Candidate Name	Centre Number					Candidate Number				
						0				

GCSE

SCIENCE (Double Award)

UNIT 3: PRACTICAL ASSESSMENT

SAMPLE ASSESSMENT MATERIALS

INVESTIGATING THE EXTENSION OF A SPRING

SECTION A

(1 hour)

For Examiner's use only		
	Maximum Mark	**Mark Awarded**
Section A	**6**	

ADDITIONAL MATERIALS
In addition to this paper you will require a calculator.

INSTRUCTIONS TO CANDIDATES
Use black ink or black ball-point pen.
Write your name, centre number and candidate number in the spaces at the top of this page.
Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES
The total number of marks available for this section of the task is 6.
The number of marks is given in brackets at the end of each question or part question.
This task is in 2 sections, **A** and **B**. You will complete section **A** in one session and section **B** in the next session.

SECTION A

Introduction

Your task is to investigate the extension of a spring.

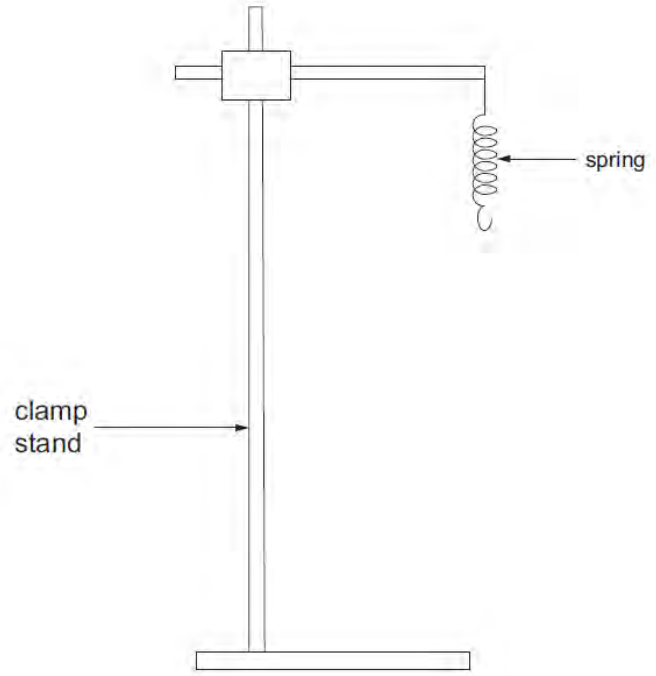
When a load is added to a spring it extends. The extension of a spring is the difference between the unstretched and the stretched length. The apparatus shown below can be used to investigate how the extension of a spring varies with the force stretching it. The force on the spring can be calculated from:

force (N) = mass (kg) × 10

Apparatus

The following apparatus is required for each group:
(each group should consist of no more than three candidates)

- 1 × expendable spring (spring constant 25 N m^{-1}) prestretched prior to use
- 1 × clamp stand and boss
- 1 × 30 cm ruler (resolution ± 1 mm)
- 1 × 100 g mass hanger and 5 × slotted masses



Read the method and answer question 1(a) before carrying out the experiment and recording your results.

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Method

1. Set up the apparatus as shown in the diagram.
2. Use the ruler to measure the length of the spring.
3. Add a 100 g mass hanger to the spring.
4. Measure the new length of the spring.
5. Calculate the extension.
6. Repeat steps 3 - 5 until all masses have been added.
7. Repeat steps 1 - 6 to gain three sets of results in total.

Answer **all** *questions*

1. (a) Make a hypothesis for this experiment. [1]

……

……

You may record raw results in the space below.

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(b) Present your results in a table, including all of your results and the mean extension for each value of the independent variable. [5]

END OF PAPER

Candidate Name	Centre Number					Candidate Number				
						0				

GCSE

PHYSICS

UNIT 3: PRACTICAL ASSESSMENT

SAMPLE ASSESSMENT MATERIALS

INVESTIGATING THE EXTENSION OF A SPRING

SECTION B

(1 hour)

For Examiner's use only		
	Maximum Mark	**Mark Awarded**
Section B	**24**	

ADDITIONAL MATERIALS
In addition to this paper you will require a calculator and your section **A** exam paper.

INSTRUCTIONS TO CANDIDATES
Use black ink or black ball-point pen.
Write your name, centre number and candidate number in the spaces at the top of this page.
Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES
The total number of marks available for this section of the task is 24.
The number of marks is given in brackets at the end of each question or part question.
This task is in 2 sections, **A** and **B**. You will have completed section **A** in a previous session.

