Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

November 2020

Pearson Edexcel GCSE

In Physics (1PH0) Paper 2H

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

November 2020
Publications Code xxxxxxxx*

This was the third examination using the GCSE (9-1) specification and was the second of the two examinations used to assess separate physics. This examination would normally have taken place in the Summer Series 2020. However, as events unfolded the examination was sat by a small number of candidates in November 2020. The examination assessed understanding and application of physical principles by the use of questions which tested both practical and theoretical knowledge. Questions were in a variety of formats, including multiple choice and extended response and were taken from the following topics.

- Topic 1 Key concepts of physics
- Topic 8 Energy-forces doing work
- Topic 9 Forces and their effects
- Topic 10 Electricity and circuits
- Topic 11 Static electricity
- Topic 12 Magnetism and the motor effect
- Topic 13 Electromagnetic induction
- Topic 14 Particle models
- Topic 15 Forces and Matter

Candidates were able to recall and use equations and complete calculations and were generally able to explain physical principles but were much less familiar with the core practicals and how they should be carried out.

Question 1 Topic 9 Forces and their effects

1a The majority of candidates realised for the see-saw to be in equilibrium then the clockwise moment about the pivot must be equal to the anticlockwise moment.

1b Most answers were awarded two marks and were clearly expressed, starting with P being further from the hinge therefore a smaller force was needed to close the door.

1c Although the question gave that moments were to be taken about A many candidates attempted to take moments about B or about the line of action of the 450N force. Some candidates that did take moments about A and equate the clockwise and anticlockwise moments were able gain full marks. Most candidates were able to calculate one moment but lacked experience of equating moments (principle of moments) to find a force.

Question 2 Topic 14 Particle model

2ai The majority of candidates were able to gain three marks and were familiar with the use of a Eureka (displacement) can and a measuring cylinder. Although It was apparent from some responses that this core practical had not been carried out although any attempt to measure volume was credited.

2aii Most candidates were able to recall and use the equation and evaluate the density correctly.

2bi Most candidates gave a correct rearrangement of the equation but many did not recognise t at the piece of copper had cooled from 100 °C to 22°C making $\Delta 2$ = 78°C . The majority of candidates gained one mark either for the correct rearrangement or the recognition of the temperature change of 78°C.

2bii The standard answer of repeat and average was not applicable to this experiment as there is no point in repeating an experiment which gives an inaccurate value. The most frequently acceptable answer was to reduce heat loss in some way although there were the occasional suggestions of, using a stirrer, using a larger piece of copper and transferring the copper faster.

Question 3 Topic 8 Energy- forces doing work

3a The upward force increasing as the speed in turns per minute increases was described by most candidates, but many did not gain the second mark although stating the relationship was non-linear would have been sufficient. Describing the increase as 'gradual' did not gain the second mark, 'gradually changing' or ' at a changing rate' is a satisfactory way of describing the change in the slope of the graph.

3bi,bii and biii The first part of the question was generally answered correctly. However, bii only required candidates to know that the change in gravitational potential energy was the useful work done and that no calculation was necessary. The answer to bii should have been carried through to biii . In many cases the correct equation for power to be calculated was used and candidates were awarded full marks if they correctly calculated the power from their value of work done.

Question 4 Topic 11 Static electricity

4ai Most candidates knew that by rubbing a balloon with some insulated material this would give the balloon an overall electrostatic charge

4aii the majority of candidates realised that it was only the negative charge (electrons) that can be transferred and therefore negative charge had to be added to the balloon.

4aiii Most responses gained two marks for bringing the balloons together and observing repulsion to show like charges. Few candidates were able to suggest how this could be done practically when the forces are small and therefore the balloons need to be suspended using the cotton threads to show the effect.

4bi Candidates need to be aware of charging by induction to know that the surface of the metal disc closest to the negatively charged plastic block would acquire an induced positive charge.

4bii The majority of responses identified that the negative charges (electrons) moved. However the second mark was not accessed as frequently because candidates were uncertain as to direction of flow of the electrons.

4biii The majority of diagrams showed at least three straight lines drawn between the metal disc and the plastic block to show the shape of the magnetic field, but only about half the responses showed the direction of the field lines as positive to negative.

Question 5 Topic 12 Magnetism and the motor effect

5ai Almost all responses identified the strongest point in the magnetic field as the point at which the field lines are closest together.

5b To show the magnetic field due to a straight wire carrying a current at least two circles centring on the wire are required. Many candidates showed the field but were unable to work out the direction using the right hand grip rule.

5ci Almost all candidates were able to calculate the force given the equation.

5cii Most candidates showed that the thumb, first finger and second finger were mutually perpendicular by drawing a diagram this gave them the first mark. All three marks could be obtained with a correctly labelled diagram. Many candidates knew the second finger represented the direction of the current, however a significant number of candidates assigned the first finger as the force rather than the magnetic field.

5ciii Very few candidates actually worked out the direction of the force acting on the roller, the application of the rule proving harder than knowing it.

Question 6 Topic 15 Forces and matter

6ai Most candidates correctly estimated the length of the spring.

6aii Candidates may be less familiar with compression springs than extension springs but there were many responses that just repeated the stem without describing the measurements of original length and final length that need to be made to subtract and find the reduction in length.

