Rewarding Learning

General Certificate of Secondary Education

Centre Number

Candidate Number

Double Award Science: Physics

Unit 7 Practical Skills
Booklet B
Higher Tier

[GDW78]

GDW78

Assessment

TIME

30 minutes.

Assessment Level of Control:
Tick the relevant box (✓)

Controlled Conditions	
Other	

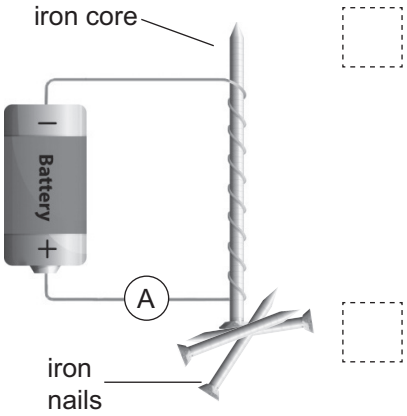
INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen.**
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 35.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **2**.

1 An electromagnet is shown below.



(a) Write the letters N and S in the dotted boxes to show which end of the electromagnet is the North pole and which end is the South pole. [1]

The strength of the electromagnet can be measured by the number of nails it can pick up.

A student wants to find how the strength of the electromagnet depends on the current flowing through it.

The size of current was changed and the number of iron nails held by the electromagnet is shown in the table.

Current / A	Number of iron nails held by electromagnet		Average number of iron nails held
	Experiment 1	Experiment 2	
0.1	5	7	6
0.2	13	11	12
0.3		16	18
0.4	23	25	24
0.5	28	31	

(b) (i) Identify the dependent and independent variables in this investigation.

Dependent variable: _____

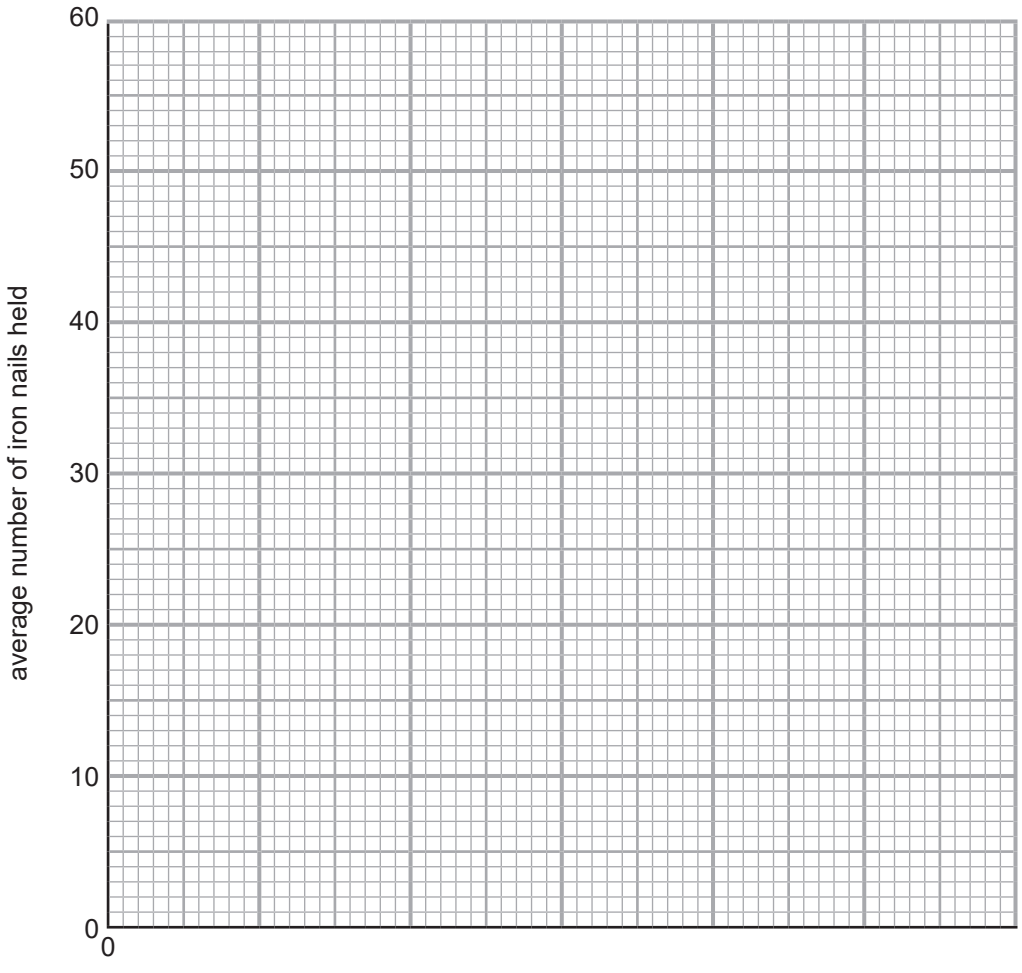
Independent variable: _____ [2]

