

Oxford Cambridge and RSA Examinations
General Certificate of Secondary Education

PHYSICS

1982/5

PAPER 5

FOUNDATION TIER

Specimen Paper 2003

Candidates answer on the question paper.

Additional materials:

Pencil, Ruler (cm, mm)

TIME 45 minutes

Candidate Name

Centre Number

Candidate Number

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INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer all the questions.
- Write your answers, in blue or black ink, in the spaces provided on the question paper.
- Read each question carefully and make sure you know what you have to do before starting your answer.

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 50.
- *You will be awarded marks for the quality of written communication where an answer requires a piece of extended writing.*

Question number	For examiner's use only
1	
2	
3	
4	
5	
TOTAL	

- 1 This question is about communications.
- (a) Communications use signals to carry a message.

Finish the table by writing in the type of signal.

Choose the best words from the list.

electrical

heat

light

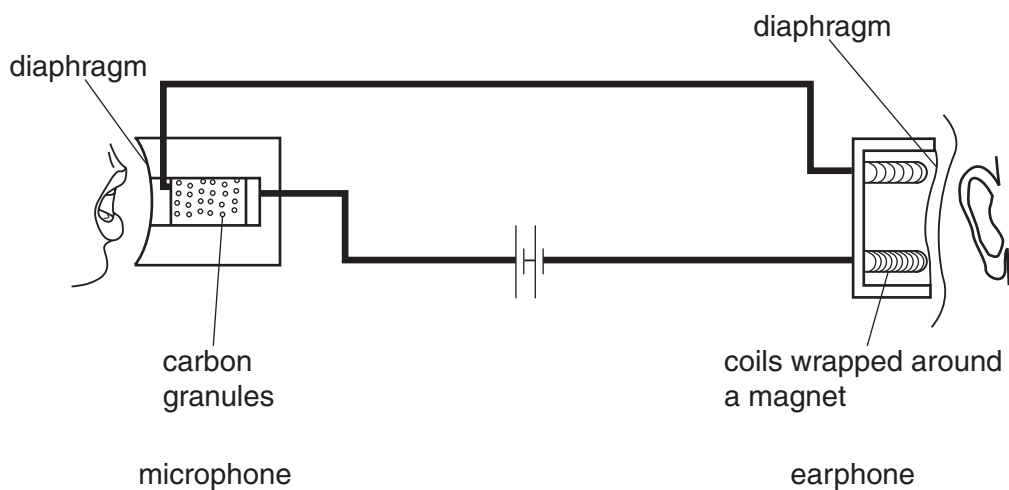
sound

method of communication	what carries the signal	type of signal
voice	air	
telephone	wire	
telephone	optical cable	

[3]

- (b) A telephone receiver has a microphone and an earphone.

The diagram shows a simple version of a telephone link.



Finish the sentences by choosing the **best** words from this list.

Each word may be used once, more than once or not at all.

decreases

increases

magnetic field

sound

spin

vibrate

Sound waves from the voice make the microphone diaphragm _____ .

When the diaphragm moves in, the carbon granules are squashed.

The resistance of the granules decreases, so the current in the circuit _____ .

The changing current causes a changing _____ in the earphone coils.

This makes the diaphragm vibrate which produces a _____ [4]

(c) Mobile telephones are now very often used for communication.

(i) Mobile phones use microwaves.

What type of radiation are microwaves?

_____ [1]

(ii) Write down **one** other use of microwaves

_____ [1]

Scientists are concerned about the health hazards from the use of mobile telephones. A report in a recent newspaper suggested that radiation from mobile telephones could cause memory loss.

(d) Scientist tell each other about their work in many ways. One way they do this is in the media.

(i) Write down **one** other way that scientists tell each other about their work.

