



**GCSE**

**Science B J640**

**Gateway Science Suite**

**General Certificate of Secondary Education**

## **Report on the Units**

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**June 2008**

**J640/MS/R/08**

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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.

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#### **Gateway Science B (J640)**

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# B621/01 Foundation Tier

## General Comments

The paper produced a mean mark of 31.6, again demonstrating that most candidates could show what they know, understand and can do. There was a good spread of marks ranging between zero and 57, with a standard deviation of 8.5. Assistant examiners and team leaders thought that the level of difficulty of the paper was appropriate. Candidates were able to access the paper well with very few questions omitted. There was no evidence of lack of time.

The paper differentiated well with C grade candidates scoring well on the more demanding questions. A small number of candidates would have benefited from entry to the higher tier paper, but centres' entry policies are generally good.

37 marks were required to gain grade C and 19 for grade F.

## Comments on Individual Questions

### Section A (Module B1)

#### Question 1

A significant number of candidates scored 4 marks on this question. Candidates who did not score full marks usually correctly linked the heart to 'pumps blood around the body' and the artery to 'carries blood around the body under pressure' but often incorrectly linked the pancreas or skin to 'detects the balance of the body'.

#### Question 2

**2(a)** was well answered with most candidates scoring 3 marks. A significant number of candidates only wrote in two responses limiting themselves to 2 marks.

**2(b)** produced a range of marks. Better candidates scored 2 marks for 'DNA' found in the 'nucleus'. A number, however, wrote them the wrong way around and failed to score. A number of candidates gained 1 mark for a correct response but then coupled it with either 'egg' or 'cytoplasm' and lost the second mark.

#### Question 3

The majority of candidates correctly stated 4 units in **3(a)(i)**, but not all continued to state 0.08 in part **(ii)**. Incorrect answers in part (i) carried forward the error and could score in part (ii). 0.8 was a careless error in part (ii) that was commonly seen.

In **3(b)**, most candidates scored the first mark for recognising that Belinda was over the legal limit or had excess alcohol in her blood, but only the better candidates then went on to score the second mark for commenting on the effect that alcohol would have on her body.

#### Question 4

The majority of candidates knew that protein is used for growth and repair in **3(a)(i)**. 'Carbohydrate' was the most common incorrect answer. In part **(ii)**, most candidates correctly stated that fibre prevents constipation. Incorrect responses (usually fat) were more common than in part (i).

In part **(b)(i)** most candidates understood that digestion is the break down of food, although a number gave a description of where the food went after digestion and not what happened to it **during** digestion. Part **(b)(ii)** was poorly answered by all except the best candidates. 'Stomach' or just 'intestine' were common incorrect responses for the first part whilst the enzyme 'lipase' was hardly seen at all.

**Section B (Module C1)****Question 5**

In part **(a)**, the majority of candidates correctly stated that E160 is a food colour. Part **(b)** was less well answered. The majority of candidates do not understand that the ingredients are listed in order of quantity. Common incorrect answers included carrots, E160 and wheat flour.

Better candidates realised that there were four elements in sodium benzoate in part **(c)**. Many candidates counted the total number of atoms (15). They did not always manage to do this correctly with '14' and '16' appearing commonly.

In part **(d)** better candidates correctly stated that antioxidants stop food from reacting with oxygen. Carbon dioxide was a common incorrect answer.

**5(e)** revealed that a surprising number of candidates were not aware that mayonnaise contains an emulsifier. Better candidates gained this mark. All three incorrect answers featured approximately equally.

**Question 6**

Part **(a)** differentiated well. Grade C candidates understood the idea of a finite resource which takes a long time to form. Weaker candidates invariably wrote variants on the theme of 'can't be used again' and failed to score.

The majority of candidates scored the mark in part **(b)(i)** for correctly recognising the harm that oil slicks can cause to wildlife. In part **(ii)** a large number of candidates confused cracking with fractional distillation. Only the best candidates scored both marks. The most common incorrect responses were 'cracking separates crude oil into fractions' and 'cracking works because different fractions have different boiling points'.

