OCR
RECOGNISING ACHIEVEMENT

GCSE

Physics A
Twenty First Century Science

General Certificate of Secondary Education **J635**

Report on the Units

January 2008

J635/PER/R/08

Oxford Cambridge and RSA Examinations

OCR (Oxford, Cambridge and RSA Examinations) is a unitary awarding body, established by the University of Cambridge Local Examinations Syndicate and the RSA Examinations Board in January 1998. OCR provides a full range of GCSE, A level, GNVQ, Key Skills and other qualifications for schools and colleges in the United Kingdom, including those previously provided by MEG and OCEAC. It is also responsible for developing new syllabuses to meet national requirements and the needs of students and teachers.

This report on the Examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the syllabus content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the Examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

CONTENTS

GCSE Twenty First Century Science - Physics A (J635)

REPORTS ON THE UNITS

A331/01 – Twenty First Century Science Physics A (P1, P2, P3) Foundation Tier

General Comments

The paper was well attempted and produced a reasonable mean mark.

Centres are reminded that questions on A331 will all be objective in style.

Candidates should be aware that the marking is done from scanned images of their scripts. Consequently, if candidates change their minds, any alterations must be made clearly and unambiguously. Any marks that are ambiguous – possibly made with the intention that the examiner could give credit for either of two possible responses, where only one is correct – will not gain credit on this paper.

The level of difficulty was appropriate for the ability range and all questions were accessible to candidates across the ability range. The majority of candidates generally performed well and marks were awarded across a wide range, demonstrating appropriate differentiation. Scores typically ranged from the low teens to the high thirties.

Most candidates correctly followed the instructions in the questions and most made their responses appropriate to the number of marks available. Some, however, did not read the questions carefully enough.

All candidates seemed to have made good use of their time. There was no evidence of candidates running out of time.

Comments on Individual Questions

Q1 (a) The majority of candidates could correctly sort the Earth, Moon and Sun in order of size. A significant minority made one error, although this did not follow any particular pattern in terms of the incorrect choice.

(b) Almost all candidates recognised the correct orbital period for the Earth as a year. A large number of candidates incorrectly chose 'The Earth orbits the moon every 28 days' as their second answer. Centres are reminded that candidates need to be able to make qualitative comparisons of the age of the Earth, Solar System and Universe.

Q2 (a) Most candidates could successfully link the three primary energy sources to their waste products. Candidates are advised to use a ruler and pencil for drawing lines to link boxes. Some responses were unclear, usually due to multiple lines that had not been rubbed out or neatly crossed through. In such cases, candidates could not score full marks.

(b) The middle two responses were usually correctly given for this question and many candidates could also provide the final response correctly. A relatively few candidates could correctly identify electricity as a secondary energy source.

Q3 (a) This question was very poorly answered, with 'a stream of energy' being chosen by most candidates in preference to the accepted description of a photon from the specification.

(b) The majority of candidates could not identify which were the ionising radiations from a list. A large number of candidates incorrectly chose 'microwaves' as one of their answers here.

(c) Following on from Q3 b), many weaker candidates felt that non-ionising radiation causes cells to become radioactive.

Q4 (a) Candidates answers were split almost equally between the correct answer and sound waves in this question, despite a clear reference to the expected answer in the passage provide.

(b) This question was extremely well answered by candidates of all abilities.

(c) Candidates performed well on the first two parts of this question, the only common error being mistakenly identifying 'Greg' in place of 'Roger' as not being aware of a risk. Part three of the question was only well answered by more able candidates. There is evidence that many candidates had been better prepared for this 'talking heads' style of question than in previous sessions.

Q5 (a) There was evidence that candidates had been well practised in reading data from graphs and many candidates scored full marks here. Some weaker candidates read from the y-axis when working out the dose and therefore incorrectly gave the answer of '0.10%', which was the associated risk for this dose.

(b) Very few candidates could successfully relate risk to the workers to the benefit the workers gain. Centres are reminded that candidates should be able to 'discuss personal and social choices in terms of a balance between risk and benefit' as part of the ideas about science aspect of this specification.

(c) Most candidates could identify one of the two expected answers for this question. As no guidance was given as to the number of expected responses in the stem of the question, it was felt fair to accept a single, valid answer for the mark to avoid undue penalty to candidates at this level.