6aiii Candidates needed to use information from the diagrams to give ways of improving experimental procedure. Some noticed the need for finer divisions on the ruler or suggested adding the same weight each time. Occasionally no parallax or the use of a pointer was mentioned.

6aiv Surprisingly few responses indicated that the coils of the spring would be touching eventually and this would limit the reduction in length.

6b When the correct equation was recalled most candidates could rearrange to find the spring constant although full marks also depended on the conversion of millimetres to metres.

6c Generally candidates were able to select the correct equation and rearrange to find $x^{2.}$ Although writing the equation with $\frac{1}{2}$ rather than 0.5 caused some candidates problems with the rearrangement . Two marks could be obtained by completing the calculation as far as finding x^2 but finding the square root of 1.6×10^3 presented difficulties for some candidates.

Question 7 Topic 13 Electromagnetic induction

7ai Candidates generally were not able to relate the deflection of the milli-ammeter to the motion of the magnet this could be due lack of practical experience of generating a current by induction.

7aii Most responses gained two marks usually for 'stronger magnet' or' more coils'.

7b Very few candidates gained the full four marks for their answers. Some confused the action of the loud speaker with that of the microphone but were still able to gain the odd mark although out of context. Some responses referred to a changing magnetic field being produced or magnetic fields interacting but rarely did this lead to the idea of a force on the coil which caused the coil to vibrate.

7ci Almost all candidates recognised that the transformer would increase the voltage output.

7cii Some candidates selected the incorrect equation citing voltage and current rather than voltage and number of turns. The unknown value being the denominator also presented some candidates with problems in. rearrangement. However a majority of responses did give a correct evaluation.

Question 8 Topic 10 Electricity and circuits.

8ai The responses showed that there were still a significant number of candidates unable to put a voltmeter in parallel with a resistor in a circuit.

8aii Most candidates were able the give that an ammeter and a voltmeter would be needed to find the resistance of resistors in a circuit.

8aiii Almost all responses identified the single resistor as having a value of 1Ω

8iv Most candidates were able to gain one mark for stating that the resistance decreases as the number of resistors increases. The majority were then able to suggest non-linearity, decreases at a decreasing rate or inverse proportionality. Many candidates then tried to explain the theory of adding resistors in parallel which gained no credit. The third mark was for using information from a least two points on the graph to support the relationship that had been commented on.

8bi Most responses showed the correct evaluation for the substitution into V=I x R which had to be recalled. A number of candidates did not read the question properly and founf the potential difference across both resistors.

8bii Almost all responses gave the correct evaluation for the power.

Question 9 Topic 9 Forces and their effects

9a Most candidates understood the use of an arrowed line to represent a force in magnitude and direction and selected equal and opposite forces to give zero acceleration.

9b Very few candidates were able to draw a scaled vector diagram and show the resolution of the two forces in the correct direction. A ruler is essential to completing scaled diagrams accurately However, as only the magnitude of the resultant force was required a significant number of candidates were able to obtain the value for the magnitude either by drawing or using Pythagoras' theorem.

9c Most candidates were able to state a number of relevant forces such as friction or reaction and this allowed them to achieve a Level 1. However, responses from many candidates confused the gravitational force acting on the hanging weight as a force acting on the block rather than considering the tension in the rope.
Some candidates were able to make logical connections between the forces acting either horizontally , the frictional force and the tension in the string or vertically, the weight of the black acting downwards and achieve a Level 2.
Very few candidates were able to achieve Level 3. as this required them to realise that in order to move at a constant horizontal speed the resultant horizontal force would be zero therefore the friction must be equal to the tension or that there was no movement vertically because the weight is equal to the reaction.

A common error made by candidates was to state that the block continued to move because the force of tension in the rope was greater than the frictional force between the block and the table.

Question 10 Topic 15 Forces and matter

10a Most candidates were able to identify the correct diagram showing water spouting a greater distance as the water gets deeper.

10bi Very few candidates gained full marks, some did not select the correct equation, Boyles Law equation was quite frequently selected. If the correct equation was used and the pressure difference calculated, rarely was this added to the atmospheric pressure to obtain the pressure of the gas supply

10bii Candidates did not appreciate that the pressure at any depth is independent of area and that this could be shown by there being no are in the equation $P = \rho \times g \times h$

10c Most responses identified isolated knowledge of relevant principles e.g. the presence of upthrust or an overall density difference. These were awarded Level 1.
Most responses failed to appreciate that to float the upthrust must equal the weight. Many considered that the upthrust was a fixed quantity which could not vary as the boat displaced more

water. A few candidates could make some logical connections and made statements such as “the upthrust and weight are balanced ” or “upthrust is caused by a pressure difference between the top and bottom of the boat”. These were awarded Level 2.
A small proportion of candidates demonstrated detailed knowledge and made logical connections giving statements such as “upthrust is equal to the weight of water displaced” and “when a load is added, weight is increased and the boat displaces a greater weight of water”. These were awarded Level 3.

Summary of points for improvement.

- Bring a ruler and a protractor to the examination
- Practice resolution of forces using vector diagrams
- Keep notes on how you carried out core practical experiments.
- Learn the direction of magnetic and electric fields
- Practice using the rule for the motor effect .
- Do not truncate an interim answer in a calculation
- Practice the use of the principle of moments in calculations.