Pearson

Examiners' Report/

Principal Examiner Feedback

Summer 2017

Pearson Edexcel GCSE

In Physics (5PH2F) Paper 01

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Summer 2017
Publications Code xxxxxxxx*

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Paper Introduction

Unit P2: Physics for the future

This unit is divided into six topics and candidates' knowledge and understanding of all six topics is tested in the examination.

It was intended that the examination paper would allow every candidate to show what they knew, understood and were able to do. To achieve this, each question increased in difficulty as the question progressed. Within the question paper, a variety of question types were included, such as objective questions, short answer questions worth one or two marks each and longer questions worth three or four marks each. The two six mark questions were used to test quality of written communication.

It was particularly pleasing to note the much improved performance on such questions on this P2 paper compared to that on earlier series of examinations. This was most evident in Q3(e) with most candidates able to correctly calculate the kinetic energy of the car.

The overall impression of the examiners was that the majority of candidates had been well prepared for this examination.

5PH2F_01_Q01aii

Question Introduction

The vast majority of students arrived at the correct answer. However, a significant number of candidates were confused with the unit for acceleration and squared the velocity. This meant they evaluated 70.0×2.4^2 to give an answer of 403.2 (N).

Weaker candidates failed to use the equations given on the formulae page at the front of the paper. This often resulted in the mass of the car being divided by its acceleration.

Examiner Comment

A common error was to divide the mass of the car by the acceleration. This was rarely seen if the candidate wrote down the correct equation from the formulae page at the front of the paper.

Examiner Tip

Always make use of the equations given at the front of the examination paper.

5PH2F_01_Q01bii

Question Introduction

Most candidates either achieved full marks or lost 1 mark for small errors due to misreading the scales on the graph axes. Some candidates multiplied numbers from the graph and some candidates divided numbers that were taken from the graph, but were not correctly linked to line on the graph.

5PH2F_01_Q01bii

Question Introduction

Most candidates either achieved full marks or lost 1 mark for small errors due to misreading the scales on the graph axes. Some candidates multiplied numbers from the graph and some candidates divided numbers that were taken from the graph, but were not correctly linked to line on the graph.

Examiner Comment

A significant number of candidates calculated the correct magnitude of the resultant force but gave the wrong direction.

5PH2F_01_Q02a

Question Introduction

The vast majority of candidates scored the mark for the 1st column and marks for either one or both of the remaining columns. There were very few completely blank responses.

Examiner Comment

Many candidates lost the mark for the second column by confusing the marks for the neutron and the electron.

Examiner Comment

A significant number of candidates gave the mass of a neutron as zero. Possibly confusing charge with mass.

5PH2F_01_Q02bi

Question Introduction

Many candidates scored both marks but weaker candidates frequently misunderstood the question. The most common error was simply describing how the rod became charged instead of describing how to test whether it was charged. A common reason for only gaining 1 mark was describing the effect of a charged rod placed near a thin stream of water issuing from a tap but stating that the water should bend away if the rod is charged (without any qualifying remarks about whether the water was charged) or simply talking about an oppositely charged object sticking to the rod. Many weaker candidates described testing whether the rod would give someone an electric shock.

5PH2F_01_Q02biii

Question Introduction

Many candidates scored at least one mark for explaining that the charge on the rod resulted from electrons or negative charges moving. However, only the most able candidates correctly described the movement of electrons from the rod onto the cloth. Many candidates lost marks through descriptions of positive electrons, protons and neutrons moving.

Examiner Comment

The process of charging by friction was often poorly understood and there were many confused responses such as this one.

5PH2F_01_Q03ai

Question Introduction

This straightforward introductory item caused much confusion amongst candidates. Many candidates correctly added the two distances, but significant numbers subtracted or even multiplied the two distances.

5PH2F_01_Q03aii

Question Introduction

There were many correct responses seen by examiners but also many responses showed confusion between increased reaction time and increased speed of reaction. A great number of answers were ways to react faster, such as stimulants, coffee, not being tired, not taking drugs. Others mis-read the question and gave answers such as better tyres, better road surfaces, etc.

Examiner Comment

Many candidates either mis-read or misunderstood the question, as evidenced by responses such as this.

5PH2F_01_Q03aiii

Question Introduction

Many correct responses were seen by examiners but many candidates failed to score the mark through carelessness. Many candidates did not qualify their answer, for example, giving speed as their answer, instead of increased speed. There were also many candidates that gave ideas that would decrease breaking distance, for example new tyres or (fitting) new brakes.

Examiner Comment

Poor spelling but phonetically correct and so scores the mark.

5PH2F_01_Q03c

Question Introduction

This question was answered well by the majority of candidates with an answer of 72500 J. Some candidates made a power of 10 error (usually by adding an extra 0).

Weaker candidates failed to make use of the equations on the formulae page at the front of the paper and consequently an answer of 2900 (14500/5) was not uncommon.

Examiner Tip

Candidates should take care that commas are not mistaken for decimal points. It is better not to use commas when writing out large numbers.

Examiner Tip

Take care when writng the number 7. In this example it is easily confused with the number 1. The seven in the working has ensured that the candidate scored both marks.

