

Report on the Units

June 2007

J649/MS/R/07

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 Report.

© OCR 2007

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 870 6622
Facsimile: 0870 870 6621
E-mail: publications@ocr.org.uk

CONTENTS

General Certificate of Secondary Education J649

Applied Science Double Award J649

REPORTS ON THE UNITS

Unit	Content	Page
B482/01		1
B482/02		5
*	Grade Thresholds	9

B482/01: Applied Science: Double Award, Foundation Tier

General Comments

The Foundation Tier paper is intended for candidates who are operating at grade C or below. The majority of candidates had clearly been well prepared for the exam and performed within the target range. There was little evidence to suggest candidates had been incorrectly entered for the tier. Questions 5 and 6 were shared with the Higher Tier and tested to grade D and C standard with some opportunity for extended writing. Few candidates performed well on these questions. The remaining questions were almost always targeted at grades G, F and E standard. It was a pleasure to see most candidates performing well on these questions. The candidates used their time well, with very few part questions left blank.

There was some evidence of weakness in expressing scientific ideas using appropriate scientific vocabulary. The consequence of this was that the answers often lacked precision and were ambiguous. It is important for all questions that candidates try to make specific scientific points, using scientific vocabulary, rather than broad generalised statements.

There was little evidence of candidates misinterpreting the rubric. Candidates appeared to have sufficient time to complete the paper, with the vast majority of candidates attempting all questions.

Comments on Individual Questions

Q 1

- a Very few candidates were able to correctly identify the three ways heat loss occurs from the house. Conduction and convection were commonly confused. Many weaker candidates included endothermic and exothermic in their answer.
- b Many candidates could suggest ways of reducing heat loss, with double glazing and roof insulation and draft exclusion being the most common.
- c Most candidates simply repeated the question saying that less heat was loss. Many extended this to the idea that less energy was needed. However very few explained why this reduced bills.
- d Only the best candidates identified both global 'warming' and 'renewable' as correct. Many scored one or the other. The incorrect choices appeared to be equally attractive.

Q 2

- a This question was answered well by nearly all candidates. In part (ii) laminate flooring was the most common error, possibly confusing insulation and fire resistance.
- b Nearly all candidates scored both marks, the few errors were usually 'looks like wood'.

Q 3

- a The correct response of 'continents' was not popular; the most common choice was volcanoes. Many candidates successfully identified appropriate natural disasters; by far the most common mistakes were tornado and other meteorological events.
- b This was poorly answered with few candidates able to give correct symbols for Oxygen (O or O₂) or Nitrogen (N or N₂) and even fewer able to subtract 21 and 1 from 100.
Most candidates identified carbon dioxide as the greenhouse gas, with Nitrogen the most common error. Many candidates could give a result of the greenhouse effect, most commonly global warming, however few went on to give a second effect.

- c **Teacher's Tip**
Candidates are expected to know the correct symbols for elements and compounds listed in the specification, variations such as N², n, O₃ will not be credited.

Q 4

- a Few candidates could give the meaning of exothermic. Even when they recognised it was related to temperature or heat they had difficulty in expressing the idea clearly.

Teacher's Tip
Questions are often designed to assess the meanings of scientific terms in one way or another. Candidates should learn the meaning of scientific terms given in the specification.

- b This was generally well answered The most common error was that calcium sulphate did *not* contain 3 different types of atom.
- c This was well done most candidates scoring 2 or 3 marks; the most common error was having neutrons in place of electrons and electrons in the nucleus. It was pleasing to see few candidates confusing neutron and nucleus.

Q 5 This question was common with the higher tier paper.

- a Candidates had a tendency to get muddled between energy costs and maintenance costs; it was quite common to have answers given in the wrong part of the question. In part (i) most candidates identified the sun as the energy source, but failed to mention that it was 'free'. In part (ii) the difference in life between bulb and LED was spotted, but often confused with life of the sign. Surprisingly few candidates mentioned replacing bulbs or LEDs as an issue.
- b About half the candidates were familiar enough with Sankey diagrams to score marks, however a large proportion of candidates just copied the previous diagram.
- d Few candidates appreciated what was being asked for in this question. The link to the Fuels used to produce the mains electricity was rarely made. When it was the most common mark was to identify them as non-renewable. Otherwise some candidates gained a mark for the idea of power cuts. Many candidates repeated the answers they had given in part (a).