**Question 7**

A surprising number of candidates omitted parts of this question. Most scored the marks in part **(a)** with 'plastic bags' being the most popular answer to part **(i)** and 'clothing' to part **(ii)**. Some weaker candidates misunderstood the question and gave properties of poly(ethene) and nylon.

Part **(b)** discriminated well with the best candidates scoring all three marks, often for references to landfill sites, non-biodegradability or disposal by burning. Weaker candidates wrote that councils should recycle polystyrene and failed to score.

Part **(c)** also discriminated well. More able candidates knew that the polymer was not a hydrocarbon because it contains oxygen. Weaker candidates gave reasons such as 'there's a double bond', 'there isn't the same number of Cs and Hs' or 'its got oxygen and nitrogen in it' The latter comment presumably refers to the presence of 'n' in the formula.

**Question 8**

Part **(a)** was aimed at grades C and D and discriminated well. Better candidates quickly and succinctly homed in on availability, flammability, storage or toxicity scoring one or both marks. Weaker candidates referred to the container or included references to explosions, environmentally friendly or made vague references to safety or cost.

Very few candidates scored 2 marks in part **(b)** and many failed to score. Carbon dioxide was the most common correct response but rarely with water. Hydrogen and carbon were frequent incorrect answers demonstrating that complete combustion is not well understood.

Part **(c)** was generally well answered although acid rain was a common misconception.

Report on the Units taken in June 2008

### Section C (Module P1)

#### Question 9

Most candidates scored well in both parts **(a)** and **(b)**. No incorrect response seemed to occur more than others.

#### Question 10

In part **(a)**, the majority of candidates correctly matched the method of insulation to the place of use and scored 2 marks.

In parts **(b)(i)** and **(ii)** candidates tended to score both marks or zero. Better candidates correctly calculated 2 years in part (i) and £2000 in part (ii). A number incorrectly stated £200 in part (ii) possibly because they did not have access to a calculator. Parts **(iii)** and **(iv)** discriminated well at grade C with only the better candidates understanding that the foil reflects heat. Weaker candidates thought that the foil produces heat or stops heat escaping. Only a very small number of candidates understand that air is important in loft insulation and double glazing because it is a good insulator. Most thought that air is important because 'we need it to breathe'!

#### Question 11

In part **(a)**, the majority of candidates gained at least 1 mark with a relatively small number gaining all three. 'Wavelength' was the most frequent correct answer with 'crest' and 'amplitude' often reversed. The cueing of 'distance between' could indicate why the second part was answered better than the other two.

Part **(b)** was well answered by the majority of candidates.

#### Question 12

In part **(a)**, many candidates appreciated the portable nature of wireless technology, but some did not state the more obvious answer that no cables or wiring are needed. Some answers referred to the advantages of a phone rather than a **mobile** phone.

In part **(b)**, a range of correct answers was given, although many candidates only scored 1 mark as they suggested two dangers to humans. Risks of sparks and dangers to humans living near the mast were never seen. The idea of interference was rare but scored the mark.

# B621/02 Higher Tier

## General Comments

Many candidates performed to a good standard throughout the paper with levels of performance in the three sections of the paper being fairly comparable. Candidates appeared to have sufficient time to complete the paper. The grammar and punctuation were appropriate to this level of examination and generally the examiners had no problems in interpreting the writing. Unfortunately some candidates were unable to express themselves clearly in certain places and this may have lost them marks.

There were specific weaknesses in the genetics questions and in question twelve, concerning the comparisons between digital and analogue signals.

For a small number of candidates a foundation tier entry may have been more appropriate.

## Comments on Individual Questions

### Section A (Module B1)

#### Question 1

**(a)(i)** Few candidates did not achieve this mark; a minority suggested '3', a smaller number '2' and a minority '2.5' or very high numbers such as '98'.

**(a)(ii)** Those candidates correctly giving '4' in '1a(i)' also gained this mark. Similarly, those suggesting '3' correctly gave the 'ecf' answer. A few answers included the incorrect magnitude such as '0.8', '8' or '80'.

