Pearson

Examiners' Report
October 2025

Pearson Edexcel International Advanced Subsidiary level In Physics
WPH13/01

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Introduction

The Pearson Edexcel International AS-level paper WPH13, Practical Skills in Physics I is worth 50 marks and consists of four questions, which enable learners of all abilities to apply their knowledge and skills to a variety of styles of question.

Each question assesses the learner's knowledge and understanding of the skills developed while completing practical investigations.

A learner understanding of the 8 core practical tasks will be assessed by the WPH11 and WPH12 papers. As such, the practical contexts met in the WPH13 paper may be less familiar but are like practical investigations learners may complete during their AS Physics studies. Learners who do little practical work will find this paper more difficult as many questions rely on applying their learning to unfamiliar, as well as other standard experiments.

The scenarios outlined will be related to content taught during the study of WPH11 and WPH12. However, the focus of WPH13 is the assessment of the practical skills the learners have developed, during the completion of the required core practical tasks and other experiments, as applied to the physics context described in the question.

There will be questions that are familiar to learners who have revised using the earlier series of WPH03 and WPH13 papers, but some performances would suggest some learners were unfamiliar with the practical skills outlined in the specification for Unit 3.

At all ability levels, there were some questions which learners answered with generic and pre-learned responses, rather than being specific to the scenario as described in the question. Additionally, understanding the meaning of the standard command words (such as deduce and determine) proved a challenge to learners at the lower end of the ability range.

Question 1(a)

Most learners suggested how the safety issue (sharp/broken glass) could be dealt with, to prevent injury.
Eg wear gloves to protect hands from broken glass

However, many did not link the issue to the act of measuring diameter using the micrometer screw gauge.
Eg overtightening might break the glass tube, so wear gloves to protect your hands

Question 1(b)

Many learners gave the standard response "measure in different orientations and positions and calculate the mean". However, this was the technique described in the question, so was not worthy of credit.

When asked to "Explain" an error, rather than give/state, learners should name the error and identify the type, in this case linking zero error to systematic error.

Learners should also be made aware that many measuring instruments do not cause parallex error, as the scale and marker are close/touch.
Eg the scale on rotating part of the micrometer is very close to/touching the mark on the cylinder.

Question 1(c)

The most commonly awarded mark was 4, however the mean mark was less than 3, so many learners made at least one error.

Question 1(c)(i)

It was common for learners to assume there must be an anomaly (often the second 3.19 was disregarded). Unless there is a significant difference, then any variation should be considered to be the effect of random error, and all values should be included in the mean.

Question 1(c)(ii)

Appendix 10 of the physics specification defines the uncertainty of a set of repeated measurement to be "half the range". It was common to see use of "half the resolution" – which is the uncertainty of a single measurement.

Question 2(a)(i)

Question 2 is based on a scenario that is similar to Core Practical 8, which should be completed during learners study of WPH12 content.

This question tested basic understanding of the cause of the interference pattern seen in that practical (and in this scenario)

Question 2(a)(ii)

This question proved a challenge. When completing Core Practical 8, learners will likely have measured between two bright spots on a wall/screen, from a diffracted laser beam.

So, the first marking point covers similar issues as would be seen in that practical. Many learners gave answers covering this marking point.

Here there is no flat surface to measure along – which is the idea covered by the various versions of the second marking point. This concept was seen very rarely.

Question 2(b)(i)

Carrying out a calculation, using given data and a previously unseen equation is a standard question type on WPH13 papers.

In this question, the learners then needed to use an equation from the equation sheet to complete the calcluation of frequency.

Here, the challenge was the conversion of the units. It was common to see "powers of 10" errors in the final answer.

There was a significant number of learners who used the speed of sound, rather than the speed of light, when calculating the frequency of the microwaves.

Question 2(b)(ii)

This question proved to be a challenge, as many learners linked a larger D to a smaller λ and then incorrectly linking that to a smaller x value.

That would have increased percentage uncertainty, contradicting the question.

Question 3(a)

Most learners are now well prepared to calculate percentage uncertainty and scored both marks, with the average mark being 1.5.

Appendix 10 of the physics specification defines the uncertainty of a single measurement to be "half the resolution"

For this question, learners were required to recognise the smallest measuring interval in the voltmeter display shown was 0.1 mV.

The most common error seen was to use the full resolution in the percentage uncertaintly calculation, however as shown by the mode and mean marks, this was rarely seen.

Question 3(b)(i)

Most learners understand that reseting a measuring device to zero before starting an experiment eliminates zero error or systematic error.

However, as this was described in the question, it was a dependent mark. Learners needed to explain what would cause this error, the metre rule bending under its own weight (we did accept the addition of the strain gauge's weight causing the rule to bend).

Question 3(b)(ii)

Carrying out a calculation, using given data and a previously unseen equation is a standard question type on WPH13 papers.

In this question, the command words for the question were "show that". For these questions, we need to see all stages of the calculation and a correct final answer showing at least 1 more significant figure.

Around half the learners scored 3 marks.

As there were a variety of "powers of 10" in the data given, it was common to see answers that were "fudged" in the final stage.

Eg working out that would not give the correct powers of 10 for the final answer, but the powers of 10 were "adjusted" at the final stage (it was common to see a random "÷ 1000" in the final line)

In this case, it was judged the answer had not been "shown" in the working, so the final mark was not awarded. This is consistent with the mark awarded if a learners starts with the given value and carries out the calculation as a "reverse show that".

Question 3(b)(iii)

This type of question is commonly seen on WPH13 papers and learners are now well prepared to answer it.

It was common to award 2 or 3 marks, from the first three marking points.

As learners were not expected understand the link between strain, resistance and potential different, identifying an single value as an anomaly was not enough, they needed to justify this statement for the final marking point.