Q 6 This question was common with the higher tier paper.

- a Most candidates identified the heart rate as less than normal, but only a few quantified the rate as 60 beats per minute or 1 per second.
- b This was very badly done. Very few candidates scored more than one mark, this usual for 'blood from the lungs'. A common misunderstanding appeared to be the idea that blood flows into one side of the heart and out from the other.
- c Nearly all correctly identified the red blood cell. Very few knew the functions of the parts of the blood; white blood cells were best understood. Common misconceptions were red blood cells transporting *blood* and platelets *preventing* clotting.

Q 7

- a This was very well answered by nearly all candidates, with the exception of part (v) were only a few identified the two DNA samples as being the same.
- b Candidates showed a good grasp of the differences between selective breeding and cloning. Many candidates scored full marks and most scored at least two.
- c This was not well answered. Nearly all those who attempted this assumed that a clone would be a fully grown replica of its parent, and based answers on this. Very few identified medical and/or ethical reasons.

Report on the Units taken in June 2007

B482/02: Applied Science: Double Award, Higher Tier

General Comments

The higher tier paper is designed to test the knowledge and skills of candidates performing at grades CC to AA*. This session there was a great deal of evidence to suggest that many candidates had been mis-entered for the higher tier paper. The performance of candidates was poorer than in previous sessions, leading to a drop in the mean mark on the paper of almost 10 raw marks. In addition, the candidates' answers to the 'higher tier' questions (4 to 6) which were designed to test grades BB to AA* were very poor, raising issues about whether the candidates had covered the higher tier statements in the specifications in their lessons. The higher tier statements are given in the right hand column in the specification. These must be taught to all candidates who are entered for the higher tier paper.

Teacher's Tip

Students who have followed mainly a foundation tier course need their knowledge 'topped up' by addressing the higher tier statements before they attempt the higher tier paper to give them a fair chance at answering the questions.

It is important that candidates learn the list of formulae given in appendix D (as attached to this report) of the specification. It is clear from many papers that candidates do not know these essential formulae.

In answering the higher tier questions, it is very important that candidates tailor their answers to 'higher tier science' and that they give enough clear points to match the number of marks available. A common reason for poor scores was that many candidates give vague, 'everyday' answers rather than pausing to think about how they can answer more fully using science they have learned in lessons.

There was little evidence of candidates misinterpreting the rubric. Candidates appeared to have sufficient time to complete the paper, with the vast majority of candidates attempting all questions.

Comments on Individual Questions

- Q 1** This question was an 'overlap' question designed to test candidate at grades DD and CC. It also appeared on the foundation tier paper.
- a Most candidates identified the heart rate as less than normal, but only a few quantified the rate as 60 beats per minute or 1 per second.
 - b This was very badly done. Very few candidates scored more than one mark, this usual for 'blood from the lungs'. A common misunderstanding appeared to be the idea that blood flows into one side of the heart and out from the other.
 - c Nearly all correctly identified the red blood cell. Fewer knew the functions of the parts of the blood; white blood cells were best understood. Loose wording sometimes lost marks eg 'white blood cells stop you being ill'. Common misconceptions were red blood cells transporting *blood* and platelets *preventing* clotting.

Q 2 This question was also common with the foundation tier paper.

- a Candidates had a tendency to get muddled between energy costs and maintenance costs; it was quite common to have answers given in the wrong part of the question. In part (i) most candidates identified the sun as the energy source, but failed to mention that it was 'free'. In part (ii) the difference in life between bulb and LED was spotted, but often confused with life of the sign. Surprisingly few candidates mentioned replacing bulbs or LEDs as an issue.

Teacher's Tip

Use this question as a practice question to help students realise the importance at reading the question and tailoring their answer to match. In this case, writing down facts about solar panels does not gain marks – it is important that the correct points are emphasised in the right places. Compare the questions and markschemes for parts a and c.

- b At higher tier, most candidates correctly completed the diagram. A common error, however, is to make the end of the arrow small, but have the arrows equal thickness where they divide from the main arrow – this was not given credit.
- c Few candidates appreciated what was being asked for in this question. The link to the fuels used to produce the mains electricity was rarely made. When it was the most common mark was to identify them as non-renewable. Otherwise some candidates gained a mark for the idea of power cuts. Better candidates identified that most of our electricity is produced from burning fossil fuels, and some went on to discuss specific environmental problems that this can cause.

