OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL A-LEVEL PHYSICS

PH04 Paper 4

Report on the examination

June 2018

REPORT ON EXAMINATION: INTERNATIONAL A-LEVEL PHYSICS PH04 UNIT 4 JUNE 2018

GENERAL

As this was the first examination for this module the cohort of candidates was small.

The paper seemed to be accessible to the majority of candidates. There were no indications that candidates faced significant time constraints. The average performance of candidates was the same in section A (structured questions) as it was in section B (multiple choice questions).

Candidates tended to be more successful with calculations than with written responses. Although candidates could correctly quote written facts they had learned from the specification they often struggled to apply or explain these in sufficient detail to gain full credit.

Many candidates struggled to sketch graphs or to correctly identify which graph represents the behaviour of a physical system.

QUESTION 01

On the whole, this question was done well.

In 01.1 the vast majority of candidates correctly selected and rearranged the turbine equation. Those who made mistakes tended to miss a factor of pi or forget to square the radius.

01.2 was done less well with many candidates simply lacking the detail needed at this level. Answers that simply stated that the turbine was not 100% efficient were deemed insufficient and few candidates actually named a part of the turbine at which energy loss takes place. Only the most able of candidates were able to explain why the total kinetic energy of the wind could not be extracted based on a continuity of flow argument.

In 01.3 the majority of candidates were able to identify wind shadow as an effect that needed to be considered but fewer were able to explain what this was or how it affected the best layout of the wind farm.

QUESTION 02

02.1 was done extremely well with nearly all candidates able to calculate the energy needed to melt the ice.

02.2 proved to be much more demanding for students. Many students could calculate the average rate of energy transfer based on their answer to 02.1 and a significant number could go on to relate this to conductivity. Unfortunately the majority of candidates failed to appreciate that energy would be transferred across all faces of the box and so the total (internal) surface area of the cube was needed. a few candidates confused conductivity with U-value and the difference should be emphasised.

In 02.3, many candidates appreciated that the temperature would stay constant whilst the ice was melting, however very few realised that the rate of temperature increase between 2 and 4 days would slow as the internal temperature approached the external temperature.

QUESTION 03

On the whole this question was done poorly suggesting a lack of familiarity with this particular topic.

In 03.1, the vast majority of candidates failed to relate the kinetic energy of the alpha particle to the electric potential energy at closest approach and so had no way of starting the question.

03.2 was done better with around half of candidates able to demonstrate proportionality. The most successful candidates chose to calculate the value of R_0 for each data pair and to compare although other methods were acceptable (as detailed in the mark scheme).

Again 03.3 was done poorly, suggesting a lack of familiarity with the limitations of using alpha particles to estimate nuclear radius.

QUESTION 04

This question, on rotational mechanics was done much more successfully.

04.1 and 04.2 were done very well with the majority of candidates gaining full credit.

There were a variety of methods demonstrated in 04.3 and each were treated equally. Many candidates could calculate the total angle swept out after 1.5s but only the strongest candidates were able to relate this to the distance travelled.

It was disappointing that in 04.4 many candidates failed to correctly resolve the distance into its vertical component in order to find the loss of GPE. Many simply used the distance down the ramp as the height change.

04.5 was done better and when candidates did lose marks it was mainly because they couldn't correctly use the formula given for the moment of inertia of a solid sphere.

In 04.6 only the strongest candidates grasped that if there was no friction there would be no torque and thus no rotational motion. Most believed that the lack of friction would reduce rotational energy loss just as it would for translational kinetic energy.

QUESTION 05

The whole of question 5 discriminated well with a wide range of performances on each part.

In 05.1 most candidates were able to identify the region of the curve for which fusion takes place but very few were able to relate this to energy release. The strongest did this eloquently, relating an increase in binding energy per nucleon to an increase in mass defect.

In 05.2 many candidates could correctly identify the binding energy per nucleon for either uranium-235 or for the products or both. Many students failed to correctly change from MeV to J, however.

In parts 05.3 and 05.4 candidates generally had a better grasp of control rods than moderators. Few candidates were able to correctly explain why fission neutrons had to be slowed or how a moderator achieves this and many confused the moderation process with the control of the number of neutrons available.

SECTION B

Questions 12, 13, 14 and 35 were found by candidates to be relatively easy.

Candidates found questions 6, 8, 22, 23, 28 and 31 to be particularly difficult.

GET HELP AND SUPPORT

Visit our website for information, guidance, support and resources at **oxfordaqaexams.org.uk**

OXFORD INTERNATIONAL AQA EXAMINATIONS
GREAT CLARENDON STREET, OXFORD, OX2 6DP
UNITED KINGDOM

enquiries@oxfordaqaexams.org.uk
oxfordaqaexams.org.uk