(ii) Complete the table by filling in the empty cells.
Give your answers to the nearest whole number. [2]

[Turn over

(c) The experiment is now repeated with a different type of iron nail and the following results obtained.

Current / A	Number of iron nails held by electromagnet		Average number of iron nails held
	Experiment 1	Experiment 2	
0.10	11	13	12
0.20	27	21	24
0.30	34	38	36
0.40	46	50	48
0.50	61	59	60



You are asked to plot a graph of average number of iron nails held against current.

(i) Choose a suitable scale for the horizontal axis and label it. [2]

(ii) Plot the points. [2]

(iii) Draw the best fit line. [1]

(iv) Use your graph to find the current that would be needed to hold 42 nails. Give your answer to two decimal places.

Current needed = _____ A [1]

(d) Other than increasing the current, state a different way of increasing the strength of the electromagnet on page 2.

_____ [1]

[Turn over

2 In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

A student wants to find how weight depends on mass.

(a) Mass is measured in kg.

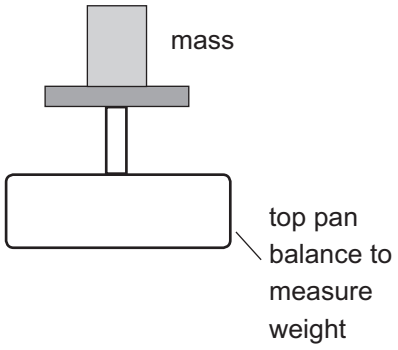
What do you understand by mass?

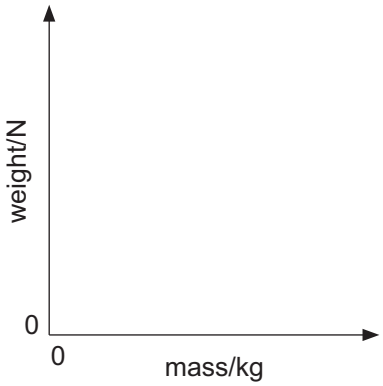
Weight is measured in N.

What do you understand by weight?

The student uses the apparatus shown and obtains a number of readings of mass and weight.

She plots the points and draws the graph of weight against mass.





Source: Chief Examiner

Describe the graph she would obtain.

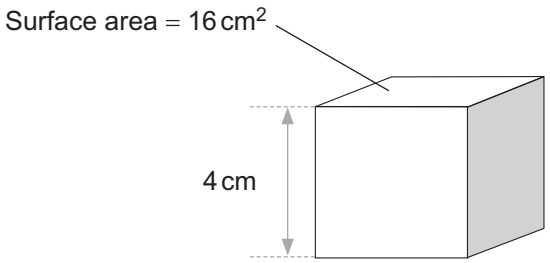
She measures the gradient of the graph.

State the unit of the gradient.

_____ [6]

(b) The student is now given a metal cube of weight 5.44 N.

Information about the piece of metal is given below.



By first finding the mass of the metal, **in grams**, calculate its density.

Include the unit with your answer.