Q 3 This question was based on new material from the new section 2.6 Planet Earth.

- a This was intended to be straightforward. However, many candidates did not realise that when percentages are presented in a table, they must all add up to 100. Hence, some guesswork appeared to operate here.

Teacher's Tip

Check the new specification for differences with the old – this is a new section and needs to be incorporated into the existing course. There are other minor changes across the specification.

- b This was well answered by most. Most stated that gas X has increased while carbon dioxide has decreased. However, very few suggested the name of gas X as being nitrogen. All gases were seen including 'hydrogen' and 'fossil fuel fumes' (both common answers). A knowledge of the gases in the air and their relative abundance is a clear specification statement.
- c This was better answered. Most knew that plants produce oxygen by photosynthesis.
- d Again, this was well answered, with most having a good understanding of the relationship between plants and animals and their effect on the atmosphere. A common error was to discuss plants *breathing* out oxygen and *breathing* in carbon dioxide. Such answers did not score.

Q 4 This question was the first of the questions targeted at higher tier only performance. As such, it was designed to test candidates working at BB and above. The specification content was higher tier material (the right hand column on the specification). It appeared that most candidates had not covered the necessary science in their lessons. Answers were very poor across almost all centres.

- a Surprisingly few recognised the cell division as mitosis. Many candidates gave answers such as 'cancer', 'division', 'tumour'.
- b Very few could label chromosomes and 'spindle' was almost never seen.

Teacher's Tip

The candidates must know the higher tier specification content if they are to be entered for the higher tier paper.

- c Again, candidates did not appear to have the knowledge necessary to tackle this question. Some gained a single mark for two ticks in the correct places.
- d Candidates performed better here. Vaccination is not a right hand column statement on the specification, which may explain why many candidates understood what happens. Most know that white blood cells produce antibodies in response to vaccination which gives a future immunity. Common errors were to think that the vaccine contains a *small amount* of the virus, rather than a dead or weakened form. Some candidates confused antibodies and antigens.

Q 5 Again, this question was based on composites, with the emphasis on cross linked polymers and clay structure before and after firing. These are also found in the right hand column statements on the specification. Again, poor responses were given.

- a Most mentioned that this composite has a layered structure; fewer stated that the layers are bonded together. Vague answers were given for the advantages of composites over other materials. Some gained marks for stating specific properties that composites have eg stronger/lighter. Many wrongly stated that making composites 'saves natural materials like wood'.
- b This question was very poorly answered. Very few discussed either molecules or structures in their answers. Almost no candidate used the term 'cross link' – a clear specification term, implying that many had not been taught about cross links in their course.
- c Again, candidates did not know the changes that happen to clay when it is fired. Almost nobody drew cross links in the second diagram, although some did know that the layers in fired clay are closer and that water is not in the structure. Many wrongly thought that the layers became wider, and hence drew thicker clay layers after firing. Few could state how the properties of clay change after firing.

Teacher's Tip

If the school does not have a kiln, use terracotta-coloured air hardening clay in the lesson. Ask students to make a small 'brick' and test it's properties before and after it has been left to dry. Use this question to practice drawing the change in structure.

- Q 6** The last question on the paper was also targeted at grades BB and above.
- a This was intended to be an easy 'lead in' to the question, but surprisingly few candidates realised that the coolant would be hottest just above the engine. In part (ii) candidates were very confused about how coolants in heat exchangers work. Many discussed hot *air* from the car heater going through the engine.
 - b Very few could correctly give conduction, convection and radiation as the three methods of heat transfer.
 - c About half the candidates correctly carried out the calculation, but almost nobody used the information in the table to evaluate the relative benefits of using water and antifreeze in car engines.

**General Certificate of Secondary Education
Applied Science Double Award (J649)
June 2007 Assessment Series**

Unit Threshold Marks

<i>Unit</i>		Maximum Mark	a*	a	b	c	d	e	f	g	u
B482/1	Raw	60	n/a	n/a	n/a	36	30	34	18	12	0
	UMS	69	n/a	n/a	n/a	60	50	40	30	20	0
B482/2	Raw	60	44	37	30	23	15	11	n/a	n/a	n/a
	UMS	100	90	80	70	60	50	40	n/a	n/a	n/a

For a description of how UMS marks are calculated see;
http://www.ocr.org.uk/exam_system/understand_ums.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

(General Qualifications)

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

© OCR 2007