Q6 (a) This question was well answered by most candidates.

(b) Only more able candidates could correctly answer this question. Weaker candidates were distracted by the other true, but irrelevant statements in the list. Candidates should be advised that there may be true, but irrelevant statements used to distract them from the correct answer.

(c) Surprisingly few candidates knew that a light year is a unit of distance. Most candidates picked up the last mark on this question.

Q7 (a) This question was well answered by most candidates.

(b) The vast majority of candidates did not show awareness that plants respire as well as animals.

(c) This question was well answered by most candidates.

(d) A surprisingly large number of candidates seem to feel that there was no carbon dioxide produced prior to the construction of factories as this answer was seen in equal measure to the correct one in the first part of the question. The second part was well answered, although weaker candidates only provided one answer instead of the two expected.

Q8 (a) This question was poorly answered by most candidates. A very large number of candidates attempted to link each box on the left to a box on the right, in contradiction to the instruction given to draw one straight line. Such answers scored no marks. Of those candidates that made a single link, the majority incorrectly believed that peer reviewers carry out experimental work as part of the process.

(b) This question was well answered by most candidates, although many used ticks in place of the 'D' 's requested for their choices. This was accepted provided there was no ambiguity in their answer.

(c) This question was well answered by most candidates.

(d) Weaker candidates tended to favour the weathering argument here, rather than the expected answer.

A331/02 – Twenty First Century Science Physics A (P1, P2, P3) Higher Tier

General Comments

Candidates performed well on the paper with a high mean mark and less than 10% scoring under half the marks and a half scoring over three quarters of the marks. Only a few candidates were inappropriately entered for this higher tier paper. Approximately half the marks on the higher tier paper are targeted at grade C/D.

In general candidates coped well with questions designed to address the Ideas about Science aspects of the specification.

Candidates should be aware that the marking is done from scanned images of their scripts. Consequently, if candidates change their minds, any alterations must be made clearly and unambiguously. Comments such as 'please mark the pencil lines not the ink ones' are impossible for markers to interpret. Any marks that are ambiguous – possibly made with the intention that the examiner could give credit either of two possible responses, where only one is correct – will not gain credit on this paper.

On the higher tier differentiation is often achieved by giving less guidance on the number of responses required. In other words, asking for the candidate to 'put a tick next to each correct statement' rather than 'put a tick next to the two correct statements'. Candidates are then required to make their own decision about how many responses are required. Please note the number of marks allocated is NOT a guide to how many ticks would be required. There was evidence that some candidates were mistakenly assuming the number of marks equalled the number of ticks required.

Teacher tip
Q1c and Q6c could be used with candidates to show that the number of marks does not necessarily equal the number of ticks.

Comments on Individual Questions

Q1 Candidates showed a good grasp of ideas and concepts related to climate change. Nearly all candidates performed well on parts (a) and (b). Parts (c) and (d) proved most challenging, with a significant minority only giving one response in part (c) instead of the two needed. In part (d) 'water vapour' was most commonly missed as a greenhouse gas.

Q2 This question was predominantly targeted at CD grade candidates, nearly all candidates performed very well on the parts (b), (c) and (d). However many candidates of all abilities are still not clear about the meaning of 'peer review' in the scientific context. A common confusion is with peer assessment, in which friends look at each others work.

Q3 Candidates had little problem interpreting the graph in part (a), although many assumed that all they had to do was read a value off the graph for part (b)(ii),hence giving an incorrect response of 10, presumably reading 0.10 as 10.0 instead of comparing two values. Candidates are demonstrating a much better understanding of the ALARA principle in this session. In part (b)(iii) the protective clothing proved a strong distracter, which was about reducing the dose as opposed to why the increased dose was acceptable.

Teacher tip
Candidates can be taught that if they get an answer that is not in a list they choose from, they have almost certainly made a mistake. Part b(ii) illustrates this point nicely. Where trying to make 0.10 equal 10 does not work.

Q4 Candidates performed well on parts (a) and (b). 'Stars have been around for a long time' was a strong distracter in part (b) for weaker candidates. Part (c) proved more demanding with over a third of the candidates scoring no marks, there did not appear to be any particular misconceptions. Candidates may have had difficulty with the question style.

