



Examiners' Report Principal Examiner Feedback

Summer 2025

Pearson Edexcel International GCSE
in Physics (4WSD5) Unit 5PR

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Introduction

This was the first examination for iGCSE Modular Physics. The examination was written to assess the full range of grades from 1 to 9. Consequently, some questions were written to be challenging whilst others were designed to be more straightforward and accessible. A range of different question types were included in the examination such as objective and multiple choice, calculations, and both short and long written responses. There were also marks available in the examination for candidates' demonstrations of experimental skills and understanding. Candidates were provided with a full list of the formulae to be used in this examination. Successful candidates were well-acquainted with the content of the specification and could recall facts whilst applying their understanding to new and complex situations. They were competent in performing quantitative work and could substitute data into given formulae then rearrange to obtain the correct answer. Successful candidates also showed evidence of undertaking all the required practicals themselves and could produce detailed, coherent methods of these experiments. Less successful candidates showed gaps in their knowledge of topics and either had limited experience or could not recall information from the required practical tasks. These candidates often did not address the demands of the question and overlooked the importance of the command words being used.

Individual questions

Q1 (a)

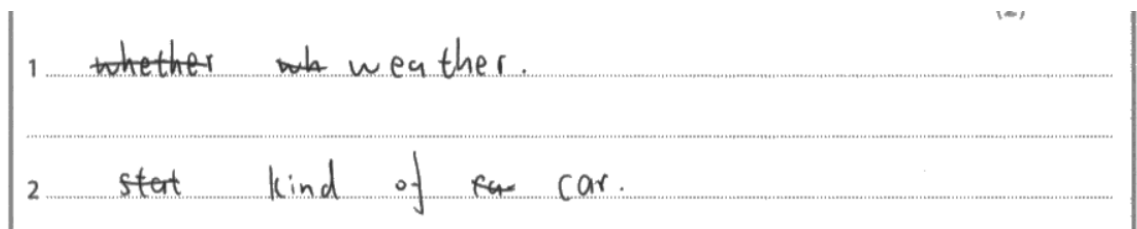
Most students were successful in this question. Those who were not tended to have combined the correct numbers by adding them, failing to note that they were in opposite directions.

Q1 (b)(i)

Most students were successful in this question. Those who were not tended to have combined the correct numbers by dividing them or subtracting them.

Q1 (b)(ii)

Most students were able to access this question. More successful students gave some detail which enabled them to hit mark points. Students who gave vague answers like the ones below, were less successful.



Q2 (a)

The students were not told, for this objective question, how many correct answers there were. It was encouraging to see that most students took the mark for the question (3) as their guide. Bulb and ammeter were common answers, but conversely so were voltmeter and variable resistor.

Q2 (b)(i)

Most students were successful on this question, although there was a wide variety of incorrect answers. A few chose a thermometer, having realised that the graph involved temperature, and the term 'thermomistor' was reasonably popular.

Q2 (b)(ii)

Most were able to read the graph scale correctly.

Q2 (b)(iii)

Most students correctly calculated the current. Students who substituted into the given formula guaranteed themselves a mark, whereas those that rearranged first, risked doing this incorrectly and limiting the marks they could then achieve.

This student substituted first, then rearranged to get a correct answer.

voltage = current $\times$ resistance

$$9\text{ V} = \text{current} \times 80\ \Omega \quad (3)$$

$$\text{current} = 0.1125\text{ A}$$

current = 0.1125 A

This student substituted as a rearrangement, getting it incorrect and consequently scoring no marks.

(3)

~~80 \div 9.0 = 8.88~~

$$80 \div 9.0 = 8.88$$

current = 8.88 A

Q2 (b)(iv)

Successful candidates for this question realised that adding another component, and changing the temperature, would both affect the circuit resistance. Not all students however, could express their ideas clearly. 'The resistance' for example, could refer to a component or the circuit, and therefore was not clear enough to gain many marks.

This student refers to 'the resistance of the circuit' and 'the resistance of the components' making it clear what is happening and gaining credit.

