Candidate Name	Centre Number	Candidate Number

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

PHYSICS 6032/4

PAPER 4 Practical Test

SPECIMEN PAPER 2 hours 30 minutes

Candidates answer on the question paper.
Additional materials:
As listed in Instructions to Supervisors
Electronic calculator

TIME 2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page and on any separate answer paper used.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.
In Questions 1 and 2, you are expected to record all your observations as soon as these observations are made, and to plan the presentation of the records so that it is not necessary to make a fair copy of them. The working of the answers is to be handed in. Marks are mainly given for a clear record of the observations actually made, for their suitability and accuracy, and for the use made of them. **Routine** precautions and theory are **not** wanted in Questions 1 and 2. You should, however, record any **special** precautions you have taken so as to aid accuracy. At the end of the examination, fasten any separate answer paper used securely to the question paper.

INFORMATION FOR CANDIDATES

Questions 1 and 2 carry 18 marks each and question 3 carries 14 marks.
Squared paper and Mathematical tables are available.
Additional paper and graphs should be submitted **only** if it becomes **necessary** to do so.
You are advised to spend approximately one hour on each of Questions 1 and 2 and 30 minutes on Question 3
You are reminded of the need for good English and clear presentation in your answers.

FOR EXAMINER'S USE	
1	
2	
3	
TOTAL	

This question paper consists of 9 printed pages, 2 lined pages and 1 blank page.

It is recommended that you spend about 60 minutes on this question.

1 In this experiment you will investigate the relationship between the angle, θ, between a pair of springs and the mass, m, hung from them.

(a) Set up the apparatus as shown in **Fig. 1.1**.

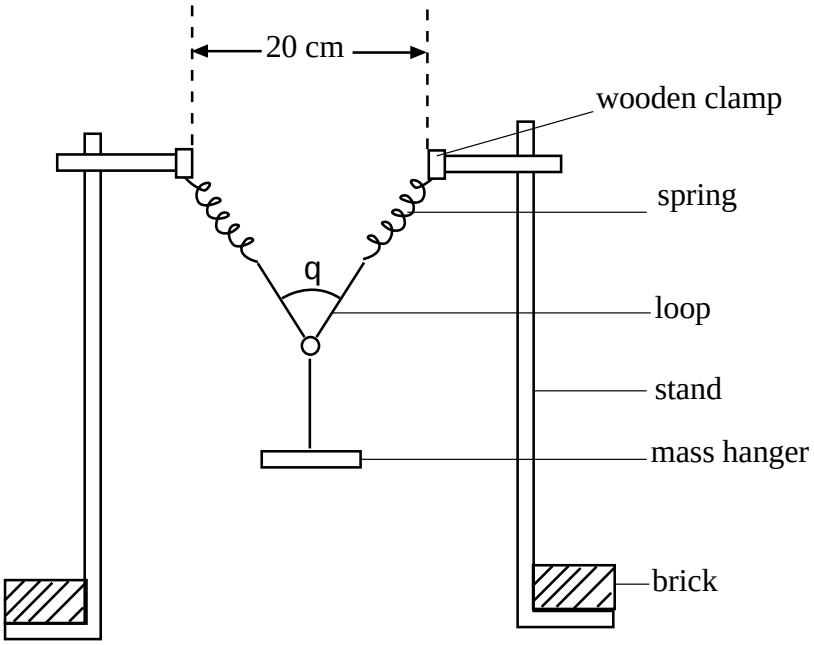


Fig. 1.1

(b) **(i)** Suspend the mass hanger from the centre of the loop.

(ii) Measure and record the angle, θ.

(iii) Add more masses and repeat **b(i)** and **b(ii)** for mass, m, in the range $100\ g \leq m \leq 600\ g$ to obtain five further readings. Include the values of m, and $\cos\theta$ in your table of values.

(c) Theory suggests that m and θ are related by the equation

$$m = \alpha cos\theta + A$$

where α and A are constants.

(i) Plot a graph of m against $cos\theta$.

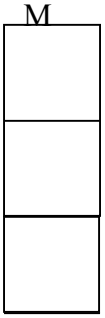
(ii) Determine the gradient and hence α and A.

(iii) Determine the percentage uncertainty in the value of α using error bars.