SECTION B

Answer **all** *questions*

2. (a) (i) Identify the independent and dependent variables in this experiment. [2]

independent variable: ……

dependent variable: ……

(ii) Name **one** variable that must be controlled in this experiment. Give a reason for your answer. [2]

……

……

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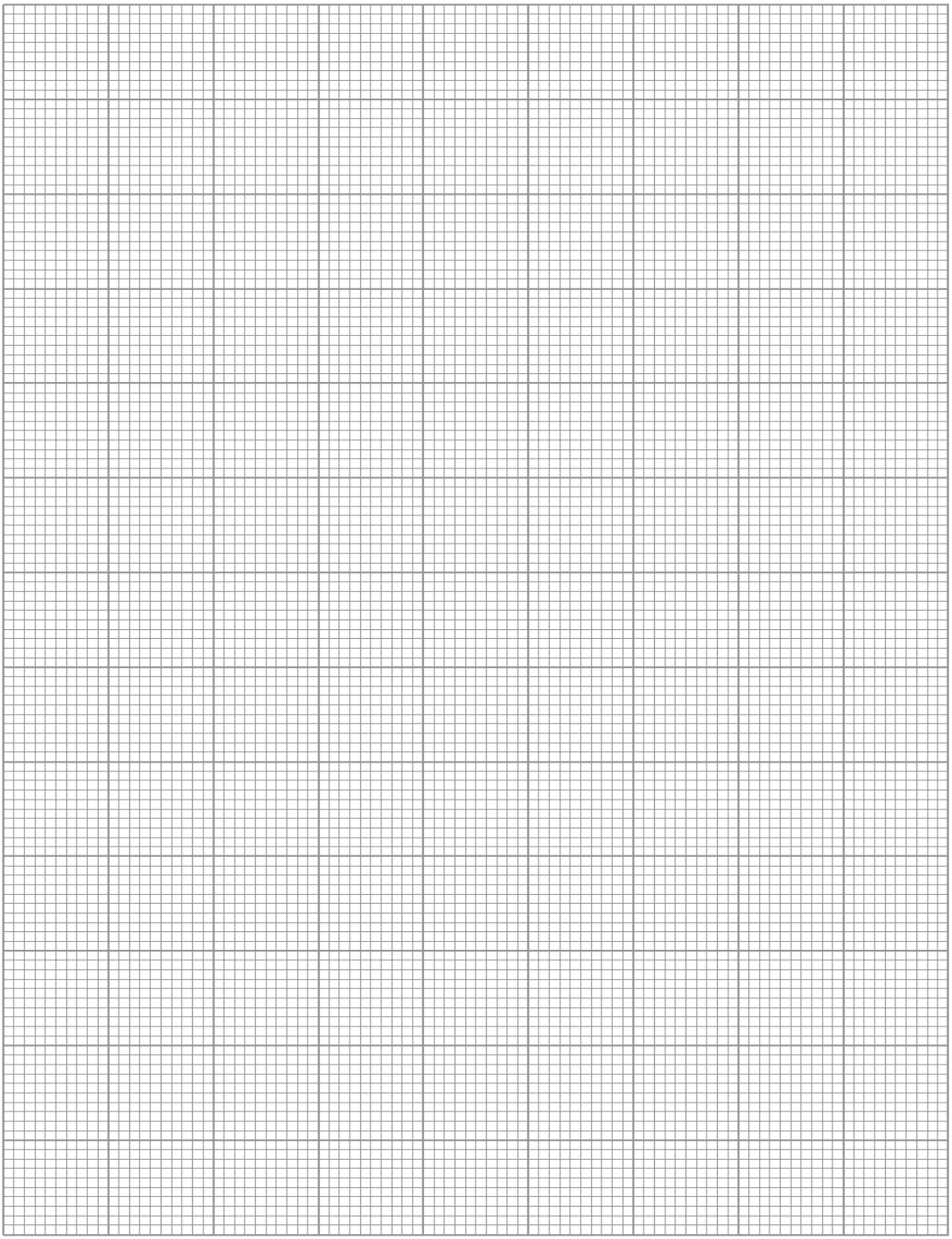
(b) A mass of 100 g provides a force of 1 N to the spring. Use this information and your results from section A to plot a graph of force (vertical axis) against extension (horizontal axis). [5]



(c) It is suggested that the extension is directly proportional to the force. Do your results support this theory? [2]

……

……

(d) The spring constant, k, is given by:

$$k = \frac{\text{force}}{\text{extension}}$$

Use data from your graph to calculate a value for the spring constant. Include a unit with your answer.

[3]

spring constant = ……..

unit = ……..

(e) The experiment is repeated with a spring which is twice as stiff. This means its spring constant is twice as big. Use the equation:

$$\text{force} = k \times \text{extension}$$

to calculate the force required to give an extension of 0.5 m. [3]

force = …….. N

(f) Evaluate the quality of the data you have collected. You should consider accuracy and repeatability in your answer. [3]

……

……

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……

……

……

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(g) Identify **one** source of inaccuracy in this experiment and state an improvement. [2]

……

……

(h) The experiment was repeated with an elastic band. The results are shown in the table below. Describe how the elastic band behaves differently to an ideal spring for which extension is directly proportional to force. [2]

Force (N)	Extension (mm)
1.0	102
2.0	303
3.0	470
4.0	579
5.0	653
6.0	732
7.0	800
8.0	860

……

……

……

……

24

END OF PAPER

UNIT 3: PRACTICAL ASSESSMENT
INVESTIGATING THE EXTENSION OF A SPRING

MARK SCHEME

GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
ecf = error carried forward
bod = benefit of doubt

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