OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL GCSE PHYSICS

9203/2

PAPER 2
Mark scheme

Specimen material

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.

Level of response marking instructions

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 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.

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 1

Question	Answers	Extra information	Mark
01.1	zero		1
01.2	momentum of car before		1
	momentum = 2500 x 14 = 35000 Kg m/s		
	Momentum before = Momentum after		1
	35000 = (2 x 2500) + (5 x mass)		
	mass = (35000 - (2 x 2500)) / 5		1
	6000 kg		1
01.3	distance = Area under line from 5s to 9s distance = ½ (2 x 4)		1
	distance = 4m		1
01.4	the time taken for the car to stop is increased		1
	this decreases the rate of change of momentum		1
	so the force on the driver is reduced		1
Total			**10**

Question 2

Question	Answers	Extra information	Mark

02.1 Examiners should also refer to the information on page 3. — 6

0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)
No relevant content.	Simple statements are made which demonstrate some understanding of some of the relevant scientific techniques and procedures. The response may lack a logical structure and would not lead to the production of valid results.	A coherent method is described with relevant detail, which demonstrates a broad understanding of the relevant techniques and procedures. The steps in the method are logically ordered. The method would lead to the production of valid results.	A coherent method is described with relevant detail, which demonstrates a broad understanding of the relevant techniques and procedures. The steps in the method are logically ordered. The method would lead to the production of valid results.

Indicative content

Equipment

Measuring cylinder, stop watch, thermometer, cups.

Variables

Independent variable – cup

Dependent variable – temperature change

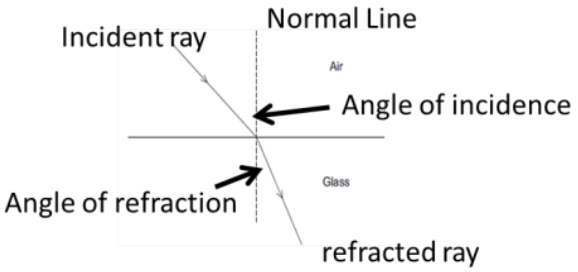
Control variables(s) – mass/volume/amount of water, starting temperature.

Method

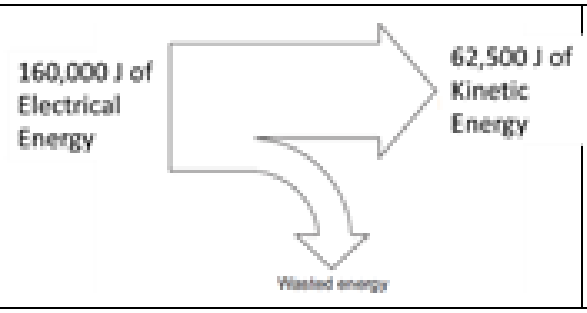
Measure temperature change in a given time

Measure time taken for a given temperature change

02.2	table with heading of Time and Temperature change		1
	units of time (s) **or** (min) and units of temperature (°C) **or** (K)		1
02.3	spot anomalous results		1
	take a mean of results to make the experiment more accurate	allow take a mean of results	1
Total			**10**

Question	Answers	Extra information	Mark
03.1	1.33 – 160		1
03.2	lead glass		1
03.3		correct ray drawn in glass block correct emergent ray drawn both angles correctly labelled two other correct labels	1 1 1 1
03.4	use refractive index of 1.48 n = sin θI / sin θr θr = sin^{-1} (sin θ, / n) θr = sin^{-1} (sin 46, / 1.48) 29 to 29.1		1 1 1
03.5	speed will remain the same		1
Total			**10**

Question 4

Question	Answers	Extra information	Mark
04.1		all three labels correct wasted energy arrow greater width than kinetic energy arrow	1 1
04.2	the energy is dissipated into the surroundings		1
04.3	(useful energy / energy in) x 100 39.1 % or 0.391	 allow 39.1 or 0.391 with no working shown for **2** marks	1 1
04.4	work = power x time Power = 62 500 / 10 Power = 6 250 (W)	 allow 6 250 (W) with no working shown for **2** marks	 1 1
04.5	(KE = ½ x mass x (speed)^2) speed = $\sqrt{(2E_K/m)}$ speed = $\sqrt{}$/(2 x 62 500 / 1 500) 9.1 m/s	 allow 9.1 m/s with no working shown for **3** marks	 1 1 1
Total			**10**