Examiner Tip

Make use of the equations given at the front of the examination paper

Examiner Tip

Write down the correct equation and substitute the values correctly and this will gain one mark even if the answer is not correct.

5PH2F_01_Q03d

Question Introduction

Most candidates used the correct equation to calculate the power output of the car's engine. Weaker candidates ignored the equation on the formulae page and multiplied the work done by the time taken to do the work.

5PH2F_01_Q03e

Question Introduction

There was a significant and pleasing increase in the number of candidates able to calculate kinetic energy compared to earlier series containing a similar calculation.

Examiner Comment

This response scored full marks but the comma can easily be mistaken for a decimal point.

Examiner Tip

Do not use commas to separate thousands in large numbers.

5PH2F_01_Q04bi

Question Introduction

The most common error was forgetting to change the unit for time from minutes to seconds. The majority of students therefore gained 2 out of 3.

I.e. 3.2 (C) was the most commonly seen response.

5PH2F_01_Q04bii

Question Introduction

Many candidates scored both marks for this question. However, there were a significant number that tried to use the wrong equation for power, i.e. some variation on power = work done / time taken.The most common wrong answer was 3.0 /4.0 = 0.75 but candidates tried various combinations of numbers.

5PH2F_01_Q04c

Question Introduction

Many candidates found this question quite challenging. Only the most able candidates gave correct responses and many of these went on to correctly explain their statement. Weaker candidates did not grasp the relationship between current and resistance and many responses stated "current decreases so does resistance."

5PH2F_01_Q04e

Question Introduction

Many candidates scored 1 mark for saying that the current increased. There seemed to be widespread confusion about why this happened. Many candidates described the LDR as somehow acting like a solar panel to power the circuit. Another common error was confusing increased light with increased resistance.

5PH2F_01_Q05a

Question Introduction

5PH2F_01_Q05bi

Question Introduction

5PH2F_01_Q05bii

Question Introduction

There were many correct responses seen by examiners but many candidates failed to describe both the penetrating and ionising abilities of alpha particles. Some candidates thought that alpha particles could penetrate paper and cardboard.

Examiner Comment

Many candidates seemed to confuse alpha particles and gamma radiation.

5PH2F_01_Q05c

Question Introduction

Many candidates produced clear descriptions of both processes, with some good use of the correct terminology (neutrons/unstable nucleus/daughter nuclei/chain reaction).

Many were able to state the names of two common isotopes produced by fission. Some common errors that lost marks were: confusing fission/fusion despite giving good descriptions of both, confusing/unlabelled diagrams showing the daughter nuclei fusing back together after a fission reaction (this also occurred in written descriptions), and confusing protons/electrons with neutrons in their description of fission. Many responses referred to fusion only happening in stars and not being possible on Earth but not explaining why.

Examiner Comment

The descriptions of nuclear fission were usually much clearer and contained more detail than those for nuclear fusion. This response contained just enough detail about fusion to score 6 marks.

5PH2F_01_Q06ai

Question Introduction

Examiners saw many clearly described advantages of using radiation to sterilise the medical supplies. Weaker candidates merely stated that 'radiation kills bacteria' or gave vague statements about radiation being cheaper or safer.

5PH2F_01_Q06aii

Question Introduction

Many candidates found this a challenging question. Many responses showed that a significant number of candidates had not fully understood the concept of half life. Many candidates recognised the idea of halving but went on to halve the half-life to give answers of 2.5 years or 1.25 years. Others halved the proton number for cobalt to give answers of 30 and 15.

5PH2F_01_Q06bi

Question Introduction

Once again vagueness lost many marks (kills him/makes him ill). Other simply re-wrote the question. Some hit more than one of the marking points.

5PH2F_01_Q06bii

Question Introduction

This question was well answered by the vast majority of candidates. Most candidates were able to score at least one mark and had clearly thought about how to deal safely with radioactive materials. Candidates who failed to score both marks often did so by referring to types of protective clothing for both parts of their answer.

5PH2F_01_Q06c

Question Introduction

Many candidates achieved 4 marks through a comparison of half-lives and most were able to state cobalt-60 lasted longer than the other isotopes. However,

only the more able candidates were then able to add further relevant detail about the penetrating abilities of gamma radiation and achieve 6 marks. Knowledge of the penetrating abilities of alpha were often poorly explained in context of the question. A significant number of candidates misread the question and read 5 years as 5 hours so that they incorrectly stated that the half life of cobalt-60 is shorter than the other two isotopes. It was clear that a large minority had very little grasp of the concept of half-life, many thinking that the half-life was the amount of time before the medical supplies needed sterilising again.

Paper Summary

Based on their performance on this paper, candidates should:

- make sure that they have a sound knowledge of the fundamental ideas in all six topics
- get used to the idea of applying their knowledge to new situations by attempting questions in support materials or previous examination papers
- identify the known and unknown quantities in a numerical problem before selecting a formula to use for the calculation
- make sure that they recognise SI prefixes such as m and K and how to handle these in calculations.
- use the marks at the side of a question as a guide to the form and content of their answer.