_____ [1]

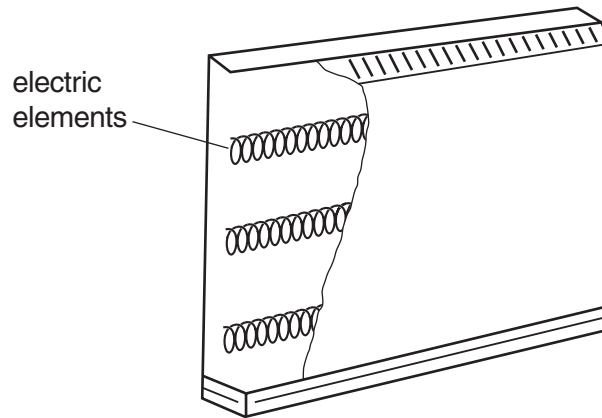
(ii) Why is it important that scientists tell each other about their work. Write down **two** reasons:

1 _____

2 _____ [2]

[Total: 12]

- 2 A heating engineer designs a storage heater, which must contain either concrete or oil. Electric elements are used to heat up the heater at night when electricity costs less.



- (a) Suggest why electricity costs less at night.

[1]

- (b) The engineer does some experiments to decide whether to use concrete or oil in his heater.

The table gives you some information about concrete and oil.

material	energy to raise the temperature of 1 kg by 1 deg C	density
concrete	3400 J	2200 kg/m ³
oil	2000 J	760 kg/m ³

He heats 1 kg of each material.

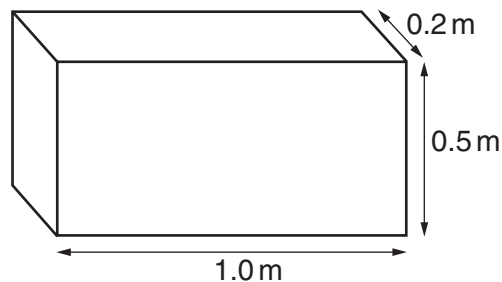
He makes sure that the temperature of each goes up by the same amount.

He measures the energy transferred to the concrete and to the oil.

Use the information in the table to explain why concrete stores more energy than oil.

[2]

- (c) The storage heater contains a box measuring 1.0 m long, 0.5 m high and 0.2 m deep.



Calculate the volume of this box.
You must show how you work out your answer.

volume = _____ m³ [1]

- (d) The engineer works out the mass of concrete which would fill the box.
He writes this in the table.

material	energy to raise the temperature of 1 kg by 1 deg C	density	mass of material to fill box
concrete	3400 J	2200 kg/m ³	220 kg
oil	2000 J	760 kg/m ³	_____ kg

Finish the table by writing in the mass of the oil.

[1]

- (e) The engineer decides to use concrete to store energy.

Look at **all** the information in the table.

Write down **two** reasons which support his decision.

1 _____

2 _____

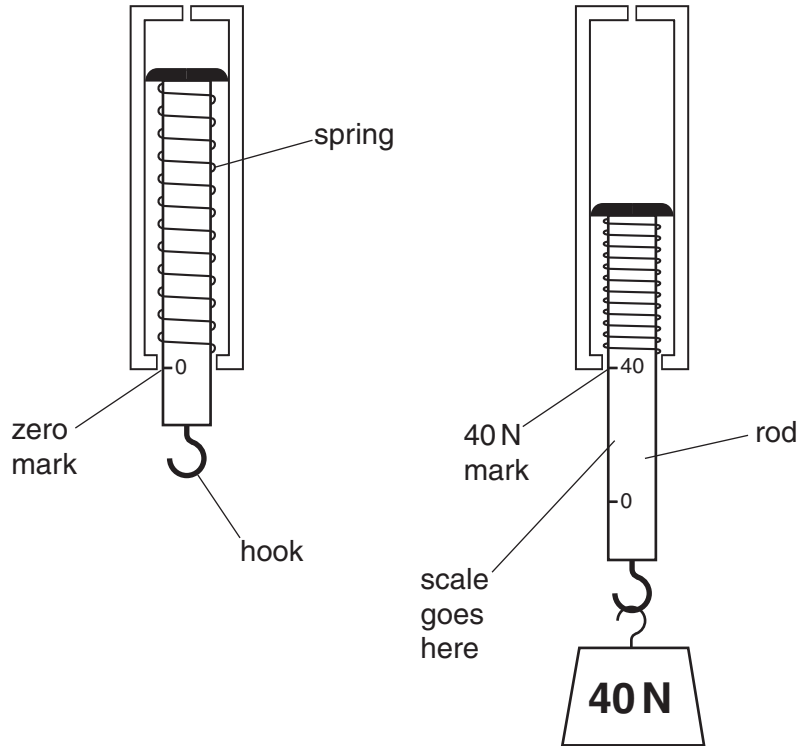
[2]

[Total: 7]

3 Jerry makes a spring balance (newton-meter) for weighing fish.

She uses a stiff spring and parts of a bicycle pump.

