Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

November 2020

Pearson Edexcel GCSE

In Combined Science (1SC0) Paper 1PF

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Q1

a) Most candidates could identify a use of x-rays and of ultraviolet waves. There was less knowledge of a use of infra-red waves.
b) Most candidates could identify blue as the colour with the highest frequency
c) Candidates were generally able to interpret the graph correctly.

Q2

a) Most candidates were able to identify the correct equation for force and do the calculation correctly. There was less certainty about the unit of force however.
b) Calculate of speed was generally done correctly.
c) Candidates were often able to suggest that the distance should be measured rather than estimated but then struggled to give a second improvement. It was common to see reference to "repeat and find the average". This is would not improve the experimental method, nor would it necessarily improve the accuracy of the final result since it would not be expected that the cyclist would perform exactly the same way in each trial.

Q3

a)
b) There was generally weak understanding of half-life. Many candidates tried to find the mean of the two masses given and/or attempted other incorrect calculations.
c) Examiners would give credit for seeing (at least) "Gieger" as a name for the radioactivity detector shown. Unfortunately, this was rarely seen. There was some appreciation of protection from effects of radioactivity. Most common precautions involved clothing with gloves being commonly seen. In general, however, candidates were not able to identify particular hazards of radiation and often suggested common lab protective measures such as wearing lab coats or tying hair back. In part (ii), very many candidates incorrectly attempted to answer in terms of the relative penetration of the different types of radiation. Successful students had at least the idea of starting with the detector near to source and then increasing the distance between the two. The students that scored well on this question recognised that the background count was relevant here. They could score marks from giving a method for taking the background countrate and also for the idea that the countrate reduces back to background level when there are no longer any beta particles detected.

Q4

a) Candidates were often able to give another example of a transverse wave with "radio waves" the most common. However, "sound" was a common, incorrect response.
Candidates were sometimes able to recognise that there were 10 waves shown and therefore able to calculate the wavelength as the length of one wave. However, a very large number simply gave the value of 32.
The concept of frequency seemed to be poorly understood and the majority of candidates simply multiplied the two given values together.

b) Many scored a mark for showing idea of oscillations in a longitudinal wave but very many showed transverse oscillations. Candidates were often able to score one mark by showing a single arrow indicating the direction of propagation of the wave rather than the movement of the rock.
The most common mistake made in part (ii) was not converting the speed into m/s – this in itself would have scored a mark.

c) There are two main ways in which students could score the marks here. Many had the idea that the rate at which the waves pass the point would be too high to measure easily but often struggled to express this unambiguously. Fewer commented about the practical difficulty of actually detecting each wave peak.

Q5

a) Candidates very often seemed to fail to read the question carefully and answered in terms of the energy transfers as the car descends the slope rather than as the car is lifted to the top of the slope. Nevertheless at least one mark could be scored for mention of a relevant energy store.

b) Most students were able to get one or two marks in this question; usually by making reference to measuring the time taken to descend the slope and then giving the equation. More successful candidates started with the equation and then described a suitable method for measuring each of the quantities and how to process them to get the speed. A final mark was awarded for an appreciation of the difference between average speed and instantaneous speed. The question asks for the speed at the bottom of the ramp, but simply dividing distance by time would calculate the average speed. This value should be doubled to find the speed at the bottom of the ramp (assuming the initial velocity = 0). An alternative final mark could be awarded for describing repeating and averaging. This is relevant in this scenario because the results of several trials would be expected to be very similar (unlike the scenario in question 2) Very few scored all of the marks available.

c) Few candidates appreciated that this required calculation of gravitational potential energy and therefore the mass of the car and the vertical height of the car above the bench must be measured.

d) Few candidates were able to demonstrate an understanding that the energy transferred to the surroundings was the change in GPE minus the final KE.

e) To score both marks here the candidate needed to identify what caused the transfer to thermal energy and suggest a way of reducing it. Whilst some students were able to identify that it was the frictional forces between the car and the ramp that caused the energy transfer, many tried to change the experiment itself; such as starting the car from a different position of the slope rather than suggesting a method for reducing the frictional forces. A surprising number of candidates wrote about insulation.

Q6

a) There was considerable uncertainty that force is a vector.

b) The equation for acceleration was generally known and candidates could usually do the calculation correctly.

c) The most common mistake was to simply calculate velocity x time at some point (usually taking the maximum velocity at the end of the line). This cannot be used in this situation because the cyclist's velocity is changing. This question required an understanding that the distance travelled could either be calculated as the area under the graph or using the fact that the average velocity was half the final velocity in this case.

d) In general, most candidates had a knowledge of some of the factors that related to the driver; such as the degree of alertness, or those that related to the car; such as the condition of tyres or the state of the road. This could provide be at least a level 1 response. Better candidates could clearly link at least one of these factors to a **change** in the stopping distance with an answer along the lines of "if the tyres are worn then the stopping distance of the car would increase" and so reach level 2. Level 3 answers contained clear explanations of how the stopping distance changes due to at least one driver factor and one car factor. Examiners saw many responses that could have potentially reach level 2 or even level 3 but simply stated that the stopping distance would alter (e.g. "*the stopping distance is affected by..*") without making clear the way that it would change (e.g. "*the stopping distance would increase because..*").

Candidates should read the question carefully and look for key words.
If the question asks "*describe how A is **affected***." then the answer should be along the lines of
"*A becomes ….* "
The question "***explain** why* (something happens)" requires an answer along the lines of
"*A (happens) **because** ….)*" .
If the question is "***explain how** A is affected by B*" then the answer has to be along the lines of
"*A **becomes** …… **because** …….B has...*"

Candidates should also be careful with the use of the word "longer" in their answers to questions involving motion. Longer could mean a greater amount of time or a further distance. Candidates need to make sure that their answers are clear and unambiguous.