Examiners' Report

October 2025

Pearson Edexcel International Advanced Subsidiary level In Physics
WPH11/01

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

October 2025
Question Paper Log Number P78831A
Publication Code WPH11_01_2510_ER
All the material in this publication is copyright
© Pearson Education Ltd

Introduction

The WPH11 unit focuses on understanding and applying the physics of mechanics and material properties. This exam evaluated that knowledge in both familiar and unfamiliar scenarios.

The paper assessed a range of abilities, including recalling key facts, applying concepts to new situations, carrying out calculations, and providing clear explanations. It also tested candidates' understanding of skills developed through core practical activities.

Many candidates showed strong mathematical ability, and most remembered to include correct units in their responses. However, a few questions revealed that many candidates find it difficult to apply physical reasoning before carrying out the mathematical steps. For instance, a large number struggled with using positive and negative signs correctly when displacement was downward, acceleration downward, and initial velocity upward in question 19b. Similarly, in question 20biii, many did not correctly determine the distance of the centre of gravity from the pivot before applying the principle of moments.

Question 13, which involved a practical experiment measuring the acceleration of a freely falling object, was challenging for many candidates. This underlines the importance of teaching broader practical skills, such as identifying potential sources of error during experimental work.

Overall, most candidates conveyed their physics understanding effectively, even if their written English was not always perfect. Apart from the * question, where answer structure was assessed alongside physics knowledge, limitations in written English were not penalised provided that responses were clear and unambiguous.

Comments on Individual Items

Section A: Multiple Choice

	Subject	Correct response	Explanation
1	Scalars and vectors	**C**	Force is a vector quantity, Energy (J), mass (kg) and power (W) are all scalar quantities
2	Efficiency	**B**	With constant power input and constant efficiency, useful power output is also constant. Energy = power × time, so energy transferred increases with time.
3	Newton's laws	**D**	In a Newton's third law pair, forces are equal in magnitude, but the forces act on two different objects, in opposite directions, and do not necessarily cause acceleration.
4	Stokes' law	**C**	Viscosity increases with decreasing temperature, and the terminal velocity of an object falling through the fluid would therefore decrease.
5	Terminal velocity	**D**	The resultant of the forces is equal to zero, as the balloon is moving at a terminal velocity. In this scenario, weight and drag act downwards, and upthrust acts upwards. So, using W as the magnitude of the weight, U as the magnitude of the upthrust, and D as the magnitude of the viscous drag force: $W + D = U$ So, the magnitude of U is greater than the magnitude of W
6	Vector notation and forces	**D**	In vector notation, the sum of all forces acting on a body in equilibrium is 0 N.
7	Acceleration	**B**	Both of the masses will accelerate, so: • the total mass m being accelerated is (0.5 kg + 0.4 kg). • $W = mg$ so resultant force F on the masses is (0.5 kg – 0.4 kg) × 9.81 N kg^{-1} . • By newton's second law, $F=ma$, so $a = \frac{F}{m} = \frac{(0.5\text{ kg} - 0.4\text{ kg}) \times 9.81\text{ N kg}^{-1}}{0.5\text{ kg} + 0.4\text{ kg}}$

8	Young modulus	**C**	$Young\ modulus = \frac{stress}{strain} = \frac{\left(\frac{F}{A}\right)}{\left(\frac{\Delta x}{L}\right)} = \frac{F \times L}{\Delta x \times A}$ $\therefore\ \Delta x = \frac{F \times L}{\text{Young modulus} \times \text{A}}$ The tensile force F applied to each wire is the same and the original length L of each wire is the same, so the numerator in the equation for Δx is the same for both wires. Considering the denominator in the equation, For wire P, the denominator is $E \times A$ And for wire Q, the denominator is $2E \times \frac{A}{2} = E \times A$ So the numerator and denominators are the same in the expression for the extension of each wire, and therefore Δx is the same for both wires.
9	Motion-time graphs	**D**	The acceleration of the object is initially constant and then drops to zero. So the rate of change of velocity is initially linear and then becomes zero. So the rate of change of displacement increases and then becomes constant. The rate of change of displacement is the gradient of a displacement time graph, so the gradient should increase and then become constant, as shown in graph D
10	Momentum	**B**	Applying the equation for momentum to the initial motion of each object: $v_{\text{R}} = \frac{p}{m}$ and $v_{\text{S}} = \frac{p}{2m}$, so $v_{\text{S}} = \frac{v_R}{2}$ Both objects have the same acceleration for the same time, so the change in velocity for both objects is the same. Because the momentum of R has doubled (and the mass has remained constant) the velocity of R has doubled. This means that the velocity of R has increased by v_{R} , and therefore the velocity of S has also increased by v_{R} So S has changed from an initial velocity of $\frac{v_R}{2}$ to a new velocity of $\frac{3v_R}{2}$, increasing its velocity by a factor of 3 If velocity of an object of constant mass increases by a factor of 3, the momentum of the object also increases by a factor of 3.