**(a)(iii)** Most answers were awarded at least one mark, both marking points being equally common. Most candidates could give either 14 or 15 for the second marking point but there were a few references to '7.5', '13', '25'. There appeared to be no suggestion that the candidates did not understand the fundamentals of the question but a few just did not interpret the data correctly.

#### Question 2

**(a)(i)** A minority of candidates appeared to understand the importance of digestion. The majority of candidates gave vague answers such as 'for use in the body', 'too big for the body' or 'to liberate the food or food value'. This question was a good discriminator between the more able candidates and the rest.

**(a)(ii)** The more able candidates achieved all three marks. Most candidates were able to score at least one mark, mainly for one of the many spellings of 'lipase'. This is a basic biology question and it was hoped that more candidates would score full marks.

**(b)** Well answered by most candidates, with two being the modal mark, mainly for 'antigen' and 'antibody'. 'Bronchiale' was sometimes substituted by 'antigen' or 'antibody'. Most candidates did not achieve the third marking point with 'capillaries' and 'trachea' being given.

### Question 3

(a) A number of candidates gave the correct bases; various other suggestions included, 'u' and 'v', 'a' and 'b', 'p' and 'q' and 'a' and 't' i.e. there was no connection, in most cases, with genetics.

(b) Relatively few candidates gained a mark, with incorrect references to 'cell damage' and 'the nucleus disintegrating'.

(c) Similar to (b) with references to 'cell damage' and with only a minority of candidates making the connection between gene and gene product.

(d) There were a number of references to 'chemical', 'gamma radiation', 'X rays' and 'nuclear radiation' but many candidates had very little idea of mutagens.

### Question 4

(a) A number of the candidates were under the impression that insulin increases blood sugar or is produced in the liver. Of those candidates who appeared to understand the action of insulin a number lost marks for failing to refer to the importance of 'blood' sugar.

(b) The correct box was ticked by most of the candidates.

(c) Many candidates scored one mark here for reference to activity or feeding patterns but many did not relate this to changing blood sugar levels.

### Section B (Module C1)

#### Question 5

(a) Most candidates answered correctly.

(b)(i) Rarely incorrect, with 'lemonade' and 'potato chips' being given as incorrect alternatives.

(b)(ii) Well answered by most of the candidates with many gaining both marking points.

(c) The concept of 'active packaging' was rarely understood by candidates. Examples predominantly centered on passive packaging such as 'keeping bacteria out' and 'preventing moisture entering'. Active and intelligent packaging was sometimes confused and so few candidates achieved a mark for this part. Most correct answers centered on 'beer frothing', 'oxygen removed' and 'moisture removed'.

(d) Most candidates achieved both marks for this part, predominantly for correct reference to 'taste', 'texture', 'food poisoning' and 'killing bacteria'.

#### Question 6

(a) A number of candidates confused reversible with sustainable and so failed to score here. Most correct answers included reference to 'time, mostly millions' and 'finite resource'.

(b)(i) Most answers centered on 'killing' or 'harming wildlife'.

(b)(ii) Rarely incorrect.

(b)(iii) The modal mark was one, with some reference to the products. The more able candidates did achieve both marking points.

### Question 7

(a) Most candidates identified the presence of oxygen. Incorrect responses included 'the presence of double bonds'.

(b)(i) Most candidates achieved a mark for this part for reference to water being too large. Many candidates referred to 'sweat' but few to either 'evaporated sweat' or 'water vapour'.

(b)(ii) Most candidates understood the need for nylon in terms of a second coating but often gave the wrong qualification such as being pliable or durable. Only a minority of candidates appeared to understand the importance of nylon as a strong support material or indeed the converse for PTFE.

### Question 8

(a) An open mark scheme allowed most candidates to achieve at least one mark and many scored the second mark. Lack of correct qualification was the main reason why candidates did not achieve a mark, as for example reference to 'safe' and 'dangerous'.

(b) Most candidates achieved at least one mark for this part with many also gaining the second marking point. A minority of equations were not awarded a mark due to the wrong size of symbol or failure to use subscript correctly.

