OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL GCSE
Physics

9203/1 - Paper 1

Mark scheme

9203

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Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement
- the Assessment Objectives, level of demand and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening and underlining

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

2.4 Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of errors / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution?

[1 mark]

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name two planets in the solar system.

[2 marks]

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Marks should be awarded for each stage of the calculation completed correctly, as students are instructed to show their working. Full marks can, however, be given for a correct numerical answer, without any working shown.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward is kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation ecf in the mark scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Allow

In the mark scheme additional information, 'allow' is used to indicate creditworthy alternative answers.

3.9 Ignore

Ignore is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

3.10 Do <u>not</u> accept

Do **not** accept means that this is a wrong answer which, even if the correct answer is given as well, will still mean that the mark is not awarded.

4. Level of response marking instructions

Extended response questions are marked on level of response mark schemes.

- Level of response mark schemes are broken down into levels, each of which has a descriptor.
- The descriptor for the level shows the average performance for the level.
- There are two marks in each level.

Before you apply the mark scheme to a student's answer, read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

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Step 1 Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 content.

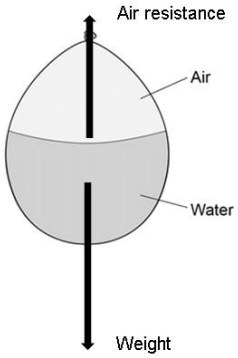
Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the Indicative content to reach the highest level of the mark scheme.

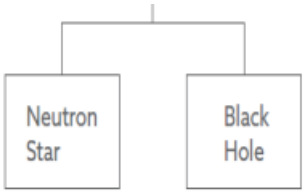
An answer which contains nothing of relevance to the question must be awarded no marks.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1.1	downward arrow labelled weight upwards arrow labelled air resistance  	 air resistance arrow should be the same length or shorter than weight arrow	1 1	AO1 3.1.1a
1.2	(air resistance) increases		1	AO1 3.1.1b
1.3	magnitude/size direction	 allow answers in either order.	1 1	AO1 3.1.1d
1.4	Quantity / Scalar / Vector Acceleration / ✓ Distance / ✓ Speed / ✓	3 correct answers gains **2** marks 2 correct answers gains **1** mark	2	AO1 3.1.1d
1.5	$4.9 = \text{mass} \times 9.8$ $\text{mass} = \frac{4.9}{9.8}$ mass = 0.50 kg / kilograms	an answer of 0.50 scores **3** marks	1 1 1 1	AO2 / AO1 3.1.1e

1.6	The 6.8 N water-balloon will reach the ground first. air resistance will have a greater effect on the lighter water-balloon.	 allow a correct explanation of terminal velocity reason only scores if correct water balloon selected.	1 1	 AO2 3.1.1e; 3.1.3h