She puts a scale in newtons on the rod.



(a) (i) What happens to the spring when the 40 N weight is put on the hook?

[1]

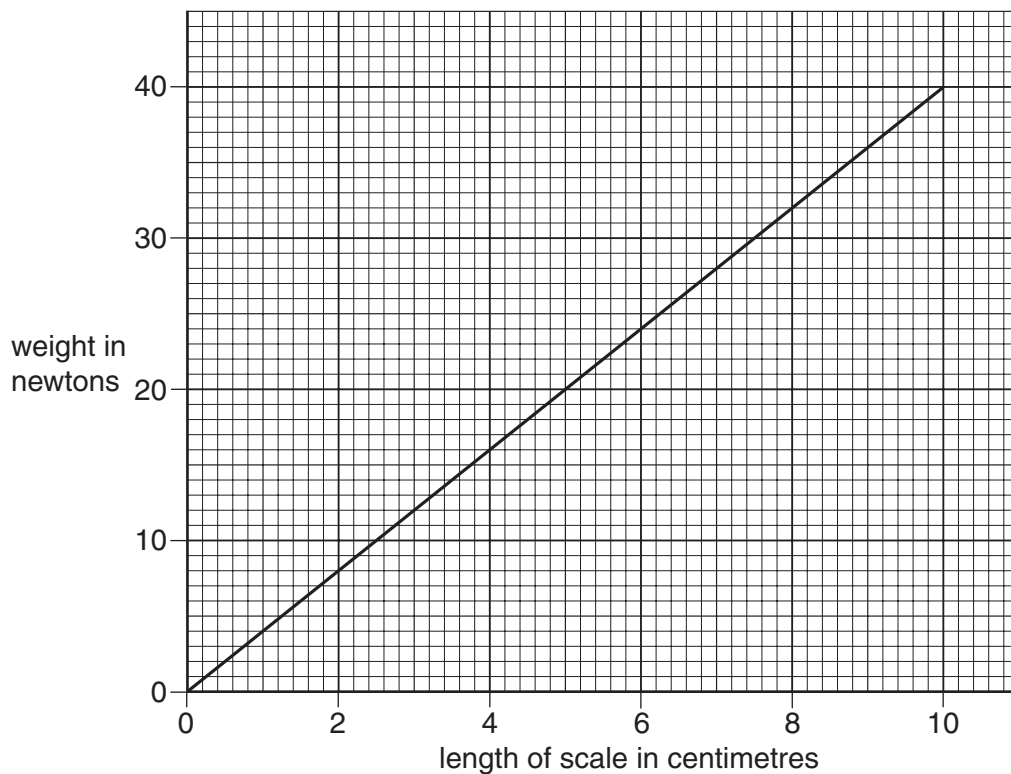
(ii) Suggest why the spring balance would not be suitable for weighing up to 80 N. You will be given credit for the correct use of technical terms and for correct use of spelling, punctuation and grammar.

[3]

(b) Jerry loads the spring balance.

Each time she adds another 5 newtons to the weight, she makes another scale mark on the rod.

The graph shows how adding weights increases the length of the scale.



(i) How can you tell from the graph that the gaps between the marks on the scale are equal?

[1]

- (ii) Put one tick (✓) in the box which shows the correct link between the **weight** and the **length of the scale**.

compressed

constant

parallel

proportional

[1]

- (c) (i) Use the graph to find the value of the spring constant in N/cm.

You **must** show how you work out your answer.