### Section C (Module P1)

#### Question 9

(a) The more able candidates achieve both marking points and many others achieved one mark, mostly for correct reference to 'bond' unqualified but some references to 'particle' were also observed. Many answers just included reference to 'change in state', 'molecular vibration' and 'latent heat'.

(b)(i)(ii) Predominantly if 'b(i)' was answered correctly so was 'b(ii)'.

#### Question 10

(a) Candidates were fairly evenly split between three, two or zero marks. Rarely was one marking point awarded.

(b)(i)(ii) Both mostly correct with no trends in the few incorrect answers.

#### Question 11

(a) A significant number of candidates were under the impression that dark skin absorbs less UV light. There were many vague references to 'pigment' and overall few inclusions of the comparator.

(b) Predominantly correct; very few references to '15'.

(c)(i) This question was quite well answered; a minority of candidates included the word 'reflect' but the majority of answers not worthy of a mark omitted reference to 'UV'.

(c)(ii) Most candidates could recall the term CFCs but many were not awarded the mark for including in some form the greenhouse gasses.

**Question 12**

**(a)** Many answers were not awarded the mark for omitting any reference to time. There were a significant number of references to wave form and to amplitude.

**(b)** Most candidates could recall at least one problem associated with microwave signals with harm correctly qualified being the most common. Most of the marking points were observed; the main reason for not being awarded a mark was either being extremely vague or in a few cases not giving any answer.

**(c)(i)** Pleasingly, many candidates could answer this question. Answers not mark-worthy included reference to wave quality and how far the wave could travel.

**(c)(ii)** With few exceptions, only those candidates referring to 'multiplexing' achieved the mark. Rarely, was correct reference to signal travelling given because most candidates omitted the key statement of 'at the same time'.

**(c)(iii)** A small number of candidates achieved a mark, predominantly for reference to 'noise is not amplified with the signal'.

# B622/01 Foundation Tier

## General Comments

Centres entry policy was very well targeted with only a small proportion of candidates whose performance suggested that they should have taken the Higher examination paper.

The mean mark for the examination paper was approximately 32 and the highest mark awarded was 57. The examination successfully discriminated between the target grades (C to G).

Most questions were attempted by the candidates. All the candidates made an honest attempt at the questions, there were few frivolous answers. The paper had enough challenging questions for the more able candidates, while giving the lower ability candidates an opportunity to score.

## Comments on Individual Questions:

### Section A (Module B2)

#### Question 1

**1(a)** was generally answered correctly, lake being a common misconception.

**1(b)(i)** was correctly answered by the vast majority of candidates, but **(b)(ii)** was frequently answered incorrectly, 'food', 'air' and 'water' being common incorrect responses.

Very few candidates scored both of the available marks for part **(c)**, but most managed to get one.

Although most candidates scored at least one and many scored both marks for **(d)**, very few seemed to actually grasp the 'use' of glucose derived from photosynthesis. Some gained two marks from describing the 'storage of energy' to carry out photosynthesis.

**1(e)** was generally answered correctly, but the belief that there is more carbon dioxide and/or water available in summer was fairly common. Many also felt that 'more Sun' was an adequate answer. Frequently candidates failed to use a comparison.

#### Question 2

**2(a)** was very rarely answered adequately to allow a mark to be given, many incorrect responses referred to 'long distance' vision and bears being able to see 'in front of them' or 'to see their prey better'.

**2(b)** and **(c)** were generally well answered. Correct answers to **(c)** other than those relating to fur thickness and/or colour were very rare. Many lost a mark through referring to 'lots of fur' or 'long fur' but still obtained the second mark.

#### Question 3

**3(a)** For a G grade question this was not answered particularly well with many candidates giving answers to do with temperature rather than food and some candidates repeating back the stem of the question.

## Report on the Units taken in June 2008

**3(b)** This was a very poorly answered question many candidates' answers referred to avoiding Alaskans hunting for baby whales. Other candidates frequently said too cold but failed to mention in Alaska.