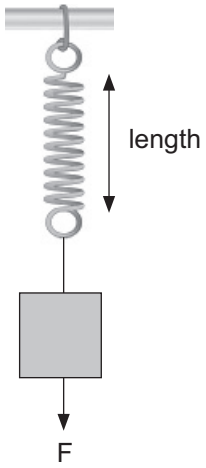
You are advised to show your working out.

Mass in g = _____

Density = _____ [6]

[Turn over

3 An investigation into the relationship between the force, F, applied and the average length, L, of a spring was carried out using the apparatus below.



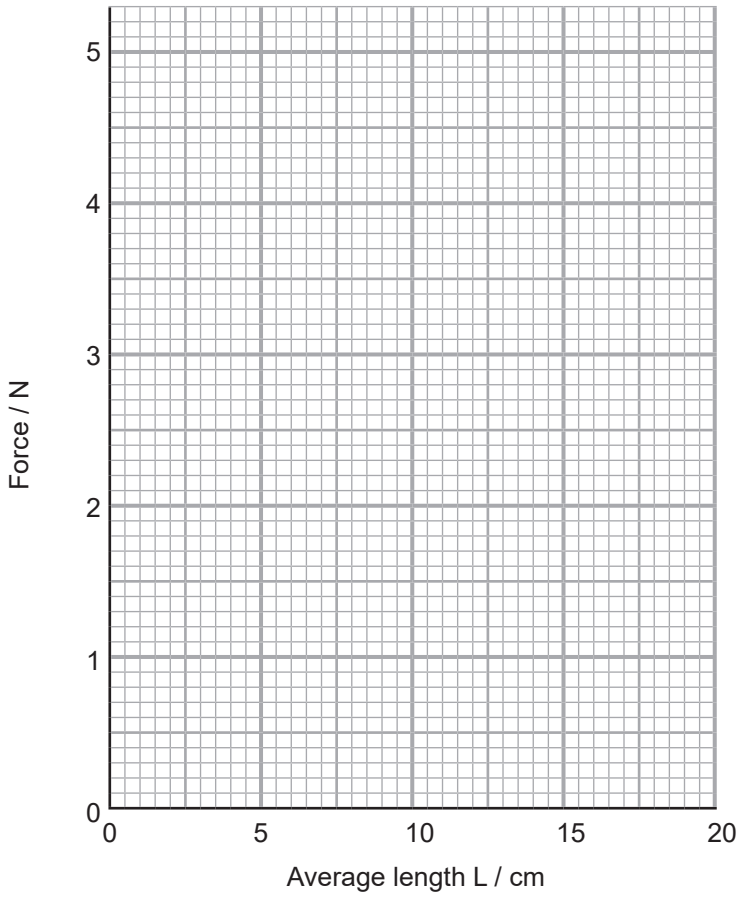
The results obtained are shown.

Force F / N	Length of spring / cm			Average length L of spring / cm
	Experiment 1	Experiment 2	Experiment 3	
1	6.7	6.5	6.4	6.5
2	9.0	9.1	8.9	9.0
3	11.8	11.4	11.3	11.5
4	14.0	10.3	14.0	14.0
5	16.3	16.6	16.6	16.5

(a) For which force has an anomalous result been recorded?

Force = _____ N [1]

You are asked to plot a graph of force, F, against average length, L, of the spring.



(b) (i) Plot the points. [2]

(ii) Draw the best fit line. [1]

(iii) Extend the graph until it crosses the horizontal axis and record this value (horizontal intercept).

Horizontal intercept = _____ cm [1]

(iv) What does the length recorded in part **(iii)** represent?

_____ [1]

[Turn over

(v) Calculate the gradient of your graph and give its unit.

Give your answer to one decimal place.

You are advised to show your working out.

Gradient = _____

Unit _____ [3]

(vi) What does the gradient of the graph represent?

_____ [1]

(vii) Three equations are suggested for the relationship between F and L.

1. $F = L + C$
2. $F = kL$
3. $F = kL + C$ where k and C are constants.

Which equation, 1, 2 or 3 correctly describes the relationship?

Equation _____ [1]

THIS IS THE END OF THE QUESTION PAPER

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For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
Total Marks	

Examiner Number