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Edexcel

Examiners' Report

Principal Examiner Feedback

November 2020

Pearson Edexcel GCSE

In Combined Science (1SC0) Paper 1PH

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This was the third examination using the GCSE (9-1) specification, being the first part of the physics section of the Combined Science. 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 2 Motion and forces
- Topic 3 Conservation of energy
- Topic 4 Waves
- Topic 5 Light and the electromagnetic spectrum
- Topic 6 Radioactivity

Candidates were able to deal with calculations, generally recalling equations and being able to complete a rearrangement successfully but were much less familiar with the core practicals and how they should be carried out.

Question 1 Topic 3 Conservation of energy

1a Most candidates were able to mention one form of energy which gained the first mark less were able to gain the second mark by describing an energy transfer which was relevant to the situation shown in the diagram .

1b The majority of candidates recognised that speed and time needed to be measured and determined the average speed of the trolley coming down the slope and it would appear that most candidates had carried out this practical work. Very few candidates were able use average speed = $v+u /2$ to find the speed at the bottom of the slope. Those candidates that suggested a light gate should be used at the bottom of the slope did not give sufficient detail of how the velocity is to be found using a light gate to get more than one mark. Repeating and averaging was also rarely mentioned.

1c Candidates that wrote the equation for potential energy generally gained two marks however it was more common or one mark to be awarded usually for the measurement of mass.

1d A few candidates realised that the energy transferred to the surrounding must be the difference between the potential energy at the top of the slope and the kinetic energy at the bottom of the slope. However, most candidates just suggested the impractical idea of measuring the heat that was produced in some way.

Question 2 Topic 1 Motion and Forces

2a Many candidates did not recognise that force has magnitude and direction and is therefore a vector quantity

2bi and bii The majority of candidates were to give the equation for acceleration and then insert the relevant values to get the correct answer.

2c i Some candidates recognised that distance travelled is the area underneath a velocity-time graph. However a significant number of candidates either just multiplied 7×15 (velocity \times time) or tried to split the triangle into smaller triangles and rectangles making, with the addition of these smaller areas, it unlikely that they would achieve the correct answer.

2cii Many candidates did not realise that acceleration is the rate of change of velocity with time and is therefore the gradient of the graph. Decreasing acceleration is shown by a graph that has a decreasing slope. This line can be drawn above or below the existing line and must start from zero (rest) as given in the question.

Question 3 Topic 5 Light and the electromagnetic spectrum

3a A few candidates did not correctly recall the equation. The majority of candidates recalled and rearranged the equation but a significant number were unable to convert megahertz to hertz or to use standard form correctly. Very few candidates were able to complete the calculation, dividing by 2 to give the length of the aerial

3b Only a few candidates gained both marks for this question and this is a core practical. Most commonly candidates wanted to measure an angle without removing the glass block and did not define the angle that they would measure. There were very few answers which indicated that the incident and emergent rays should be marked, the block removed and the angle between the normal and the refracted ray measured. A clear description of the angle to be measured should have been given or marked on the figure 3.

3c Very few candidates gained full marks. It was not understood that part P of the wave was refracted and part Q reflected. Also candidates did not define which ray they were referring to either as P or the ray in the upper layer or Q as the ray in the lower layer. Without being sure which ray was being referred to marks could not be awarded.

Question 4 Topic 4 Waves

4ai Most candidates gained a mark for finding the value of the difference between the two values given for the speed of sound and using this in the numerator. However quite frequently the value used for the denominator was incorrect due the question not being read properly.

4aii Reaction time was rarely given as the reason for the variation in time. Some candidates noted that in the diagram not all the students were the same distance from the starting pistol but the most common answer referred to the differences in the students ability to detect sounds

4aiii Candidates rarely suggested using a larger distance to increase the time measured and reduce the effect of the reaction time.

4bi. Only a few candidates were able to identify a wavelength as being the distance between two adjacent compressions at any point on the diagram.

4bii. Some candidates did recognise that the particles vibrate but then did not give the direction of the vibration as being parallel to the direction of travel of the wave. Some candidates gained the consolation mark for stating that the sound wave is a longitudinal wave.

Question 5 Topic 6 Radioactivity

5a. Most candidates were able to describe isotopes in terms of atomic number and number of protons.

5b. Fewer candidates were able to identify beta plus decay although the accompanying diagram did show a proton becoming a neutron.

5c. Candidates were not always able to work out that if the half life was 5 years and then in 20 years there would be 4 half lives years. Most candidates had the idea of the halving the activity of the radioactive source but only a few actually halved it 4 times.

5d. Many candidates were able to gain both marks most frequently for damage to cells and cancer.

5ei. A significant number of candidates tried to calculate the average count reading from the points on the graph whereas the question asked for the average count rate which is the slope of the graph. As the graph is a straight line any point on the graph could be taken to give the slope (count reading/s)

5eii. Only a few candidates recalled that radioactive decay is a random, unpredictable process and that by its nature will always produce variations in the readings obtained by the G-M tube

Question 6 Topic 2 Motion and forces

6ai Candidates did not always remember to change km to m even though the final unit was given in the question.

6aii the equation was given but candidates still struggled with the division of values given in standard form

6b Very few students appreciated that the trolley with the spring modelled the action of a crumple zone and although this is a suggested practical it seemed to be unfamiliar to many candidates. Most candidates could quote the equation for force being equal to rate of change of momentum but did not realise that to verify this experimentally and show there is less force when the spring is used then the mass of the trolley and the contact time need to be measured. Some candidates only considered time and distance for the slope and described how acceleration down the slope could be determined this was irrelevant as it was the same for both trolleys. The candidates that achieved level 2 usually quoted the equation realised that the trolleys with and without the spring had to be

used and measured the mass of the trolley. Level3 was achieved by comparing the difference in impact times using the timer.

6c. Many answers were just repeats of the stem of the question There was little understanding that the rocket and asteroid were in contact for the same time, the forces were equal and opposite and therefore the change in momentum was the same for both. Most candidates gained 1 or 2 marks from quoting an equation or knowing the (total) momentum before the collision was equal to the (total) momentum after the collision .

Summary of points for improvement.

- Learn the unit conversions
- Learn the prefixes and powers of 10 for magnitude
- Practice the use of standard form
- Use the information on diagrams
- Add to diagrams or draw a diagram if this helps with your answer
- Make sure that you clearly define the area, line or angle that you are referring to