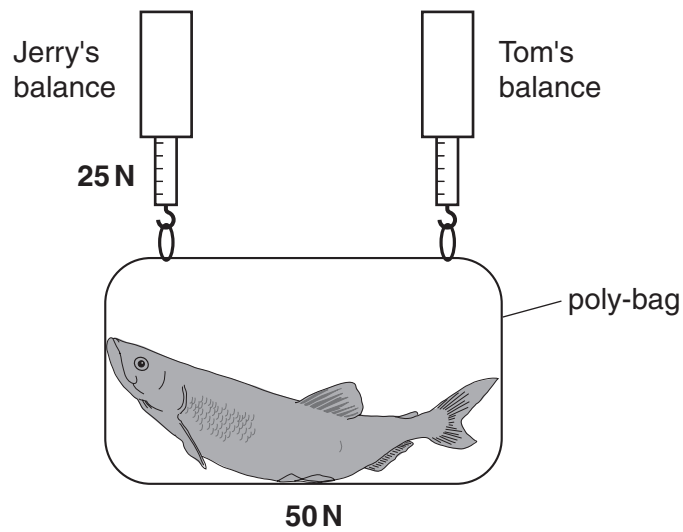
spring constant = _____ N/cm [2]

- (ii) What is the value of the spring constant in N/m?

spring constant = _____ N/m [1]

(d) Jerry catches a really big fish. It is too heavy for the balance.

Her friend Tom also has a balance. They weigh the fish using both balances.



(i) What is the reading on Tom's balance? _____ N [1]

(ii) Explain your answer.

[2]

- (e) Jerry and Tom drive along a track with regular bumps.
This makes their van bounce up and down.

At a certain speed the van bounces 8 times in 10 seconds.

- (i) What is the frequency of the bounces?

frequency = _____ Hz [1]

- (ii) If the van slows down slightly the bounces become more violent.

Write down the name of this effect and why this happens.

[2]

- (iii) What could they do to try to make the bounces less violent?

[1]

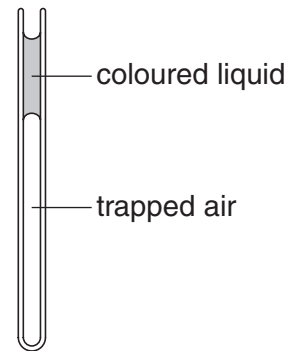
[Total: 16]

- 4 Anna investigates whether a trapped column of air in a thin glass tube acts like a thermometer.

The tube is sealed at the bottom and open at the top.

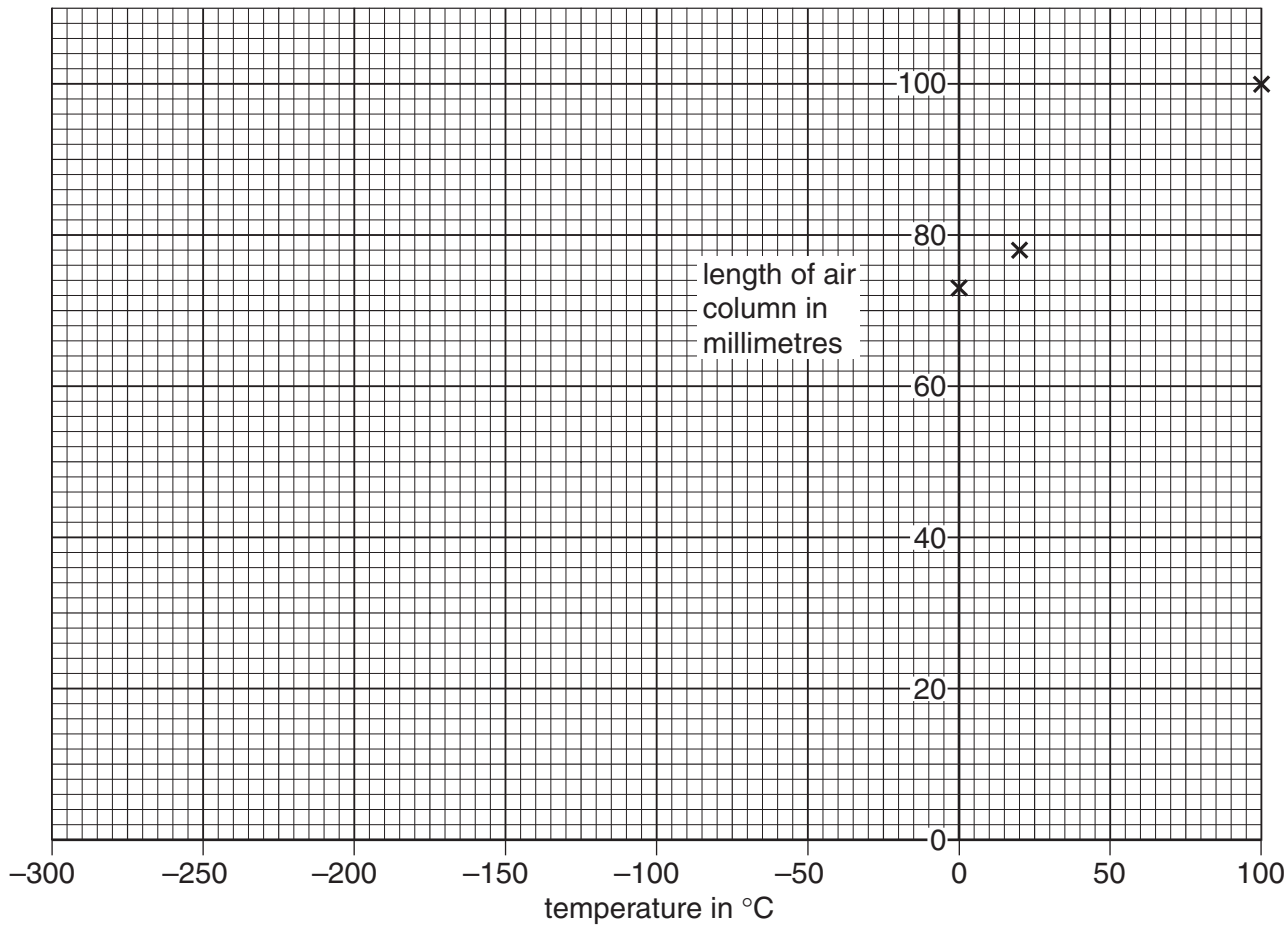
The air is trapped by a short length of coloured liquid.

