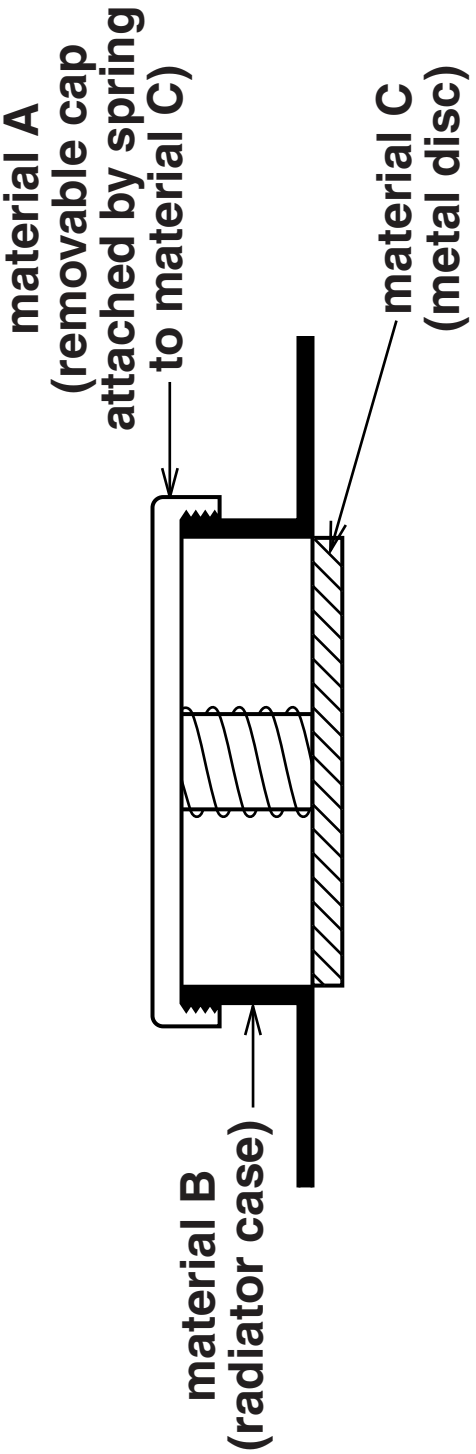
_____

_____

_____

_____ **[4]**

[Total: 4]


material A
(removable cap
attached by spring
to material C)
material C
(metal disc)
material B
(radiator case)

6 Describe how you would find the ELECTRICAL CONDUCTANCE of a sample.

Your answer should include

- **a diagram of the circuit**
- **how you would make measurements**
- **how you work out the electrical conductance.**

_____

_____

_____ **[4]**

[Total: 4]

END OF QUESTION PAPER

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