Version 1.0: 0310

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Physics 1456

Specification B: Physics in Context

PHYB2 Physics Keeps Us Going

Report on the Examination

2010 examination - January series

Further copies of this Report are available to download from the AQA Website: www.aqa.org.uk

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334). Registered address: AQA, Devas Street, Manchester M15 6EX
Dr Michael Cresswell Director General.

GCE Physics, Specification B: Physics in Context, PHYB2, Physics Keeps Us Going

General Comments

Descriptions from candidates in this paper were generally poor. Although physics is tested in context in this specification, it is still a suite of papers rooted in physical principles. Candidates cannot expect credit for ill-considered answers that contain no accurate physics. This applies especially in areas well covered (often without correct physics) in the media. Candidates should guard against a superficial descriptive approach in their answers.

There was no strong evidence that the paper was overlong. Almost all attempted the last few questions with the exception of Question 10 (b). This part was, however, also poorly answered by those who attempted it and the lack of attempts may therefore have little significance.

Question 1

This question was well done question with many good responses. The rare failures included incorrect additions and inversions of the fraction in the equation.

Question 2

About half of the candidates got this correct. A popular distractor was D; candidates presumably thought that ozone changes were implicated in global warming.

Question 3

Part (a) was done well by the overwhelming majority.

About half the candidates completed part (b) successfully. Errors here usually centred around non-clarity in the direction of the velocity. It was often unclear whether the angle was to the east or west of north.

Question 4

About one-quarter of all candidates were able to calculate the diameter of the wire with accuracy. Common errors were to compute the radius and then to forget the final doubling to give the correct answer, or to incur power of ten errors. A handful of candidates could make only poor progress with the calculation.

Question 5

Again, about one quarter of all candidates were able to give two good responses with half of candidates providing one good response. Statements were in general too vague and lacked physical insight. Errors of physics were common; confusions between the various electrical quantities, pd, current, energy, power and so on were very frequent.

Question 6

The very straight forward part (a) was well answered with generally clear solutions being provided.

Part (b) was answered more unevenly. About 60% of candidates arrived at a complete answer with the remainder making more or less progress with what was a straightforward question. Inconsistencies of sign in the treatment of deceleration and the velocities were very common and were penalised. It is not acceptable simply to ignore the fact that an equation yields a squared quantity with a negative sign.

Question 7

About one-third of the candidates arrived at the correct answer for the blade length in part (a) (i).

In part (a) (ii), graph read-offs were exceptionally poor with 80% of all candidates' responses lying outside a generous acceptable range. It was clear from the answers (the frequent 8.6 MW as an example) that candidates did not pay sufficient attention to the grid of the graph and its labels.

For part (a) (iii), although errors carried forward from (a) (ii) were allowed, 20% of candidates could not calculate the efficiency with accuracy.

About a half of candidates realised that the output at low speeds is because the wind does not supply sufficient energy to turn the turbine blades in part (b).

In part (b) (ii), the recognition that turbine blades are feathered at high wind speeds to prevent damage was rare.

Convincing explanations in part (b) (iii) of the funnelling effect as wind moves over a hill were unusual. Almost all candidates stopped short of explanations that dealt in detail with the mass of air moving through a more constricted area in a given time. The time element of the physics was usually missing.

Question 8

The level of attainment in this question that tested the electrical areas of the specification was very poor. Some candidates are clearly not comfortable with even the simplest problems tested here.

The pd in part (a) (i) was correctly identified by most candidates.

Answers to part (a) (ii) were very mixed and in general poor. Explanations were not adequate and the application of $V=IR$ confused.

20% of candidates did not attempt part (b) (i) and only 10% gave completely accurate answers. Both the understanding and application of the potential divider by candidates as poor.

Again many used poor physics that did not relate to the circuit in part (b) (ii). There was a misunderstanding as to which pd to use in the equation.

One-fifth of candidates offered no explanations to part (c). The essence of the question was a computation of the total resistance of a parallel resistor network. About half of candidates were able to negotiate this with comfort, but the remainder were usually able to quote the appropriate equation but not to get further with it.

Only the more able candidates gave a complete picture of the situation in part (d). To gain full credit candidates needed to recognise both the change in atomic vibration and the increase in charge carrier density as a result of temperature increase, but then to go on to state that the second effect outweighs the first.

Question 9

In part (a) (i), only partial credit was available to those who failed to relate the area under the graph to the stored energy.

Many were able to successfully begin part (a) (ii) by equating the stored energy with kinetic energy. But, from this point on, explanations became poor with the full detail of the algebraic manipulations either not being shown or being fudged.

The straightforward substitution and evaluation from the equation in (a) (ii) was done well in part (b) (i).

Full credit was rare to part (b) (ii). Candidates are too fond of stating 'air resistance' as their full answer without suggesting the seat of the energy loss. There are a number of air resistance possibilities in this situation and many candidates left it to the examiners to decide which one was operating here. There were frequent answers that suggested air resistance when the arrow had left the bow despite the question's focus on the initial acceleration of the arrow whilst in the bow. Examiners are looking for more awareness of the context in this type of question.

Those who attempted the three parts to part (c), all of which examined the use of kinematic equations and vector components, did well, often achieving full credit. However, many (about one-fifth) did not attempt (c)(iii).

Question 10

A surprisingly high number could not show how to evaluate the average speed of the toboggan in part (a).

About half of all candidates were able to answer part (b) well and with clarity. The remainder could usually get nowhere with it.

Quality of communication was tested in part (c). Responses were on the whole satisfactory without being outstanding. About 10% of all candidates achieved a level 3 response showing that they provided thoughtful, complete answers that encompassed most aspects of the situation. Generally, candidates focus on only one aspect of the question to the exclusion of others. For example, here there was a common recognition that the snow/straw mixture extends the time over which momentum is lost. However, few candidates said explicitly that the total momentum lost is constant (indeed many thought that the snow/straw reduces the initial momentum) or made comments about the structure of the snow /straw and how its loose packing achieves the reduction in force. There was much confusion between the terms *force* and *energy*.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results statistics page of the AQA Website.