Question 3(c)

This type of "applications of the physics" question is always a challenge, as the context of the scenario may be less familiar for some learners. In this case aeroplane wings, which are designed to bend/flex during flight.

It was common for answers to ignore the wings and many learners gave very basic answers about the aeroplane itself, but we focussed on three main concepts.

- To allow engineers to find the safe limits of stress/force/strain
  Eg "to see how strong the wings are"
- To check wings are not bending excessively
- To make improvements to the design/materials used to build the wings

The first two could be suggested as applying during the design stage or when the aeroplane was in use.

Question 4(a)(i)

Describing a method / applying measuring techniques is a standard question on WPH13. However, the scenario changes each, so learners need to apply their knowledge of the various measuring techniques they have developed as they complete practical work (including the Core Practicals).

For this paper, it was common to see learners adding light gates (a technique that has appeared on a recent paper). However, that technique is discussed in the next question.

Here learners were expect to focus on three main ideas

- The accurate starting of the stop watch
- The accurate judgement of the end position
- The reduction of the effect of random error (caused by the above)

A recent WPH13 paper included the use of slow motion video, which we accepted if it was made clear how the time was measured (eg including the stopwatch in the recording, using the time code, etc)

Question 4(a)(ii)

learners who have experience of using light gates (for example when completing Core Practical 1) were at an advantage, as this experiment scenario was similar (measuring the time for an object to move a measured distance, while also accelerating).

It was common for learners to be able to give advantages, so scoring 1 or 2 marks.

The most common disadvantage seen focussed on the time taken to set up being longer. It was very rare for learners to realise the ball would need to be moving to cut the beam of the first light gate.

Question 4(b)(i)

learners are generally well-practised with this type of question. Often these questions ask learners to link a quantity in the formula to the gradient.

In the scenario presented to learners, the equation was arranged to be in y = mx + c format, so the marks were awarded for correctly linking the gradient to $\frac{g}{3s^2}$

The majority scored 2 marks, but a sizeable number scored 0, usually due to needlessly re-arranging the given equation.

Question 4(b)(ii)

The calculation of $1/t^2$ did not generally cause issues. However, learners should be aware that calculated values should be rounded to the same number of significant figures as the data used in the calculation. In addition, table data is usually recorded to the same number of decimal places.

There were some issues seen with values being truncated, rather than rounded

Question 4(b)(iii)

Graphs remain a challenge to learners, but this is one area where a little more time spent on practice would significantly benefit learners.

There are 5 marks available for plotting a graph on WPH13. This makes up 10% of the marks available, so a well-drawn graph could increase a learners achievement by a grade.

The standard expectations of a well-drawn graph are:

- Labelled axes – the quantity **and** unit separated by a **/**
  eg t^{-2} / s^{-2} and *h* / m
- Scales chosen that maximise the size of the used portion of the graph, while still being an easily interpreted scale. The graph paper provided is divided into 10 small squares every 2 cm, so we expect a scale with increments **on the 2 cm** lines that go up in **1, 2 or 5** if we ignore powers of 10 – this makes the smaller squares a sensible increment.
  eg on the *y*-axis increments of 0.2 s^{-2} every 2 cm and on the *x*-axis increments of 0.01 m every 2 cm.
- Data points that are plotted accurately to **within 1 mm** (half a square) in both directions. This means large or unclear plots cannot be checked for accuracy, eg learners should be advised that **large bullet-point style plots** will not be credited as their accurage cannot be judged. Small neat plots (eg ×) are expected.
- A well-balanced single line of best fit that follows closely the trend of the plots.

Question 4(b)(iv)

Most learners correctly linked the gradient to the wavelength and wave speed. Others used data from the graph or table, with the equation given. In either case, most were able to score at least 2 marks.

The most common errors were;

- Using data from the table that did not lie on the line of best fit.
- Using too small a range of data for the gradient calculation.

In part (ii), most learners now understand that a "deduce" question requires them to calculate evidence, compare and form a conclusion.

Overall performance on this style of question is improving over time, with a third of learners scoring maximum marks (5 out of 5) for 4(c), with the majority scoring at least 4 out of 5.

Summary

Learners will be more successful if they routinely carry out and plan practical activities for themselves using a wide variety of techniques.

These can be simple experiments that do not require expensive, specialist equipment.

They should make measurements on simple objects, using vernier calipers and micrometer screw gauges, and complete all the Core Practical experiments given in the specification.

In addition, the following advice should help to improve the performance on this paper.

- Learn what is expected from different command words, in particular the difference between describe and explain.
- Be able to describe how to measure lengths, angles, force, time, potential difference and current using appropriate apparatus and techniques.
- Refer to **random** or **systematic** errors when explaining techniques.
- Practise writing experimental methods including identifying safety issues specific to that experiment.
- Show working in all calculations and give answers using appropriate significant figures and a unit.
- Choose graph scales that are sensible, i.e. the value of the smallest square is 1, 2 or 5 and their powers of ten only, so that at least **half** the page is used. It is **not** necessary to use the entire grid if this results in an awkward scale, e.g. 0.25, 3, 4 or 7.
- Plot data using neat crosses (× or +), and check any points that lie far from the best-fit line.
- Use a one piece, 30 cm ruler to draw straight best-fit lines. Ensure there are data points on both sides of the line, and the line cannot be rotated. Using a pencil will allow for the line to be changed if needed.
- Draw a large triangle that covers at least **half** of the plotted data using sensible points. Drawing the triangle on the graph often avoids mistakes in data extraction.
- Learn the definitions of the terms used in practical work and standard techniques for analysing uncertainties at AS level. These are given in Unit 3 and Appendix 10 of the IAL specification.