The resistance of the circuit increases. Firstly, when adding the second component X in series with the other components, the ^{resistance} of the circuit equals the sum of the resistance of these component. ^{Also} ~~therefore~~ the temperature of these ^{components are} resistance both reduced to 26°C , according to the graph, as resistance ~~in~~ decreases when temperature increases, both the resistance in components are ~~is~~ increased to $160\ \Omega$, so the new resistance in circuit is $320\ \Omega$, and it's bigger than the origin of $80\ \Omega$.

This student starts well but fails to mention that the graph shows the resistance for component X and therefore the second part of the answer does not gain credit.

(4)

The resistance of the circuit is increased.
 As seen from the graph, lower the
 temperature higher the resistance

Q3 (a)(i)

This formula was to be found on the formula sheet and therefore made this mark accessible to nearly all.

Q3 (a)(ii)

Most were able to substitute and rearrange this correctly. Again, substituting first ensured that at least one mark would be gained. On this occasion, a significant number of students were unable to rearrange the formula correctly. Another benefit to substituting into the original formula is the ability to simplify it before rearranging. Those who calculated 55×10 to get $4750 = 550 \times h$, were more successful at then rearranging this, than those, like the student below, who rearranged before simplifying the calculation.

$$4750 = 55 \times 10 \times h$$

$$h = \frac{4750}{55 \times 10} = 8.63$$

vertical height = 8.63 m

Q3 (a)(iii)

Most understood the command word 'state', but some students tried to carry out a calculation. One line, one mark and the command word 'state' gave big clues here about what was required.

Q3 (a)(iv)

Lots of students selected the correct formula and then substituted and rearranged correctly. The most common error was forgetting to take the square root. Those who kept the ' $v^2 =$ ' as in the example below, were more successful in remembering to square root and therefore gain the final mark.

$$ke = \frac{1}{2} m v^2$$

$$v^2 = \frac{ke}{\frac{1}{2} m} \rightarrow \frac{4750}{55 \times 0.5} = 172.72^{(3)}$$

$$v = \sqrt{172.72} = 13.14229812$$

$$\text{speed} = 13.14 \text{ m/s}$$

Diagram: A triangle with 'ke' at the top, '0.5 x m x v^2' at the bottom, and 'm = 55' and 'v^2 =' to the right.

Q3 (b)

Most students gave a general description of how the bag may fall down the tube using vague language such as 'hitting the sides'. Those who realised that the question concerned energy transfer did better, although some referred to just 'losing energy' or 'releasing heat'

This student used much better language and this was therefore a good answer.

The speed will be less because the kinetic energy of the bag will be less. Not all of the ^{GPE} energy will have transferred to the KE energy store. Some of the energy ~~is~~ transferred mechanically to the thermal energy store of the surroundings because work is done against the friction of the sides of the tube to overcome the frictional force.

Whereas this student focussed on air resistance instead of friction, limiting the marks available.

Because there's air resistance force existing during the falling process, a part of gravitational potential energy is being used to against the air resistance ^{force}. Therefore, the energy transferred into kinetic energy ~~is decreased~~ ^{decreases}, leading to a smaller speed of the bag as ~~the~~ the mass of the bag remains constant.

Q4 (a)(i)

Students found it challenging to understand this practical. Those who were not sure what was happening, tended to just state pieces of the practical equipment from the stem of the question. Students should be encouraged to use words that are not in the stem for questions such as this, as it rarely leads to creditworthy answers.

Those who scored well such as the student below, were clear in their language.

(i) Give three control variables in the student's investigation.

1 ~~thickness of metal bar~~ ~~temperature of water~~ (3)

2 length of metal bars.

3 length of metal bar submerged in water

Whereas this student did not understand the experiment and therefore repeated words mainly from the stem.