She measures the length of the column of air.



	temperature	length of air column
at room temperature	20 °C	78 mm
when the tube is in melting ice	0 °C	73 mm
when the tube is in boiling water	100 °C	100 mm

She plots these results on a graph:



(a) (i) Why is the length of the air column longer at higher temperatures?

_____ [1]

(ii) Finish the graph by drawing the best line through the points. [1]

(iii) Use your graph to find the length of the air column at 60°C.

length = _____ mm [1]

(iv) Use your graph to find the temperature at which the length of the air column is zero.

temperature = _____ °C [2]

(v) What do we call this temperature?

_____ [1]

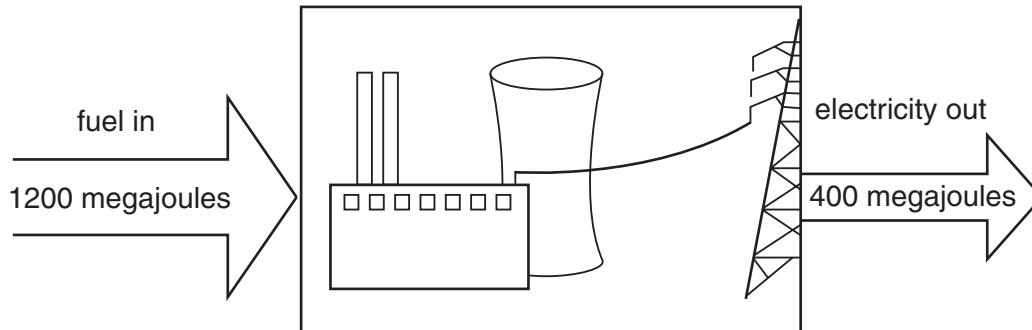
(b) Use your ideas about particles in air to explain why the column of liquid does not fall to the bottom of the tube at room temperature.

You will be given credit for the correct use of technical terms and for correct use of spelling, punctuation and grammar.

_____ [5]

[Total: 11]

- 5 The diagram shows energy transfers into and out of a power station each second.



- (a) Not all the energy transfers are shown.

- (i) How much energy each second is **not** transferred from the fuel in to the electricity out?

energy = _____ MJ [1]

- (ii) Suggest what happens to this energy.

_____ [1]

- (b) In one second the power station supplies 400 **megajoules** to the Grid.

- (i) What does **mega** mean?

_____ [1]

- (ii) What is this energy in joules?

energy = _____ J [1]

[Total: 4]