**3(c)** This question was found by candidates to be the most difficult one on the paper. Common answers were, 'won't run out' or 'won't become extinct'. Very few had the idea of maintenance of levels.

**3(d)** A large number of candidates scored 1 mark for safety or conservation arguments but a large number of the arguments against were just opinions and not reasons worthy of credit.

### Question 4

**4a(i)** was answered correctly by most candidates, but **4(a)(ii)** and **4(b)** rarely gained marks.

Many incorrect answers in **4(a)(ii)** referred to 'more people', 'pollution' or using more sulfur dioxide.

Popular incorrect responses in **4(b)** featured 'global warming', 'climate change' and depletion of the ozone layer.

### Section B (Module C2)

#### Question 5

**5(a)(i)** and **5(a)(ii)** were well answered.

A number of candidates were able to score 1 mark in part **5(b)** but few mentioned a second way, such as stirring or use of a catalyst. Many candidates mentioned changing the amount of substance used, not really understanding the meaning of concentration.

Most candidates were able to score 1 mark for **5(c)(i)**, surprisingly only 50% of candidates named salt as the correct response in **(c)(ii)**, water being often given.

#### Question 6

There were many suggestions of glucose, hydrogen, carbon monoxide and even water for **6(a)**, but a reasonable proportion of candidates did answer correctly.

Most candidates did gain at least one mark for **6(b)**, but "carbon dioxide" was frequently used as one of the two answers. Many gained a single mark for unbalanced equations, but very few managed to gain the second mark for balancing the equation correctly. Centres should continue to encourage candidates to use subscripts and lower case letters in formulae where appropriate. Carbon Dioxide was too often written as Cobalt, Co2.

#### Question 7

The vast majority of candidates scored well on part **7(a)** with the most common error being that of repeating one or two of the materials mentioned in the question.

**7(b)(i)** was poorly answered, with few candidates able to give calcium carbonate as the chemical name for limestone and marble. Few candidates were able to state how many atoms of carbon were in the formula of calcium carbonate.

This question, **7(b)(ii)** was found by candidates to be the second most difficult question on the paper.

Report on the Units taken in June 2008

### Question 8

**8(a)** was well answered.

Only the more able candidates were able to respond correctly to what is meant by thermochromic paint in **8(b)**.

A surprising number of candidates only ticked 1 box in response to **8(c)**.

### Section C (Module P2)

#### Question 9

**Q9** This question had 4 correct responses. Most candidates were able to score at least 2 marks.

#### Question 10

A considerable number of candidates dropped a mark by putting 'alternate' or 'alternative' instead of alternating current in answers to **10(a)**.

**10(b)(i)** was poorly answered, only the more able gaining credit. Many candidates listed renewable sources as their answers with solar appearing relatively frequently. Very few answered **10(b)(ii)** correctly. **10(b)(iii)** confused many candidates.

Only the more able candidates were able to complete the calculations in **10(c)(i)** and **(ii)**. It was disappointing to see a number of candidates unable to multiply  $12 \times 8$  incorrectly. A number of candidates were given a mark in **10(c)(iii)** for e.c.f.

#### Question 11

Question **11(a)** was well answered.

**11(b)** was well answered by more able candidates. Weaker candidates failed to name the radiation and just described the diagram.

#### Question 12

Surprisingly few got both marks for **12(a)**, but most did score at least one.

Better candidates were able to give the correct answer to **12(b)** but a number of candidates gave electric current or electric field as their answer.

#### Question 13

Although most got at least one and many got two marks, relatively few got all three available marks. The commonest mistake was the 'stars have a finite size' option.

# B622/02 Higher Tier

## General Comments

The paper performed well with all marks being accessible. The mean mark was up on last time and candidates seemed to have been well prepared for this paper. Candidates often failed to score – not through totally incorrect answers but through vague answers which missed out on detail. Most of the candidates were entered for the correct tier with very few achieving single figure marks

## Questions on Individual Questions

### Section A (Module B2)

#### Question 1

Most candidates were able to identify two characteristics of daphnia from the key in part **(a)**.