(3)

1 The hot water

2 The temperature sensitive ~~strips~~ strips

3 ~~The hot water~~ The hot water's temperature

Q4 (a)(ii)

Many students had not understood the nature of the practical apparatus used and described a practical using each bar separately. This did not prohibit any marks but made it harder to achieve some as extra detail was needed. Most students failed to understand the significance of the temperature sensitive strip and the fact that the colour would change gradually up the length of the strip. There was some confusion over the language with some referring to the heat apparatus as the 'clamp stand' and dipping this into the beaker of water. This student clearly understood the task and was able to describe the method using correct terminology.

~~Ensure~~ ~~temperature~~ ~~strip~~

Ensure length and position of temperature sensitive strips are the same for each metal bar. Place hot water in beaker.

Use clamp stand and clamp to hold and lower ~~the~~ metal bars into the ~~water~~ hot water in the beaker.

Immediately start the stopwatch.

Observe and record time taken for each temperature sensitive strip on each metal bar to change colour at the top. to have colour change at the top.

Repeat ~~the~~ the experiment and obtain a mean result for each metal.

~~temperature~~ ~~and~~

If time taken for top of strip to change colour is small, metal is more effective at ~~transferring~~ transferring energy by conduction.

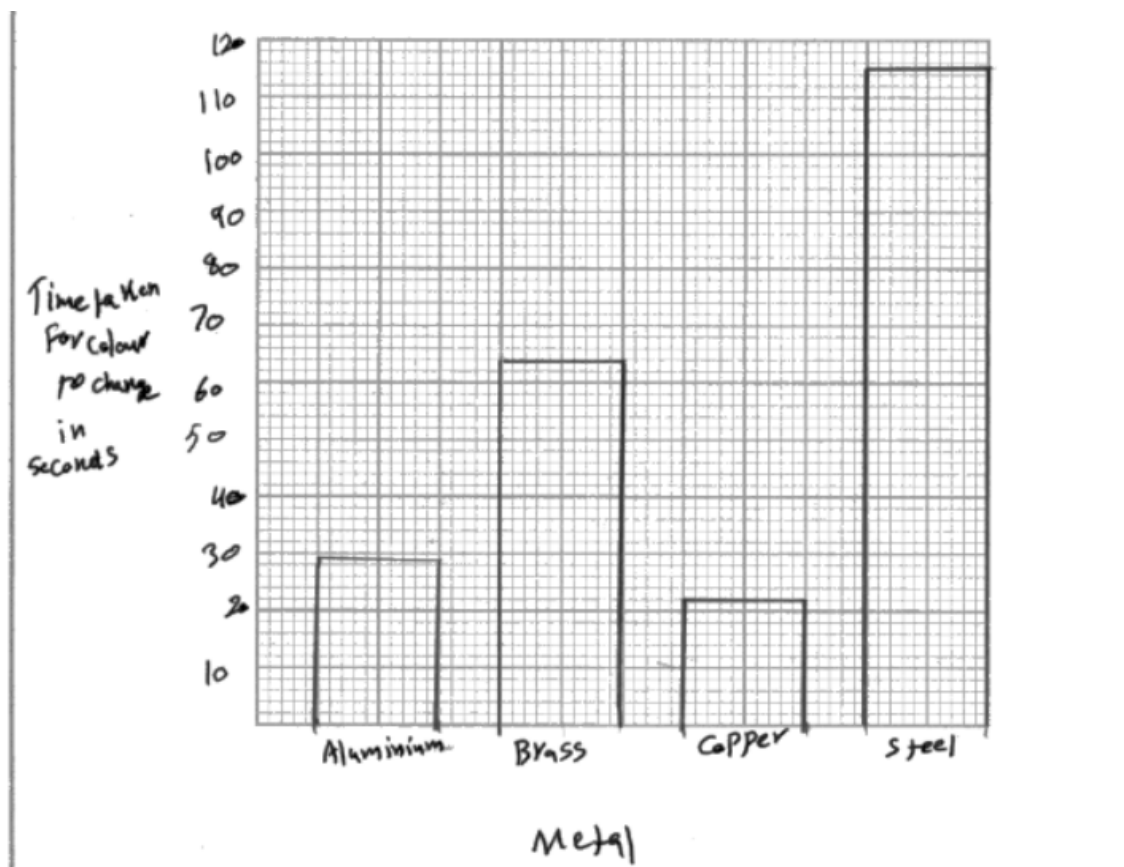
Whereas this student started well but didn't understand the significance of the temperature sensitive strip.

