



Rewarding Learning

General Certificate of Secondary Education

Physics

Practical Skills Assessment

Unit 3

Booklet A

Higher Tier

[GPY33]

Assessment

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria which they should apply in allocating marks to candidates' responses.

Assessment objectives

Below are the assessment objectives for GCSE Physics

Candidates must:

- AO1** Demonstrate knowledge and understanding of scientific ideas, scientific techniques and procedures;
- AO2** Apply knowledge and understanding of scientific ideas, scientific enquiry, techniques and procedures; and
- AO3** Analyse information and ideas to interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.

Quality of candidates' responses

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

Flexibility in marking

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

Positive marking

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Examiners should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate. Candidates can be awarded full marks for an answer if they have not shown a method. The advice to show clearly is to allow partial credit to be awarded.

Awarding zero marks

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate. If the starting point for a response is clearly incorrect Physics then award 0.

Marking Calculations

In marking answers involving calculations, examiners should apply the 'own figure rule' so that candidates are not penalised more than once for a computational error.

Types of mark schemes

Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

Mark Scheme Experiment 1 Stretching a Spring

AVAILABLE
MARKS

Procedure Completion of Table 1

Step 1

Heading added to column 1 or 2 Extension/cm [1]
Five extensions added to column 1 ($[\frac{1}{2}]$ each, round down) [2]

Step 2

Five extensions added to column 2 ($[\frac{1}{2}]$ each, round down) [1]

Typical values in Table 1

Mass/ g	Extension 1/ cm	Extension 2/ cm
0	0.0	0.0
100	3.9	3.7
200	7.6	7.6
300	11.4	11.5
400	15.2	15.3
500	19.0	19.0

These are typical values the actual values will depend on the spring you use. However the values in the two columns should be similar.

Analysis of data Completion of Table 2

Step 3

Force values added to column 3 of Table 2 [1]
Column 3 heading Force/ N [1]

Step 4

Average extensions increasing as force increases [1]
Five average extensions added to table [1]
Deduct [1] (once) if values not given to 1 d.p.

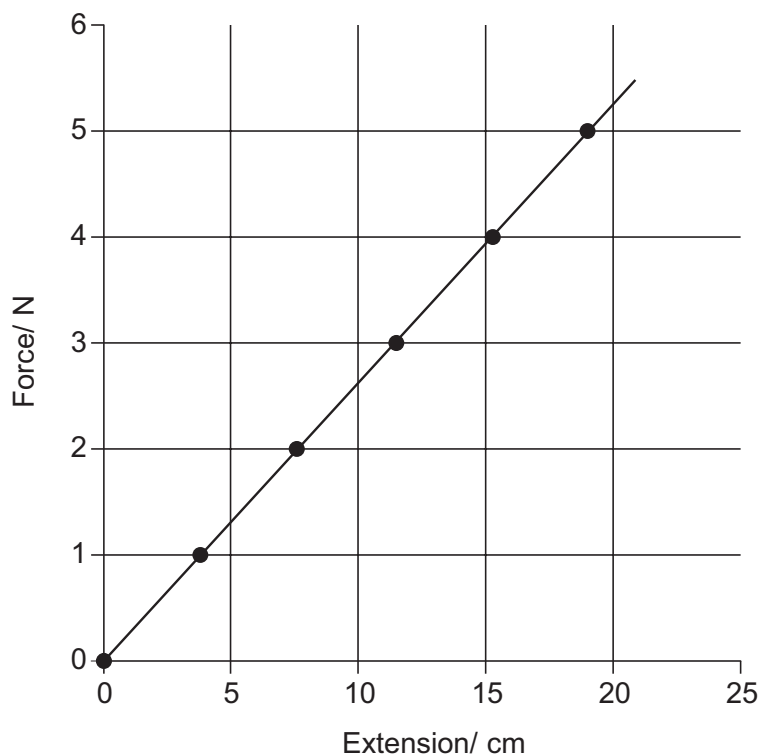
Typical values in Table 2

Force/ N	Average extension/ cm
0	0.0
1	3.8
2	7.6
3	11.5
4	15.3
5	19.0

Interpretation of data

- 1 Y axis – Force/ N X axis – extension/ cm [1]
 Suitable scale (more than half of the grid used) [1]
 Six or five points correctly plotted (± 1 div) [1]
 Best fit line (using a ruler) [1] [4]

Typical graph



- 2 (i) Gradient = $\frac{F}{e} = \frac{4}{15.2 \pm 0.1}$ The value will depend on your spring [1]
 Unit = N/cm [1]
- (ii) The spring constant [1] [3]

Total

7

15

Experiment 2 Refraction of Light

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Step 1

No marks are awarded for this step

Step 2

Angle of refraction for angle of incidence of 10°
recorded in the table between 5° to 8°
Outside this range give [1] e.g. by 2°
If 0° give [0]

[2]

Step 3

Four sets of values of angle of incidence and angle of refraction recorded
within the range of typical values in the table below.

Typical values in Table 3

Angle of incidence/ $^\circ$	Angle of refraction/ $^\circ$
10	5 to 8
20	10 to 14
30	16 to 20
40	25 to 29
50	30 to 34

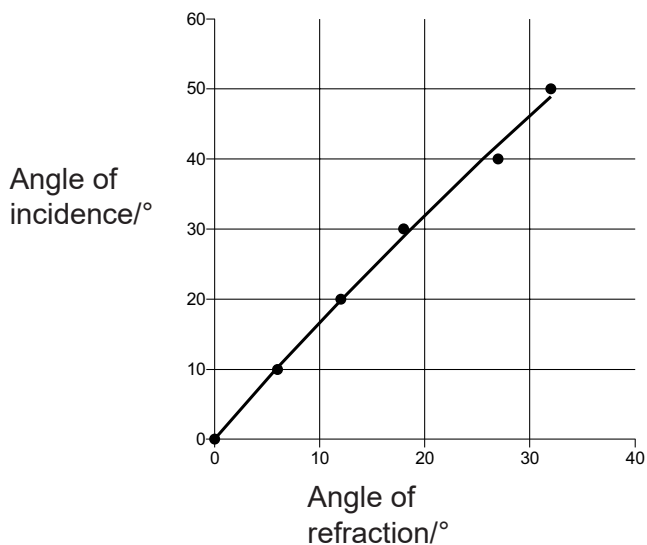
[4]

Allow some tolerance for the angles of refraction

6

Analysis of data

1 Typical graph



Labels and units on both axes [1] The unit can be in words or symbol
 Good scale [1] A good scale means at least half the grid used in both
 x and y axes
 6/5 points [2] ± 1 Div
 4/3 points give [1]

[4]

2 Best line
 Consistent with their points
 Joining with short lines give [0]

[1]

Interpretation of data

3 Straight line
 Passes through (0,0)

[1]
 [1] [2]

4 Sight of three ratios 1.71, 1.79, 1.95
 Sight of 2 ratios give [1]

[2]

9

Total

15

**AVAILABLE
 MARKS**