Rewarding Learning

General Certificate of Secondary Education
2019

Physics

Practical Skills Assessment
Unit 3
Booklet B

Foundation Tier

[GPY32]

TUESDAY 18 JUNE, MORNING

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.

AVAILABLE MARKS

1 **(a)** At the midpoint or 50 cm mark/centre/middle/equal amount of ruler each side [1]
Weight acts there or that is its CoG/CoM [1] [2]

(b) Force x (perpendicular) distance **from pivot** [1]

(c) CoG marked x at the intersection of diagonals or middle [1]
Or
where lines from the midpoint of two straight edges meet
Construction **lines to be shown** [1] [2]

(d) To ensure the CoG is at the 20 cm mark
Weight acts at 20 cm mark or in exact position [1]

(e) When the lever (metre rule) is balanced [1]
Clockwise moment = Anticlockwise moment [1]
About the pivot or a point [1] [3]

(f)

Distance from pivot on the LEFT/cm	Weight/N	Anticlockwise Moment/N cm		Distance from pivot on the RIGHT/cm	Weight/N	Clockwise Moment/ N cm
(20)	(1)	**20**		(20)	**1**	**20**
(10)	**4**	**40**		(20)	(2)	**40**
(25)	(4)	**100**		**20**	(5)	**100**

Unit mark for moment [1] both required
11 entries [$\frac{1}{2}$] each round up [6]

(g) ACM = 40 × 5 = 200 (N cm) [1]
For 3 N we require a distance of more than 50 cm [1] [2]
(or 66.7 cm is needed)
66.7 cm puts us off end of rule
or we need a ruler 116.6 cm
Or maximum possible CM is only 150 N cm

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						AVAILABLE MARKS
2	(a)	(i)	Correct reflected ray checking using online facility	[1]		
		(ii)	60°± 2°	[1]		
		(iii)	60°± 2°	[1]		
		(iv)	30°± 2°	[1]		
		(v)	30°± 2° No ecfs allowed for parts **(a)(ii)** to **(a)(v)**	[1]		
		(vi)	Correct reflected ray (by eye)	[1]		
		(vii)	The rays are parallel/anti-parallel or in opposite direction	[1]	[7]	
	(b)		Laterally inverted, same size as object, virtual Deduct 1 mark for each tick greater than three	[1] [1] [1]	[3]	
	(c)	(i)	Line perpendicular to XY at point of incidence	[1]		
		(ii)	Both rays refracted in correct sense Red above Blue	[1] [1]		
		(iii)	Angle r marked between blue (or lower) ray and normal at AB. **Allow ecf from (ii)**	[1]		
		(iv)	Red light travels at the same speed as blue light in air but red is faster than blue in glass	[1]		
		(v)	Blue has a larger angle of incidence No ecf	[1]		
	(d)	(i)	Spectrum	[1]		
		(ii)	Red, orange, yellow, green, blue, indigo, violet	[1]	[8]	18

AVAILABLE MARKS

3 (a) Indicative content

Find the weight or mass of the load – balance/newton meter
Distance load is moved – metre rule/tape measure (**not** a ruler)
Time to move this distance (or to lift load) – stop clock/stop watch
Time is repeated
To obtain a reliable result
To find an average
Power = work done/time taken (w/t) or load/weight × distance/time or mgh/t or PE/t

Response	Mark
Candidates describe in detail using good SPG **at least 5 points**. 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 SPG **at least 3 points**. The form and style are of a high standard and specialist terms are used appropriately on some occasions.	[3]–[4]
Candidates make some reference to **one of the points** using good SPG. The form and style are of a satisfactory standard but there is limited use of specialist terms.	[1]–[2]
Response not worthy of credit	[0]

[6]

(b) (i) 1 watt = (1) joule per second **not** per unit time [2]
Accept 1 J/s for [1]

(ii) Kinetic energy **remains constant** [1]
Potential energy **increases** [1]
Total energy **increases** [1]

(iii) Heat and Sound [2]

(iv) Efficiency = useful output energy/total input energy [1]
= 63/100 [1]
= 0.63 [1] [10]
useful output energy is required for partial credit

(c) (i) As load increases speed decreases [1]
accept negative correlation

(ii) The motor failed to raise the load
or motor is not turning or stopped
motor cannot lift load (not capable of)
8N or greater [1] [2]

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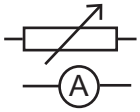
						AVAILABLE MARKS
4	(a)	(i)	Iron	[1]		
		(ii)	Rheostat (or variable resistor) Ammeter (**not** ampmeter)	[1] [1]		
		(iii)	Correct symbols in gaps in circuit for rheostat and ammeter (position unimportant) 	[1] [1]	[5]	
	(b)	(i)	Label: Current/mA **or** I/mA Scale: 2 cm = 50 mA and no other	[1] [1]		
		(ii)	1 mark for each correct point (to max 4) No tolerance Deduct 1 mark for each incorrect point	[4]		
		(iii)	**Ruled** line of best fit (not point-to-point) must include origin (0,0)	[1]		
		(iv)	Straight line Through origin (**any order**)	[1] [1]		
		(v)	Evidence (vert. line at 225 mA or horiz. line at 22.5 clips) Sight of 22.5 (clips) or 23 clips } Quality marks 22 clips can be lifted } Quality marks	[1] [1] [1]	[12]	17
					Total	**70**