Q5 Part (a) was a simple recall question, yet nearly half the candidates were unable to answer it correctly, electromagnetic being the most common, too vague, answer. Part (b) was demanding, with some strong distracters, again there was evidence of candidates failing to read the instructions correctly and putting in too many lines. Candidates performed well on part (c), demonstrating a better understanding of the precautionary principle.

Q6 Candidates demonstrated a good grasp of the processes in a nuclear reactor with most scoring highly in part (a). Nearly two thirds of candidates were unable to identify the self-sustaining reaction as a 'chain' reaction in answer to part (b). The most common error was 'nuclear'. Many candidates in part (c) restricted themselves to two responses, limiting themselves to a maximum of one mark.

Q7 This was the most demanding of the questions. Most candidates knew the 'nucleus' of the atom in part (a). However, only about half gave the correct 'proton' in part (b), with 'neutron' by far the most common error. Part (c) was targeted at A/A* level and very few scored both marks. One mark was scored most commonly for correctly identifying 'The atom will still be the same element' and 'The atom will still have the same number of neutrons in its core' as false.

A332/01 – Twenty First Century Science Physics A (P4, P5, P6) Foundation Tier

General Comments

Candidates performed well on the paper with a high mean mark and less than 10% scoring under half the marks and a half scoring over three quarters of the marks. Only a few candidates were inappropriately entered for this Foundation tier paper.

In general candidates demonstrated a good grasp of basic physics through out the paper. On the foundation tier, questions often test the understanding of the words used in physics. Candidates would benefit from learning definitions and meanings of the physics terms in the specification.

Candidates should be aware that the marking is done from scanned images of their scripts. Consequently, if candidates change their minds, any alterations must be made clearly and unambiguously. Comments such as 'please mark the pencil lines not the ink ones' are impossible for markers to interpret. Any marks that are ambiguous – possibly made with the intention that the examiner could give credit either of two possible responses, where only one is correct – will not gain credit on this paper.

Please note the number of marks allocated is NOT a guide to how many ticks would be required. Whilst this is more common on the higher tier, it is also true of the foundation tier.

Comments on Individual Questions

Q1 The graph was generally well understood, however few candidates identified section D as the highest speed. Candidates performed very well in part (b), clearly able to perform simple momentum calculations.

Q2 Most candidates showed good understanding of the language required. The most common error was mass in place of weight. Weaker candidates also muddled potential and kinetic energy.

Q3 This was question was common with the higher tier and was targeted at grades C and D. More candidates were unable to correctly identify the forces than could. The common error was to reverse the directions in parts (a)(i) and (b). Weaker candidates gave both forward and backward or both left and right in part (a)(ii).

Q4 By far the most common error was with the power supply; most commonly the symbol chosen was the fuse. Otherwise candidates performed well. The weaker candidates had problems identifying the variable resistor symbol. The symbol set used for circuit diagrams is included as an appendix in the specification.

Q5 This question differentiated well, with able candidates scoring full marks. Weaker candidates had problems with parts (a) and (c). In part (a) weaker candidates most commonly 'a flow of charge' and in part (c) 'a continuous loop' was a strong distracter. In part (d) about a quarter of candidates suggested that electrons are pushed apart by 'an attractive force'.

Q6 About half the candidates identified the circuit correctly using the ammeter and voltmeter. However less than a third knew that potential difference meant the same as voltage.

Q7 This was question was common with the higher tier and was targeted at grades C and D. Candidates performed well on part (a) with over 90% scoring at least one mark, the most commonly correct line was with the magnet still to the needle not moving. In part (b) 'transformation' proved a very strong distracter.

Q8 Most candidates demonstrated a good basic knowledge of waves. A common error was to think amplitude is from peak to trough (response A in part (a)). Just under half the candidates could identify the wavelength on a wave front diagram in part (b). Well over three quarters of the candidates scored at least one mark in part (c), there was no apparent pattern to the errors.

Q9 Over half the candidates scored 2 or 3 marks. The most commonly correct was reflection, refraction and diffraction appeared to be the most common errors.

Q10 Part (a) proved the most difficult, with fewer than half the candidates able to correctly identify the analogue signal in part (a). This error was often carried forward to part (b), however more than half correctly identified the clean digital signal. Most candidates correctly identified the input to the amplifier.