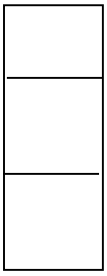
For Examiner's Use

Measurements and calculations

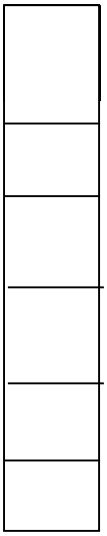
M

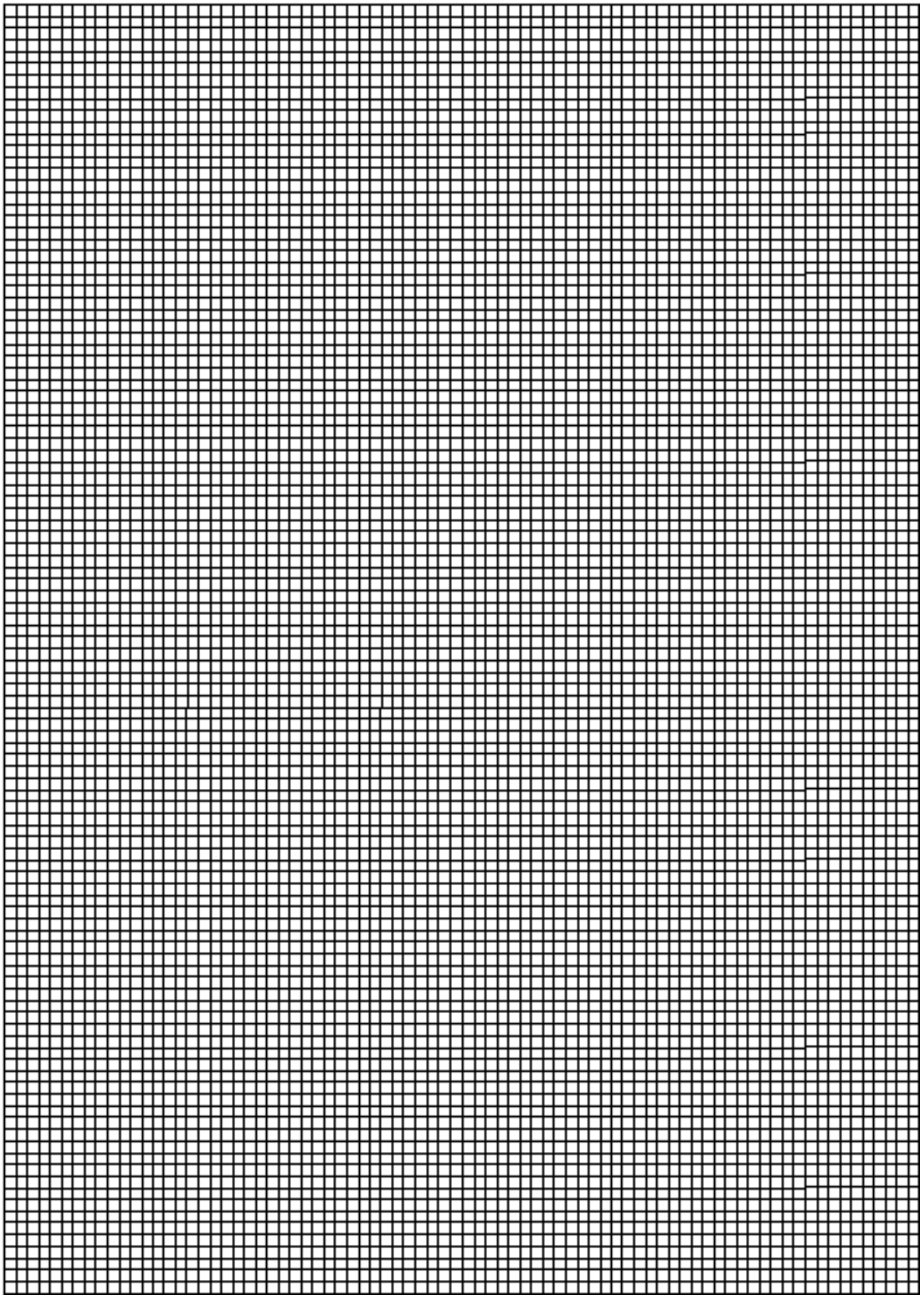


R



A





G

It is recommended that you spend about 60 minutes on this question.

2 In this experiment you will investigate how the emf, V, of a thermocouple varies with temperature, θ.

(a) **(i)** Set up the apparatus as shown in **Fig. 2.1**.

