



Rewarding Learning

General Certificate of Secondary Education

Physics

Practical Skills Assessment

Unit 3

Booklet B

Higher Tier

[GPY34]

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.

- 1 (a) (i) $\frac{\text{mass} \times \text{acc due to gravity} \times \text{height of stairs}}{\text{time taken}}$
or
 $\frac{\text{weight} \times \text{height of stairs}}{\text{time taken}}$ [2]
 If mgh/t or work done/time award only 1 mark
- (ii) Average time = $(4.5 + 4.7 + 4.6)/3 = 4.6$ s [1]
 Height of stairs = $15 \times 0.2 = 3.0$ m [1]
 Power = $(60 \times 10 \times 3.0)/4.6$ [2]
 = 391 or 391.3 [1]
 W [1] [6]
 If the wrong step height is used i.e 0.25 rather than 0.2 m
 the answer will be 489 W or 489.1 W
 In this case award 5 marks
- (iii) Run up the stairs faster or
 Run up carrying a load [1]
- (b) There is no relationship between the power and the student's mass [1]
- (c) Power = $(45 \times 220)/60$ [2]
 = 165 (W) [1] [3]
 If 1 minute not converted to 60s award 2 marks

AVAILABLE
MARKS

13

2 (a) **Indicative content**

Apparatus *lens, screen and metre rule (3 points)*
 Procedure *move lens until sharp image on screen*
 Measurement *distance from lens to screen*
 1 mark per item max of 3 points
 Sharp is required

| Response | Mark |
|---|---------|
| Candidates describe in detail using good spelling, punctuation and grammar 5 or more points shown above. The form and style are of a high standard and specialist terms are used appropriately at all times. | [5]–[6] |
| Candidates describe in detail using good spelling, punctuation and grammar 3 or 4 points shown above. The form and style are of a high standard and specialist terms are used appropriately at all times. | [3]–[4] |
| Candidates make some reference to 1 or 2 of the main points shown above using satisfactory spelling, punctuation and grammar. The form and style are of a satisfactory standard and they have made some reference to specialist terms. | [1]–[2] |
| Response not worthy of credit | [0] |

5 points award 6 marks, 3 or 4 points award 4 marks,
 1 or 2 points award 2 marks [6]

- (b) (i) Student 5 [1]
 (ii) Repeat the measurement [1]
 (iii) 10 cm [1]

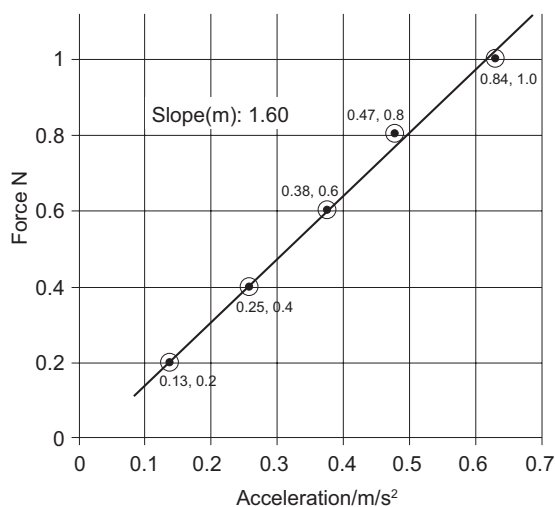
(c) (i)

[1] Incident ray [1] 40° or i [1] 90 or r [1] Refracted ray [1] Weak reflected ray [5]

Poorly drawn lines deduct 1. Check angles by eye

- (ii) Total Internal reflection [1]
 (iii) Angle of incidence in the glass [1]
 greater than critical angle [1] [2]
 in the glass must be stated for the first mark

- 3 (a) (i) Friction [1]
- (ii) Width/length of the card [1]
- (iii) The time to travel between the gates [1]
- (iv) Average values (0.13) 0.25 0.38 (0.47) 0.64 [2]
 [$\frac{1}{2}$] each round up
- (v) Axes labelled Accelerating Force/N [1]
 Acceleration/m/s² [1]
 Scales to cover at least half of grid in both x and y directions [1]
 Points plotted – 5 points plotted correctly [$\frac{1}{2}$] each round down [2]
 Straight line through (0,0) [1] [6]



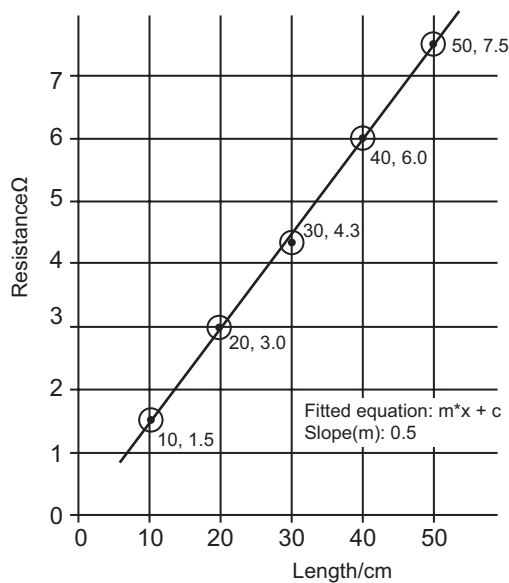
- (vi) Graph is a straight line [1]
 passing through (0,0) or through the origin [1] [2]
- (vii) Gradient = $\frac{0.8}{0.50} = 1.6 \pm 0.1$ [1]
- (viii) Unit = N/m/s² or kg [1]

- (b) (i) Graph 2 [1]
- (ii) Inverse relationship [1]

AVAILABLE MARKS

17

- 4 (a) (i) Length [1]
(ii) Resistance [1]
(iii) Temperature [1]
(iv) Switch [1]
Only closed when a reading is taken [1] [2]
(v) Circuit to show:
Switch in series with battery [1]
Ammeter in series with battery [1]
Voltmeter in parallel with resistance wire [1] [3]
Correct symbols otherwise penalty [-1]
(vi) Four resistance values calculated [2]
1.5, 3.0, (4.3), 6.0, 7.5
(vii) Y-axis label is Resistance [1]
Unit is the ohm/ Ω [1]
5 points correctly plotted 5 points $\frac{1}{2}$ each round down [2]
Line of best fit [1]
Scale at least half the grid [1] [6]
(viii) $K = \text{gradient} = \text{value from their graph } 0.15 \pm 0.01$ [1]
Value consistent with their graph [1] [2]



- (b) (i) Three ratios calculated $1.05 \times 1.1 = 1.15$ [2]
 $4.6 \times 0.25 = 1.15$ $14.4 \times 0.08 = 1.15$
(ii) $R = \frac{K}{A}$ or $RA = K$ [2]
(iii) Unit of $P = \text{ohms} \times \text{millimetres}^2$ [1]
 $= \Omega \text{ mm}^2$

Total

23

70