Q11 This was question was common with the higher tier and was targeted at grades C and D. Many candidates did not know the sequence of parts of the spectrum, with only a quarter obtaining full marks. Only a third were able to identify gamma radiation as having the most energetic photons.

A322/02 – Twenty First Century Science Physics A (C4, C5, C6) Higher Tier

General Comments

This was the first time that these topics have been set as a Physics paper though questions on the same content were set in Additional Science last June.

All candidates made a good attempt at this paper. They used the time well and completed the paper fully. Many candidates showed good knowledge of the topics and a clear understanding of all the concepts covered by this paper. Only a few would have been better suited to the foundation paper.

Whilst many papers were clear and easy to mark, some had extensive crossings out. Although examiners will look at a whole page to find the answer, judging the sequence of a candidate's writing to find the final answer is more difficult with scanned scripts.

Comments on Individual Questions

Q1 This question involving forces highlighted common misconceptions involving interacting pairs of forces. The majority of candidates failed to distinguish between the forces acting on the car and those acting on the driver.

Q2 Almost all candidates were able to work out the gravitational potential energy of the ball in part a(i). The second part of 2 a) was targeted at more able students, the majority of whom could successfully rearrange the formula for kinetic energy. Question 2 b) again highlighted the same problem with interaction pairs as Q1, with most candidates choosing 'C' as their answer.

Q3 This question on momentum was well answered, with many able candidates picking up full marks. Some weaker candidates failed to use the terms 'true' and 'false' in answering the first part, preferring instead to tick the true answers. Where unambiguous, such answers were given credit.

Q4 Candidates showed good understanding of this question involving an induction experiment. There was a surprisingly large minority of weaker candidates who could not recognise the term 'induction' in reference to generating a voltage.

Q5 This question was very well answered by most candidates. A significant number of weaker candidates could not identify UK Mains voltage correctly as 230V, with 12V being a very popular choice instead.

Q6 This question differentiated well across the ability range. The majority of candidates correctly calculated the voltage across the 3 Ω resistor. Better candidates showed formula and working out, although no additional marks were available for this. Weaker candidates could not identify the steps involved in calculating the voltage across the battery.

Q7 This question also differentiated well across the ability range. Most candidates could easily identify an ac output, but very few correctly chose ‘B’ as the graph showing how resistance changes with temperature for a thermistor. Some candidates seem to have not picked up on the instruction that graphs could be chosen more than once in this question.

Q8 The majority of candidates could successfully order the electromagnetic spectrum in terms of wavelength. Some candidates who scored high marks elsewhere, surprisingly slipped up here. A significant minority of candidates did not select a part of the spectrum as their answer in part b). ‘Ionising radiation’ was often quoted by such candidates. As this is not a named part of the spectrum, no credit was given to such answers.

Q9 Most candidates were able to successfully link processes to explanations in this question, but some found it more difficult to link the observations given to the associated processes. Many candidates did not link boxes using a ruler and, where necessary, did not make clear alterations to changed answers. Where possible to decipher, such answers were given due credit, but some candidates lost marks due to ambiguity in the links that they drew.

Q10 This question was answered well by many candidates, but very poorly by others. It appeared that some candidates had learnt this well, often as a whole centre, but others displayed little or no knowledge of the topic. Some candidates could not identify ‘C’ as an analogue wave and a similar number were reluctant to choose ‘B’ a second time for the final answer. This question could be used by centres to help emphasise this common error to candidates.

Grade Thresholds

General Certificate of Secondary Education
Physics A (Specification Code J635)
January 2008 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
A331/01	Raw	42	N/A	N/A	N/A	29	24	19	15	11	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A331/02	Raw	42	36	32	27	23	17	14	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A332/01	Raw	42	N/A	N/A	N/A	27	24	21	18	15	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A332/02	Raw	42	35	29	23	18	13	10	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0

Specification Aggregation Results

Overall threshold marks in UMS (i.e. after conversion of raw marks to uniform marks)

	Maximum Mark	A*	A	B	C	D	E	F	G	U
J635	300	270	240	210	180	150	120	90	60	0

No candidates were entered for aggregation this series. First aggregation opportunity is in June 2008.

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553