The student can take pour hot water into a beaker and ~~clamp~~ clamp
to metal materials together and place ~~at~~ the end of ~~the~~ one of the
material in the hot water. Once the student closes that they can then
start the stopwatch & measure the time it takes for the
second metal material to get hot.

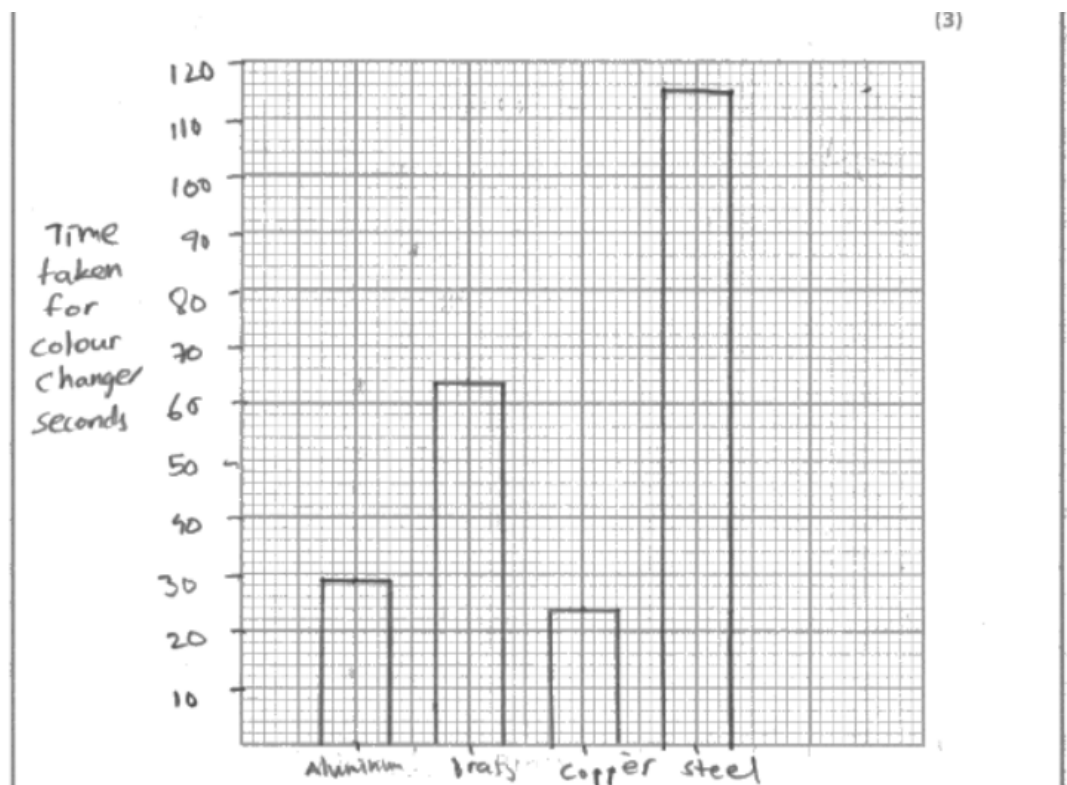
Q4 (b)(i)

Most students successfully drew the graph. Common errors were forgetting 'seconds' on the time axis and forgetting the other axis label of 'metal'. Some students misread their scale and misplotting one of the bars. Copper was commonly misplotted. Students who chose awkward scales were credited if it produced plots over 50% of the grid, but these students often lost the plotting mark as the challenge of reading an awkward scale is so much higher.

This student labelled their axes correctly, and was able to plot all the bars correctly on their sensible scale.



Whereas this student forgot the x axis label and despite their sensible scale mis plotted the copper bar.



Q4 (b)(ii)

Most students were successful on this questions, although some did not use evidence from the graph and instead wasted time explaining the mechanism of conduction, and some stated copper without giving a reason. Students should be taught to understand the expectations for different command words.