Question 11

Over 80% of candidates gained full credit on this question. The most common errors for candidates who did not get both marks was in either not calculating or mis-calculating the resultant force.

Question 12

Around two-thirds of candidates gained some credit on this question, but only about one in five scored full marks.

Some candidates did not attempt to draw a vector diagram, instead calculating the resultant force. These answers could score marking points 3 and 4, but with no diagram it was not possible to score the first two marking points.

Common errors in drawing the vector diagram included drawing the resultant force arrow in the wrong direction, or drawing a free-body diagram similar to the diagram provided in the question instead of drawing a vector diagram with arrows drawn 'tip-to-tail'.

Question 13(a)

Only about half the candidates gained any credit on this question, with a very low proportion gaining both marks.

For those scoring one mark, this was more likely to be for mentioning human reaction time. It was relatively common for candidates to refer to 'human error', but this was not enough to score a mark.

Not many identified that random errors would be large, and some suggested that systematic errors were involved, which did not gain credit.

Question 13(b)(i)

Only about a one in five candidates answered this question correctly.

It was relatively common for candidates to identify one of the variables that had already been given in the question. Some candidates gave ambiguous answers, such as 'height'. As this could have referred to either the length of the cylinder or the height from which the cylinder was dropped this was insufficient to gain the mark.

Question 13(b)(ii)

About three quarters gained some credit on this question, with over 50% giving a fully correct answer.

A common route to the final answer was to determine the time taken first and then substitute this into $a = \frac{v-u}{t}$. This is a valid approach, and if done correctly could gain full credit.

Some candidates used the approach in the mark scheme but forgot to square their values for *u* and *v*, so did not score any marks.

Question 14(a)

The principle of conservation of momentum was correctly stated in full by over half of all candidates. A common response was 'momentum before = momentum after'. This statement was not sufficient to gain any credit, as it is not clear what is being referred to: us it the entire system, or is it just one of the rocks? Any statement that made it clear that the total momentum before an interaction is equal to the total momentum afterwards, however, did gain credit.

A minority of candidates referred to moments instead of momentum.

Question 14(b)

This calculation was well answered, with almost 70% gaining all four marks.

Of those who did not score full marks, some made mathematical slips when rearranging equations, while some made an assumption that the rocks stuck together after the collision, which was incorrect.

Question 15(a)

Around three-quarters of candidates gained some credit on this question, with about 40% gaining full marks.

The unit conversion from grams to kilograms was missed by some candidates, so power of ten errors were relatively common. A sizeable minority did not calculate the weight of the 200g mass and were therefore unable to score any marks. Some candidates did not read the question carefully and treated the length of the spring as the extension of the spring.

Question 15(b)

Many candidates found this question to be challenging, with just over 10% managing to score full marks, but many scoring no marks.

Many answers lacked important details, for example noting that the gradient was constant, but not linking the gradient to the spring constant. Some candidates identified the two relevant equations but made errors when combining these to give an expression for elastic strain energy.

Question 16(a)(i)

About a quarter of candidates correctly identified that the young modulus relates to the stiffness of a material.

Many candidates named an incorrect property of a materials such as breaking stress, hardness or ductility, and it was relatively common for candidates to refer to stress, strain or both.

Question 16(a)(ii)

About 65% of candidates were able to calculate the change in length of the sample, but many of these then added the length to the extension, failing to identify that the sample was under a compressive stress rather than a tensile stress.

Question 16(b)

About 80% gained some credit, with about three in ten candidates scoring full marks for correct calculations along with a comparison with data in the table and a corresponding conclusion.

The unit conversion from cm^2 to m^2 caused a problem for many candidates, leading to a power of ten error. It was also relatively common for candidates to complete appropriate calculations, and give a conclusion, but unless they compared their calculated value with a value in the table, they were unable to score the final mark.

Question 17(a)

The majority of candidates were able to get started on this question, with about 60% scoring at least half of the marks.

Common errors included using an incorrect equation to determine the volume of a sphere and only taking into account the upthrust from one sphere, neglecting the other sphere and/or the upthrust on the box.

Some candidates did not put a unit on their calculated final value, so did not score the 5^{th} marking point.

Some candidates completed the calculations correctly, compared their calculated value with an appropriate value from the question, but drew the wrong conclusion, so did not gain the final mark.

Question 17(b)(i)

This calculation of terminal velocity was very well answered with over 60% arriving at the correct answer.