Question 5

Question	Answers	Extra information	Mark
05.1	light dependent resistor		1
05.2	25 kΩ		1
05.3	0.0002 x 25000 5	 allow 5 with no working shown for **2** marks	1 1
05.4	linear scale using all of the available axis, must cover the range 4 - 6 v negative gradient line passing through 20 lux and their 05.3	 only scores if the first mark is awarded only scores if line does not go above 6 volts	1 1
05.5	37.5 (kΩ)		2
05.6	light intensity value would be unreliable/not accurate due to variation in **resistance** value		1 1
Total			**10**

Question 6

Question	Answers	Extra information	Mark
06.1	26		1
06.2	toaster		1
06.3	cost per kWh = 88 / 11 cost per kWh = 8p cost of running computer = 30 / 8 cost = 240p/£2.40		1 1 1 1
Total			**6**

Question 7

Question	Answers	Extra information	Mark
07.1	Pole A is a North and Pole B is a North		1
07.2	reverses	allow changes direction	1
07.3	first finger: (magnetic) field second finger: (conventional) current		1 1
07.4	into the paper		1
07.5	less current in wire weaker field rotation of magnets so field is no longer perpendicular to wire	allow less current/voltage **or** more resistance **or** thinner wire allow weaker magnets **or** magnets further apart do **not** accept smaller magnets	1 1 1
07.6	reverse one of the magnets	do **not** accept there are no numbers on the scale	1
07.7	systematic error **or** zero error	allow all current values will be too big allow it does not return to zero allow it does not start at zero	1
Total			**10**

Question 8

Question	Answers	Extra information	Mark
08.1	neutrons and protons		1
08.2	0 **and** (+)1		1
08.3	number of protons	allow same atomic/proton number	1
08.4	number of neutrons	allow different mass numbers	1
08.5	because polonium-210 is an alpha emitter and alpha particles cannot be detected outside body **or** alpha particles produce heavy ionisation		1 1
08.6	because iridium-192 has a long(er) half life and so will be radioactive for longer		1 1
08.7	18		1
08.8	to determine the count rate of the sources		1
08.9	the alpha radiation would not cover such a distance		1
08.10	plots correct to within ½ small square correct curve through points as judged by eye	allow **1** mark for 4 correct points plotted	2 1
Total			**14**

Question 9

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th></tr>
<tr><td>09.1</td><td colspan="2">Examiners should also refer to the information on page 3.</td><td rowspan="4">6</td></tr>
<tr><td>0 marks</td><td>Level 1 (1-2 marks)</td><td>Level 2 (3-4 marks)</td><td>Level 3 (5-6 marks)</td></tr>
<tr><td>No relevant content.</td><td>There is a basic description of the method. This is incomplete and would not lead to any useful results</td><td>There is a description of the method which is almost complete with a few minor omissions and would lead to some results.</td><td>There is a detailed description of the method which would lead to valid results. To gain full marks an answer including a graph, or another appropriate representation of results, must be given.</td></tr>
<tr><td colspan="3">Examples of points made in the response:
• read V and I
• read temperature
• apply heat
• read V and I at least one other temperature
• determine R from V / I
• range of temperatures above 50 °C.

extra detail:
• use thermometer to read temperature at regular intervals of temperature
• remove source of heat and stir before taking readings
• details of attaining 0 °C or 100 °C
• last reading taken while boiling
• graph of R against T
• at least 3 different temperatures.</td></tr>
<tr><td>09.2</td><td>Q</td><td></td><td>1</td></tr>
</table>

Question	Answers	Extra information	Mark
09.3	any **one** from: • measurement of V too small • measurement of I too big • incorrect calculation of R • thermometer misread.	 allow misread meter ignore any reference to a systematic error	1
09.4	any **two** from: • not portable • needs an electrical supply • cannot be read directly.	 allow requires a lot of equipment allow takes time to set up allow it is more difficult to read compared to liquid-in-glass	2
Total			**10**