This student answered well including an explanation.

(2)

Copper is the most effective at transferring energy, since it takes the least amount of time to change colour.

Whereas this student, after correctly stating copper, simply repeated the stem of the question. This will not gain further credit.

(2)

Steel copper is most effective at transferring energy by conduction

Q5 (a)(i)

Most students realised that the ball was accelerating, but not all realised or were able to explain that this was constant. There were many students who contradicted themselves by mentioning acceleration but then explaining it as constant velocity.

This student has explained clearly without contradiction.

The ball falls at an increasing velocity and constant acceleration.

Q5 (a)(ii)

Not many students linked the distance travelled with the area under the graph line. Most chose to use distance = speed x time, without realising that the velocity changed throughout the relevant time.

This student answered well. It is useful to state that the area represents the distance as this is often worth a mark in itself.

$$\begin{aligned} \text{the height of the ball} &= \text{the area of } v-t \text{ graph} \\ &= 5 \frac{\text{m}}{\text{s}} \times 0.5 \text{ s} \times \frac{1}{2} \\ &= 1.25 \text{ m} \end{aligned}$$

height = 1.25 m

This was the most common response seen, using an invalid formula for this situation.

$$\begin{aligned} \text{speed} &= \frac{\text{distance}}{\text{time}} \\ \text{distance} &= \text{speed} \times \text{time} \\ \text{distance} &= 5.0 \times 0.5 \\ &= 2.5 \text{ m} \end{aligned}$$

height = 2.5 m

Q5 (b)

This question was extremely challenging for students and only higher level students were able to access most of the mark points. The unfamiliar context of something entering water at speed confused most students with many answering in terms of the ball speeding up to terminal velocity. This approach did allow for some marks to be credited. Many students were unsure what

to call the resistive force here. It was apparent that students were used to using the term air resistance for this type of question and were unable to make the jump to water resistance. Those students who called the force 'drag' were more successful. Some students did not realise that the question was about terminal velocity and described energy changes or the increase of pressure with depth. These were not creditworthy responses.

This student realised that the drag force was greater than the weight (the least awarded mark) and explained the motion as it fell clearly.

Initially when the ball hits the water, drag is increased drastically and the speed of the ball is high. because water is more dense than air. This means the ball decelerates because the resultant force is upward (drag force is greater than weight). As a result, the ball decreases speed. It is a decreasing curve. As a result, the velocity speed of the ball decreases, due to drag. This reduction in speed results in drag also decreasing (resultant force decreasing). At around 1.5 s, terminal velocity is reached, the forces are balanced, leading to the line being straight. Resultant force is zero.

Whereas this student understood that this question was about terminal velocity but simply described the motion that it normally attributed to terminal velocity but without applying it properly to this context. Learning mark schemes can only get a student so far. To reach higher level marks students need to be able to relate the knowledge they know to the context of the question.

When the ball enters the water, the main force is its weight with a small water resistance. This has an unbalanced force downwards. After some time, water resistance gradually increases until it equals the weight. Once equalled, the net force is 0, so no acceleration, so a constant velocity.

Q5 (c)

Most students successfully calculated the answer, as did the student below.

(3)

$$1000 \times 10 \times 2.85 = 28500$$
$$= 28.5 \text{ KPa}$$
$$= 29 \text{ KPa}$$
$$= 29000 \text{ Pa}$$

pressure difference = 29000 Pa

Whereas many did not attempt to round to 2 significant figures.

$$P = \rho gh$$
$$P = 1000 \times 10 \times 2.85$$
$$= \underline{28500}$$

pressure difference = 28500 Pa

Q6 (a)(i)

Most students were able to access this question. Some referred only to heater 1 or heater 2 in their answer and therefore were not successful. Some also used the work 'break' which was in the stem of the question. Credit is rarely given for using phrases from the stem.

This student stated clearly what would happen.

Circuit wont work since current wont flow

Whereas this student has only mentioned heater 1 and therefore cannot be credited.