Total			**13**

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2.1	equal to		1	AO1 3.3.4a
2.2	normal		1	AO1 3.3.4b
2.3	B		1	AO1 3.3.4a
2.4	Protractor		1	AO4 3.3.4a
2.5	repeat calculate a mean to reduce the effect of random errors **OR** use a wider range (1) to see if the pattern continues (1) **OR** use a smaller interval (1) to check the pattern is the same for all values (1) **OR** use a protractor with a greater resolution (1) to allow more accurate readings (1)		1 1	AO3 3.3.4a
2.6	upright virtual	answers may be in either order	1 1	AO1 3.3.4c
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3.1	gravitational force	allow gravity	1	AO1 3.8.1a
3.2	(nuclear) fusion		1	AO1 3.8.1b
3.3	the forces in the star are balanced		1	AO1 3.8.1b
3.4	red (super) giant		1	AO1 3.8.1g
3.5		answers may be in either order	2	AO1 3.8.1j
3.6	35.5 so it has the same period as the Earth	allow an answer between 35 and 36 allow so it takes 24 hours to orbit	1 1	AO3 3.8.2g
3.7	a low polar orbit takes a relatively short amount of time so the satellite passes over the entire surface of the planet each day	allow the satellite orbits several times a day	1 1	AO2 3.8.2g
Total			**10**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4.1	convection		1	AO2 3.4.2a
4.2	increases increases decrease	three correct answers scores **2** marks one or two correct answers scores **1** mark	2	AO1 3.4.1e
04.3	**Level 3**: The design/plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.		5-6	AO1 3.5.2g
	Level 2: The design/plan would not necessarily lead to a valid outcome. Most steps are identified, but the plan is not fully logically sequenced.		3-4	AO1 3.5.2g
	Level 1: The design/plan would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.		1-2	AO1 3.5.2g
	No relevant content		0	
	Indicative content **setting up the investigation** • stearic acid is placed in a boiling tube and heated in a water bath • a thermometer is placed in the stearic acid to measure the temperature • the boiling tube is removed from the water bath • the boiling tube is placed in a test tube rack • a stop-clock is started to measure the time. **readings** • the temperature is recorded at regular intervals • readings should continue until after the stearic acid has solidified • readings should continue until the temperature of the solid stearic acid has started to fall. **graph** • a line graph should be plotted • time should be on the X-axis and temperature on the Y-axis			
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5.1	they are absorbed	do not accept reflected	1	AO1 3.3.2k
5.2	the radiation badge monitors the radiation dose received because X-rays can damage/kill cells	allow so they know if they have received too much radiation allow because X-rays are ionising allow because X-rays increase the risk of cancer X-rays increase health risks is insufficient	1 1	AO1 3.3.2m; 3.3.2j
5.3	microwaves are not ionising so the risk to health is lower (than for X-rays)		1 1	AO2/AO3 3.3.2j 3.3.2m
5.4	 16mm = 0.016 m $3.0 \times 10^8 = f \times 0.016$ $\frac{3.0 \times 10^8}{0.016} = f$ $f = 1.875 \times 10^{10}$ Hz $f = 1.9 \times 10^{10}$ Hz	an answer of 1.9×10^{10} scores **5** marks allow a correct substitution of an incorrectly/not converted value of wavelength.	 1 1 1 1 1	AO2 3.3.1h
Total			**10**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6.1	geothermal energy cannot be used everywhere because the hot rocks are too deep in most places an answer which correctly identifies an atmospheric pollutant with a description of its effect can gain two marks.		1 1	AO1 3.2.3d
6.2	step-up transformer increases the potential difference and decreases the current to reduce energy losses the step-down transformer decreases the potential difference to levels safe for consumers	allow step-up transformer increases the voltage allow the step-down transformer decreases the voltage to levels safe for consumers	1 1 1 1	AO1 3.6.2d
6.3	$\frac{12}{100} = \frac{6\,900\,000}{\text{Total power}}$ Total power = $\frac{6\,900\,000}{12\%}$ 57 500 000 = m × 2 300 000 m = $\frac{57\,500\,000}{2\,300\,000}$ m = 25 (kg)	an answer of 25 scores **5** marks allow their calculated total power = m × 2 300 000	 1 1 1 1 1	AO2 3.4.1c
Total			**11**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7.1	the point at which the mass of an object may be thought to be concentrated		1	AO1 3.1.7a
7.2	$12 = \frac{\Delta p}{18}$ $\Delta p = 18 \times 12$ $\Delta p = 216$ $p = 216 + 48 = 264$ (kg m/s)	an answer of 264 (kg m/s) scores **4** marks	1 1 1 1	AO2 3.1.4c
7.3	$2.2 = \frac{55}{t}$ $t = \frac{55}{2.2}$ $t = 25$ (s)	an answer of 25 (s) scores **3** marks	1 1 1	AO2 3.1.2c
7.4	turning effect	allow force multiplied by perpendicular distance from the line of action of the force to the pivot.	1	AO1 3.1.8a
7.5	$84 \times 0.6 = 1.6 \times F$	an answer of 31.5 (newtons) scores **3** marks allow **1** mark for correct calculation of a moment of 50.4 Nm	1	AO2 3.1.8a

	$F = \frac{84 \times 0.6}{1.6}$ F = 31.5 (newtons)		1 1	
7.6	the longer the kayak, the harder it is to turn	answers must be comparative	1	AO3 3.1.8a
7.7	wider kayaks are more stable. length does not affect stability.	 allow length to width ratio does not affect stability	1 1	AO3 3.1.7c
7.8	(drag force is) reduced		1	AO2 3.1.6d
7.9	2.7		1	AO3 3.1.6d
7.10	E		1	AO3 3.1.6d
Total			**18**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
8.1	Nuclear weapon tests		1	AO1 3.7.2d
8.2	calculate the average background rate subtract this from each reading		1 1	AO4 3.7.2d
8.3	half-life = 200 s 10 minutes (= 600 s) = 3 half lives count rate = $\left(\frac{1}{2}\right)^3$ × 1000 count rate = 125 (counts per second) **OR** after 300s, count rate = 350 (1) 10 minutes (= 600 s) = 2 × 300 s (1) count rate= $\left(\frac{350}{1000}\right)^2$ ×1000 (1) count rate = 120 (counts per second) (1)	an answer between 120 and 130 counts per second scores **4** marks allow any correct method of determining the count rate after three half-lives.	 1 1 1 1	AO2/3 3.7.2h
8.4	nuclei in source A are less stable because A has a shorter half life so the count rate decreases at a greater rate		1 1	AO2 3.7.2j

8.5	compare the readings of background radiation before and after the experiment the two readings should be similar (if there is no contamination)	 allow if the second reading is significantly higher then there is contamination	1 1	AO4 3.7.2i

Total			**11**