Some candidates used the weight or the upthrust, rather than determining the resultant force acting, when substituting into the Stokes' law equation, which enabled them to score the second marking point only.

Question 17(b)(ii)

About a third of candidates were able to give two valid reasons why Stokes' law may not have predicted an accurate value, with a similar proportion giving one valid reason.

Many of the remaining candidates simply stated the conditions needed for Stokes' law to apply, which did not answer the question.

Question 18(a)

Many candidates drew a graph with a sudden change in gradient at time T_A. This was not penalised, as the physics being tested was about whether candidates realised the relationships between constant acceleration and distance moved, and constant velocity and distance moved. Almost all candidates started their graph from the origin, although both marks could be awarded from a graph starting at any point on the *y*-axis.

About 40% of candidates gained both marks.

Question 18(b)

The most common indicative content marks scored on this question were for describing energy changes during each of the three sections. The idea of kinetic energy increasing as the bike accelerated in section A, and of kinetic energy decreasing and gravitational potential energy increasing after the bike had launched into the air in section C did not cause too many problems. However, when describing the energy changes in section B, it was reasonably common for candidates to state that kinetic energy was decreasing, even if they had also stated in the same sentence that the bike was moving at a constant speed.

Linking the change in energy to the power output of the cyclist proved to be very challenging for many candidates, and the indicative content points which addressed this were not described often.

Only about 55% of candidates were able to score any marks on this question.

Question 19(a)

About half of the candidates gained at least one mark on this question, with the most common mark scored being for identifying that acceleration must be constant for the equations of motion to apply. Less than one in ten candidates was able to state this and then give the reason why this is the case for a shot.

Question 19(b)

Almost all candidates gained at least one mark on this question.

19(b)(i) was generally very well answered. For those who did not gain both marks, many did not give their answer to enough significant figures or truncated their answer to 8.81 m s^{-1} instead of rounding it up to 8.82 m s^{-1}.

19(b)(ii) this question highlighted issues for many candidates in using a consistent sign convention when using the equations of motion. The ball ended up below where it started, accelerated downwards, but had an initial velocity upwards, and getting these directions mixed up led to incorrect answers. Some candidates did not identify that the shot did not end up the same height it was launched from and incorrectly treated the trajectory as symmetrical.

There were also some candidates who calculated the initial angle of velocity by using the horizontal and vertical displacements from the start, which is incorrect physics.

Question 20(a)

Just under 60% of candidates were able to give a correct definition for the principle of moments. The most common error was for candidates to omit the idea of **total** clockwise and anticlockwise moments being equal, and to give an incomplete answer stating that the clockwise and anticlockwise moments are equal.

Question 20(b)(i)

Many candidates gave an answer that lacked attention to detail, with statements such as the centre of gravity of the bridge causes a moment being insufficient. If candidates did not mention the weight causing a moment, they were unable to score any marks. Almost all of those who did mention the weight causing a moment went on to gain full credit on this question, but this was only about 10 % of candidates.

Question 20(b)(ii)

Almost all candidates found it difficult to describe all three steps from a decreased moment, so a smaller force, and therefore less work done. About a quarter of all candidates gained at least two marks.

Question 20(b)(iii)

Most candidates gained some credit on this question, although many were not able to correctly determine the distance from the pivot to the centre of gravity of the section of bridge, and only about one in eight candidates gained all four marks.

Some became confused about clockwise and anticlockwise moments when applying the principle of moments to the situation.

Concluding Remarks

Candidates showed a broad range of knowledge and skills on this paper. It was encouraging to see some excellent answers and particularly pleasing to see a large number of candidates able to correctly work through some of the multi-step calculations.

While most demonstrated a solid understanding of key physics concepts, paying closer attention to detail would further improve performance. Taking the time to read the questions carefully can help students to avoid errors such as having a compressive force leading to an increase in length of a running blade.

The recommendations for improving candidate performance remain consistent with those from previous series, including:

- When writing a final answer, check to see if the final digit should be rounded up or down.
- Always include correct units in calculated results and pay close attention to unit prefixes (kilo, mega, milli, etc.) and powers of ten.
- Encourage students to read each question carefully and to check their work to minimise errors or misinterpretations. When a question includes an additional hint, such as the instruction in question 18b to think about energy changes, it is advisable to make use of it.
- Support candidates in visualising the situation described and use diagrams to help check whether they are correct, such as when determining the distance between the centre of gravity and the pivot in question 20biii.
- Provide opportunities to practise applying core principles in a variety of contexts so that students gain confidence and improve their problem-solving abilities.
- Stress the importance of accurately recalling and understanding key physics terminology and quantities.