In part **(b)** the majority of candidates stated that invertebrates had no backbone, although a few thought it had no internal skeleton.

Most candidates correctly answered part **(c)** although some candidates wrote 'more sun in summer' and this failed to score. Examiners were looking for more sunlight or just more light, longer days or warmer.

Part **(d)(i)** was often only half answered, candidates were able to state that the more bicarbonate the more bubbles were formed but often did not go on to say 'but after 0.06g it levelled off'. Candidates who identified the gas as carbon dioxide did not score.

**(d)(ii)** was answered poorly with only the best candidates scoring any marks. It was apparent that candidates did not understand the term 'limiting factor' and many repeated their answer to the previous part of the question.

#### Question 2

Most candidates gave a suitable adaptation in part **(a)** and were able to explain the adaptation satisfactorily. Approximately half the candidates knew that hybrid was the offspring of two different species

In **(b)(i)** a similar number stated that the offspring of polar and brown bears are fertile.

#### Question 3

Whilst most candidates could give satisfactory reasons for and against keeping whales in captivity for part **(a)** less were able to explain how to hunt and sustain the whale population in part **(b)**. Examiners were looking for the idea of limiting the numbers killed and leaving enough to breed and maintain the population. The key word in this answer was 'enough' and Examiners did not credit 'some left to breed'.

Report on the Units taken in June 2008

#### Question 4

This question was about the effect of increasing population on the environment. Candidates should remember that they are entered for a higher paper and trivial answers were not accepted.

In part (a) most candidates identified acid rain or one of its effects as the problem.

Very few candidates knew the word exponential to describe this kind of growth in (b).

In part (c) Examiners were looking for an increase in some named pollution (not sulfur dioxide as that is in the question) and some indication of a shortage of named resource. They did not accept simply 'need more food' without explanation at this level but 'shortage of food' was acceptable. The need for more food is not a problem until it is not available, or means that habitats have to be destroyed to grow the food etc.

#### Section B (Module C2)

##### Question 5

In part (a), most candidates were able to identify C as the most concentrated thiosulfate solution.

In part (b), the majority of candidates scored one of the marks for stating that the particles moved quicker or gained (kinetic) energy fewer candidates scored the last two marks. The marks were given for a greater **rate** of collisions often expressed as more collisions **per second** or higher **frequency** of collision and the final mark for the collisions being successful. The ideal answer in this case would be similar to: 'The particles are moving faster and so have a greater rate of successful collisions'.

Surprisingly, candidates were unable to identify salt as the cause for faster rusting at the seaside, in part (c).

Most candidates gave oxidation, the correct answer in part (d).

##### Question 6

In general, in part (a), candidates were able to write an unbalanced equation balancing proved difficult for many of them. Candidates need reminding of the conventions about size and positioning of numbers and which numbers cannot change.  $\text{CO} + \text{O}_2 = \text{CO}_3$  was a common incorrect way of balancing the equation.

In part (b) the majority of candidates identified the two processes in the carbon cycle correctly although photosynthesis was a common error in (i).

Part (c) produced some strange answers. A significant number of candidates did not read the question 'Suggest how the composition changes' and did not give an answer to this part. They then went on to explain why it changes. Examiners were looking for photosynthesis or a description of this process in the answer.

##### Question 7

The majority of candidates knew the answer to part (a) however often failed to score full marks by not reading the question. The question clearly stated 'use ideas about rock types'. Without the words sedimentary and metamorphic applied correctly the candidates could not gain full marks.

In part (b) over 90% of candidates correctly linked the material to its rock.

## Report on the Units taken in June 2008

### Question 8

This question discriminated well across the whole range. In part **(a)** candidates knew uses of thermochromic paints but only the most able could explain how oil paints dry in part **(b)**. Most candidates thought the oil evaporated rather than oxidised.

In part **(c)** several candidates ticked only one box despite there being 2 marks for the question.

### Section C (Module P2)

#### Question 9

Candidates were often vague in their answers to this question with answers such as environmentally friendly free or renewable – neither of which were acceptable. Examiners were looking for renewable *source of energy*, free *source of energy*, does not pollute the atmosphere, can be used in remote areas that have no electricity supply, etc. The most common disadvantage was does not work at night.