Power will not reach ~~the~~ heater 1
So it will stop working

Q6 (a)(ii)

Students found this concept confusing. The mention of the wire having low resistance made some students concentrate entirely on the resistance of the heaters which did not earn them any

credit. Many realised that the current would be shared between heater 1 and the wire, but did not go further and realise that the wire would take most of the current due to its low resistance. The majority of students thought that heater 2 would be unaffected by this change.

This student understood the result of the addition of the wire and was able to express it clearly.

Heater 1 is in a short circuit because the wire has a low resistance. So heater 1 can not work.
Heater 2 will work in a greater power, because the current is bigger.

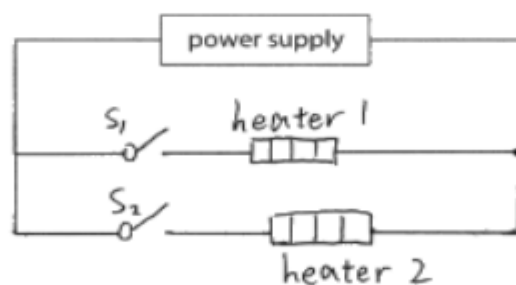
Whereas this student did not realise that heater 1 would hardly get any current and, like many others, did not think heater 2 would change.

When the ~~parallel~~^{parallel} circuit is connected the current flowing from the power supply will split at the junctions. This causes the current flowing through heater 1 to decrease; However, the current flowing through heater 2 will stay the same because the current comes back at the second junction. This causes the heating effect of heater 1 to be less affecting than heater 2 because of the decrease in current flowing through heater 1. (3)

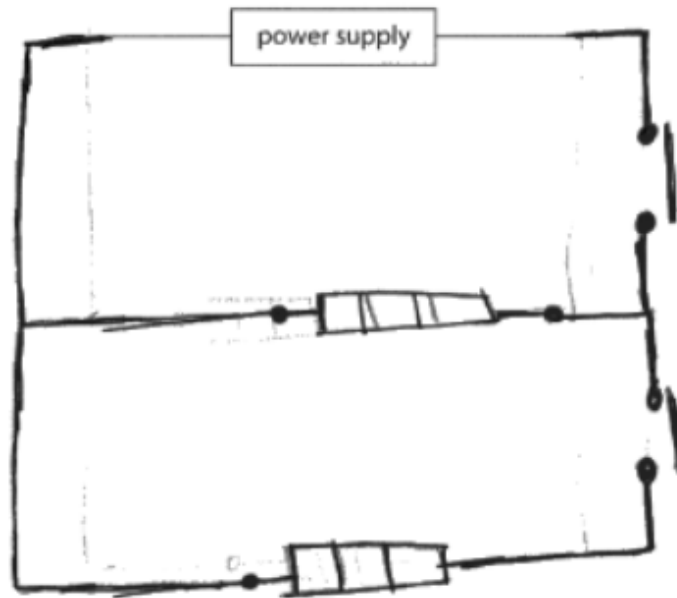
Q6 (b)

Many were able to draw a circuit that fulfilled the criteria described in the question. Many others however, were distracted by the wire in the previous part of the question, and simply drew the series circuit that they had already been given with the addition of a wire with a switch around each heater. This would not work.

This student drew the correct circuit clearly using the correct switch symbol.



Whereas this student picked a parallel circuit which was correct, but failed to put their switches in the correct places. This symbol is not standard for this specification, but is a recognised symbol and if the switches had been correctly placed, credit would have been given.



Paper Summary

Based on their performance on this paper, candidates should:

- Take note of the command work for each question to make sure that answers fully encompass the necessary Physics.
- Ensure that for each specification point the appropriate language is learnt to ensure explanations are clear and relevant.
- Show clear working for calculations including substitution, rearrangement and evaluation of an answer.
- Understand the advantage, particularly in descriptions of experimental methods, of drawing clear diagrams as part of their answer.
- Take note of how many marks the question is worth and use this as a guide as to how detailed and extensive an answer may need to be.