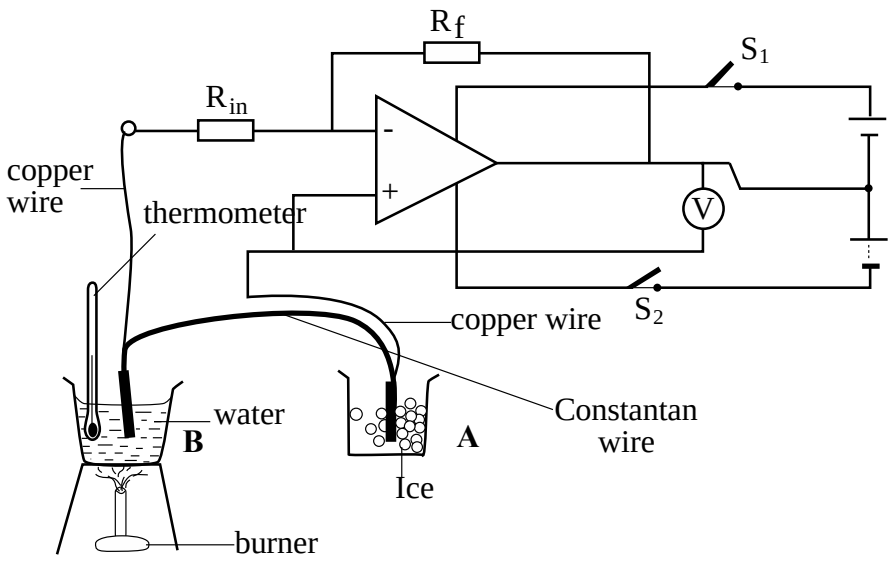


Fig. 2.1

(ii) Heat the water to approximately 90ºC. Close S_1 and S_2, measure and record the voltmeter reading, V, and the thermometer reading, θ.

(iii) Reduce the temperature by adding small amounts of cold water to beaker B, record the corresponding temperature, θ, and voltmeter reading, V.

Include values of θ^2 in your table of results.

(iv) Repeat **b(iii)** until you obtain 6 sets of readings of θ and emf, V, in the range $25 \leq \theta \leq 90$.

(b) Theory suggests that $V = \propto + \beta\theta^2$

where $\propto$ and β are consonants.

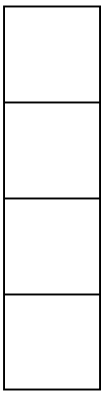
(i) Plot a graph of V against θ^2.

(ii) Determine the gradient of the graph and hence find the values of $\propto$ and β.

