Rewarding Learning

General Certificate of Secondary Education
2022

Physics

Practical Skills Assessment
Unit 3
Booklet A

Higher Tier

[GPY33]

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.

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.

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.

Levels of response
Tasks and questions requiring candidates to respond in extended writing are marked in terms of levels of response. In deciding which level of response to award, examiners should look for the 'best fit' bearing in mind that weakness in one area may be compensated for by strength in another. In deciding which mark within a particular level to award to any response, examiners are expected to use their professional judgement. The following guidance is provided to assist examiners.

- ***Threshold performance:*** Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.
- ***Intermediate performance:*** Response which clearly merits inclusion in the level and should be awarded a mark at or near the middle of the range.
- ***High performance:*** Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

Quality of written communication
Quality of written communication (QWC) is taken into account in assessing candidates' responses to all tasks and questions that require them to respond in extended written form.
These tasks and questions are marked on the basis of levels of response. The description for each level of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within levels of response as follows:

Level A: Quality of written communication is excellent.
Level B: Quality of written communication is good.
Level C: Quality of written communication is basic.

In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below:

Level A (Excellent): The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence.
There is widespread and accurate use of appropriate specialist vocabulary. Presentation and spelling, punctuation and grammar (SPG) are of a sufficiently high standard to make meaning clear.

Level B (Good): The candidate makes a reasonable selection and use of an appropriate form and style of writing. Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation and spelling, punctuation and grammar (SPG) are sufficiently competent to make meaning clear.

Level C (Basic): The candidate makes only a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary. Presentation and spelling, punctuation and grammar (SPG) may be such that intended meaning is not clear.

COVID-19 Context

Given the unprecedented circumstances presented by the COVID-19 public health crisis, senior examiners, under the instruction of CCEA awarding organisation, are required to train assistant examiners to apply the mark scheme in case of disrupted learning and lost teaching time. The interpretation and intended application of the mark scheme for this examination series will be communicated through the standardising meeting by the Chief or Principal Examiner and will be monitored through the supervision period. This paragraph will apply to examination series in 2021–2022 only.

Experiment 1 Density of a liquid

AVAILABLE MARKS

Procedure

Step 1 Mass of the empty beaker recorded ≤ 250g [1]

Step 2 Column heading – Mass of beaker and water/g or total mass/g or mass/g also units in brackets [1]

Step 3 Table 1
5 values of mass of water + beaker recorded
ignore dec. places not mass of water [1]
Mass increases as volume increases and mass values always greater than volume values [1]
Typical values

Volume of water/cm^3	50	100	150	200	250
Mass of beaker + water/g	220	270	319	369	419

Analysis of data

Step 4 Table 2
Column 2 heading Mass of water/g [1]
5 values of mass of water [1]
ignore dec. places
Typical values

Volume of water/cm^3	50	100	150	200	250
Mass of water/g	49	99	148	198	248

Step 5 Table 2
Column 3 heading density/g/cm^3 or in g/cm^3 or (g/cm^3) [1]
5 values of the density quality 1.0 ± 0.1 [1]
All quoted to 1 decimal place [1]
Typical values

Volume of water/cm^3	50	100	150	200	250
Density/cm^3	1.0	1.0	1.0	1.0	1.0

Interpretation of data

1 Graph
Vertical axis labelled mass/g or mass of water – horizontal axis labelled volume/cm^3 [1]
All points correctly plotted to within ± one 2 mm square by eye [1]
Best fit straight line through 0,0 must go through origin transposed -1 mark [1]

2 (Mass and volume (directly)) proportional [1]

3 Candidate's value for the gradient [1]
Unit stated as g/cm^3. [1]

15

Experiment 2 Strength of an electromagnet

AVAILABLE MARKS

Procedure

Step 1 Variable resistor connected in series in the gap provided
Teacher to indicate that no help was given [2]

Step 2 Trial 1 3 values of number clips added to table integer [2]
([½] each round up)

Trial 2 3 values of number of clips added to table integer [1]
Quality mark – Number of clips increasing with current in both trials [1]

Analysis of data

Step 3 3 values of the average number of clips added to table [1]
([½] each round down)

All given to the nearest whole number [1]

Interpretation of data

1 All points correctly plotted ± 1 whole square (2 mm) [½] each round down [2]
Line/curve of best fit [1]
Ignore origin

2 Middle box ticked [1]
The average number of paperclips held by the electromagnet increases on current increasing
More than one tick 0 marks

3 The current [1]

4 (Number of) paper clips [1]

5 Number of turns on the nail
Identical paper clips
Length of the nail
Width of the nail
Material of nail
Number of coils
} any one [1]

Not thickness of wire

15