OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL A-LEVEL PHYSICS

(9630) Paper 1

Report on the examination

June 2017

GENERAL

Most of the paper was accessible to the majority of candidates. There were some very strong performances but there were also candidates that struggled to come to terms with the demands of the paper.

Question 11 proved to be the most challenging part of the paper. Candidates seemed uncomfortable with data analysis and anything that touched on ideas associated with practical skills. Candidates seemed to be uncertain wherever assessment objectives AO3 and AO4 were assessed in the paper. In particular, the assessment of errors and uncertainties was not well understood. It may be helpful to draw candidates' attention to the section of the specification dealing with Practical Assessment. This outlines the skills that they should have and indicates that they will be assessed in the written papers.

Candidates tended to be successful with direct, single stage calculations but struggled with multi-stage calculations where guidance was limited. The stronger candidates tended to be much better organised in their setting out of mathematical work.

Weaker candidates had problems with the extraction of information from graphs. In particular they need to look for units on axes and to be prepared to deal appropriately with powers of ten incorporated within units. When questions were directly aimed at candidates' knowledge of SI units weaknesses were also revealed.

The other area that proved to be difficult was in the writing of clear, unambiguous and detailed explanations. There were not many opportunities for extended explanations but candidates do need to develop the skills of identifying the point of the question and checking that each relevant aspect of a situation has been dealt with in their answer.

QUESTION 1

This question was answered well with all candidates gaining at least one mark. The most common mistake was to identify weight as a scalar quantity or energy as a vector.

QUESTION 2

02.1 was well done by most. Those who gained only one mark tended to forget to specify that it is the perpendicular distance that is important in finding the moment of a force about a point. 02.2 was less well done. Most knew that they had to multiply force by distance moved but candidates struggled to find the appropriate distance. The legitimate alternative of multiplying torque by angle turned through was not seen at all.

QUESTION 3

This question was not well done. The majority of candidates were very uncertain about how to find the components of a force and did not seem to appreciate the conditions for equilibrium.

QUESTION 4

All candidates got this question at least partly correct with many getting full marks. Most knew the products of decay and made a good attempt at getting all of the details of the proton and nucleon numbers correct. Candidates were expected to stipulate that it was an antineutrino that was produced. However, on another occasion, it may be expected that they further identify the particle as an electron antineutrino.

QUESTION 5

This was poorly done. Many candidates seemed not to recognise the GW h as a unit and, if they did, were not able to say that it was a unit of energy.

QUESTION 6

Most candidates made some progress with this question. The most common errors in 06.1 were powers of ten errors. The majority did the potential energy calculation correctly in 06.2 and 06.3 was well done by many. However, in 06.3 some failed to rearrange the efficiency equation correctly and others made errors in converting units, particularly hours into seconds. 06.4 was poorly done as most candidates were unspecific in their answers. As a general rule, candidates should be advised to say where and how energy is wasted. For example, “friction” would attract no marks but “work done against friction in the turbine” would be regarded as correct.

QUESTION 7

Most of this question was done well by the majority of candidates. Only 07.3 presented real problems. As in question 3, candidates were not good at dealing with components of vectors. In 07.4, the effects of air resistance on the horizontal and vertical distances travelled by the projectile were well described.

QUESTION 8

08.1 was done quite well by most candidates although some made errors in extracting data from the graph. Candidates should be advised to check the units on axes. Most made some progress with calculating the force in 08.2 but arithmetic errors were common. 08.3 was very well done by a significant minority of candidates but was not attempted by quite a few. The majority knew that they could use the principle of conservation of momentum or an alternative method involving finding the acceleration of **Q** from the graph and using the their force from 08.2. 08.4 was not well done. Again, a significant number did not attempt the part and only a minority realised that they should audit the kinetic energies before and after the collision in order to determine whether or not the collision was elastic.

QUESTION 9

As a whole this question was well done but weaker candidates had a tendency to omit relevant detail. In 09.1 candidates were expected to comment on the mass and the charge of a positron. It was considered that a statement that the charge was positive was insufficient. In 09.2 candidates tended to know about annihilation but some did not realise or think it worth stating that two gamma ray photons were produced in the process. When candidates made an attempt at 09.3 they were usually successful but a surprising number seemed unable to deal with the idea of half lives.

QUESTION 10

Candidates found 10.1 to be very difficult. Few mentioned Newton’s first law or the idea of inertia and many had difficulty in expressing their ideas cogently. Parts 10.2 and 10.3 were well done by the majority.

QUESTION 11

Candidates found the data analysis in this question to be very difficult. In particular, they seemed unfamiliar with how to deal with errors and uncertainties. Centres and candidates may find advice in the practical handbook. Candidates were presented with a set of data in 11.1 and expected to find the percentage uncertainty. Few realised that the absolute uncertainty may be estimated as half of the range of the data set and that one could find the percentage uncertainty by comparing the half range with the mean of the data set. In 11.2 many had some idea of why the time was constant for all values of h but often failed to present full explanations. They should have mentioned that the horizontal components of velocity were not dependent on each other and that the vertical distance and the acceleration due to gravity were both constants. Their difficulties with this carried over into part 11.3. Part 11.4 was generally done correctly. Once again, few candidate had clear ideas about uncertainties in 11.5. Candidates do need to know that the percentage uncertainty in, for example, speed, may determined by adding the percentage uncertainties of distance and time. In 11.6 candidates were asked to describe how to avoid errors in a particular measurement. In this case checking that one point was vertically below another was

important. Among other simple practical techniques, candidates are expected to be familiar with how to ensure that something is vertical by using a plumbline or set-square.

Section C: Multiple Choice Questions

Candidate's overall performance in the multiple choice questions correlated strongly with their performance in the rest of the paper. Questions relating to mechanics and properties of solids were found to be difficult compared with questions on particles, radiation and radioactivity. Questions 15, 18 and 24 were found to be particularly difficult whereas questions 13, 22 and 25 were answered successfully by the great majority of candidates. It was noticeable that the more successful candidates made more annotations to their scripts in the multiple choice section – doing some calculations or formalising their thought processes. Conversely, weaker candidates often simply selected one of the available answers.

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