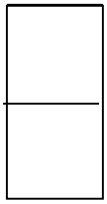
For Examiner's Use

Measurements and calculations

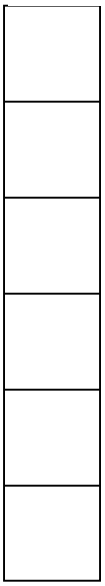
M



R



A



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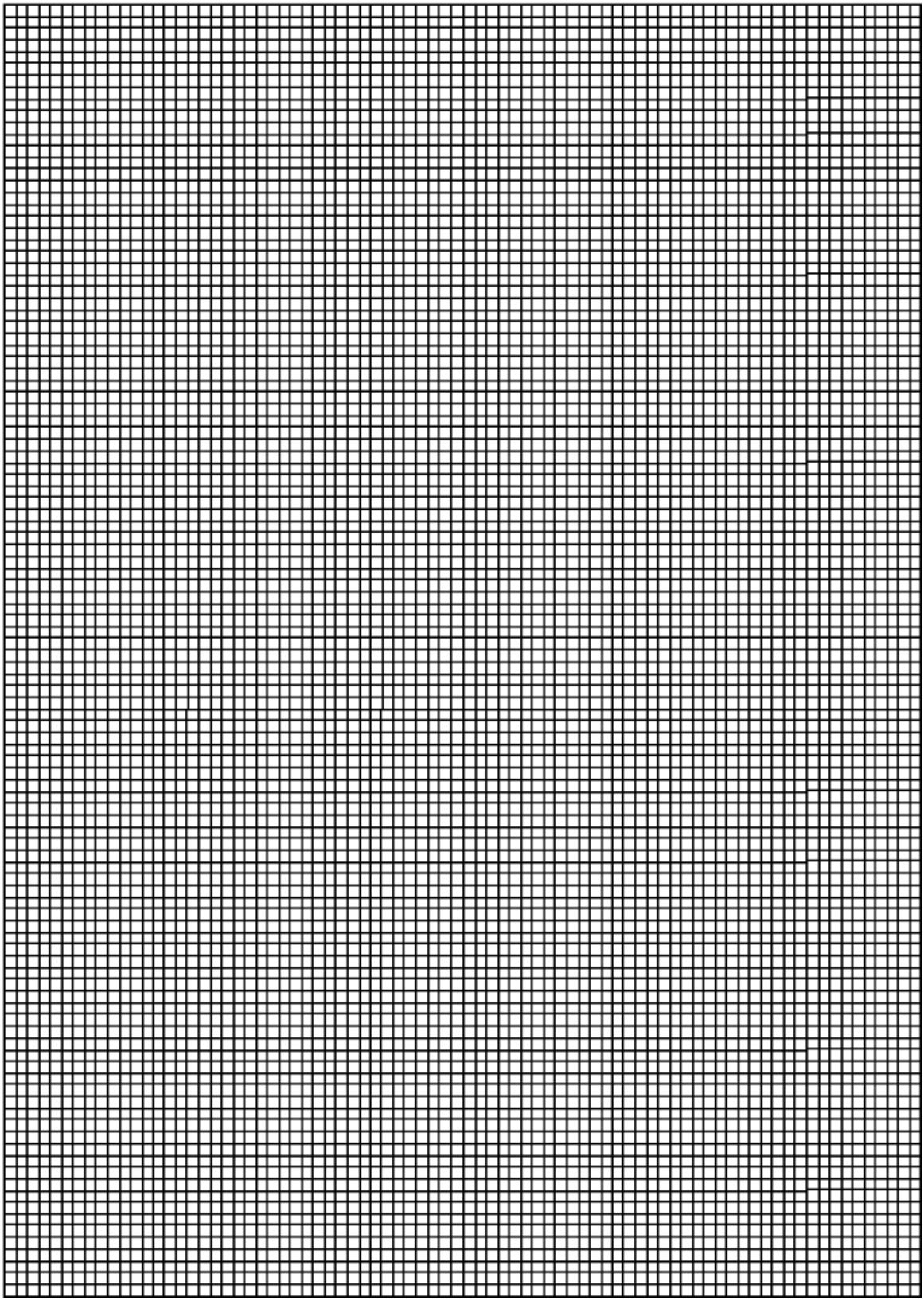

G

It is recommended that you spend about 30 minutes on this question.

3 **Fig. 3.1** shows a hunter trying to shoot an animal from a hill. Each time the hunter attempts to shoot the animal from such a position, he misses it by a distance, *x*.

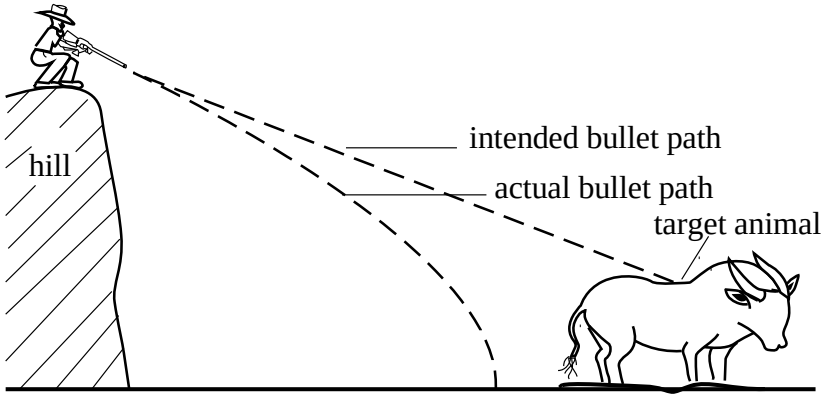

Fig. 3.1

Design a laboratory experiment to investigate how the distance, *x* depends on

(i) height,

(ii) angle at which the bullet is fired and

(iii) air resistance.

You are provided with the following apparatus and any other laboratory equipment of your choice.

Protractor
Adjustable inclined plane
Steel balls of different diameter
Carbon paper
Planks
Fan
Vacuum pump
Trolleys
Motion scissors
Light gates
Video camera.

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