#### Question 10

Few candidates were able to explain the meaning of Alternating Current in part **(a)**. Common errors were that it could flow in all directions or any direction or that it changed direction (presumably only once). Examiners were looking for the idea that the direction of the current reversed several times each second. Expressions such as 'keeps reversing' / 'moving backwards and forwards' / 'to and fro' were acceptable but 'up and down' was not.

In part **(b)** Examiners were looking for the steam having kinetic energy, which made the turbine spin which in turn caused the generator to spin. This proved a difficult question for all but the most able candidate.

Part **(c)** Most candidates were able to correctly calculate the energy used and the cost.

#### Question 11

This question discriminated well across the whole range and the answers were much better than in previous years. Candidates in general explained why A was beta and also explained why B and C were not beta allowing them to score full marks.

#### Question 12

This proved a difficult question especially for the weaker candidate. Examiners were looking for any two of the following: 'Closing the switch causes a current to flow', 'the current makes the coil magnetic / an electromagnet / produces a magnetic field', 'the compass needle is attracted to the electromagnet / lines up with the field'.

#### Question 13

In part **(a)** weaker candidates thought this referred to time, only the most able gave the correct meaning of 'light year'.

Whilst most candidates stated they were moving only about half knew they were moving away from each other, in part **(b)**.

Part **(c)** Weaker candidates were unable to answer this question correctly. Better candidates knew that the light had a red shift. Because of the wording of the second question Examiners allowed either of the following answers: the larger the red shift or the faster they are moving.

# B625 Report on Gateway Science Skills Assessment

## A General Comments

Although this is the second year of this specification, for many centres who did not enter candidates last year, this was the first time work had been moderated.

The Skills Assessment for Gateway is very different from the previous Sc1 Coursework component of GCSE and which represented a 'common assessment element' for all Awarding Bodies. For Science, there are two components Can-Do Tasks and Science in the News.

The new Skills moderators appointed by OCR were provided with training in the new requirements, and it is very pleasing to report that the process of moderation, despite large numbers, went very smoothly and that most of the candidates who were entered gained great benefits from all aspects of the Skills Assessment.

Candidates were entered for Skills Assessment 1 (Can-Do tasks and Science in the News) for Science and separate Biology, Chemistry and Physics.

The table summarises the number of candidates in each specification.

| Specification | Subject   | Number of centres | Number of candidates |
|---------------|-----------|-------------------|----------------------|
| B625          | Science   | 762               | 90810                |
| B635          | Biology   | 202               | 7941                 |
| B645          | Chemistry | 150               | 5536                 |
| B655          | Physics   | 148               | 5419                 |

It is possible that candidates use the same piece of Science in the News for more than one specification. However, each specification is moderated separately so if the same piece of work is used it must be copied each time it is used. Marks cannot be just transferred from one specification to another.

## B Administration Matters

### Administration matters - general

Teachers are required to supply, for each of the candidates chosen in the sample, a breakdown of the marks awarded for the Can-Do tasks together with the marks awarded for each of the six Qualities in the Science in the News Task which had been chosen for assessment. Although the form gives spaces for dates these are for internal use and are not required by the Moderator.

It is pleasing to report that there were fewer arithmetical errors in Can-Do tasks than in the previous year. If moderators find any mistakes in the sample, the centre will be asked to check the arithmetic of the whole sample. Centres must use the Can-Do tasks in the system, they cannot devise their own. In a separate science e.g. Physics all the Can-Do tasks must be from the Physics list.

### **Administration matters – selecting tasks for Science in the News**

One of the strengths of Gateway Skills Assessment is that all of the materials which are required for each of the Science in the News tasks are provided by OCR and are available on the secure Interchange website. Teachers do not need to invent tasks to be done but can download suitable materials.

Initially one task was provided for each module B1, B2, C1, C2, P1 and P2. There were also tasks for B5 or B6, C5 or C6 and P5 or P6. A task set for P1, for example, cannot be used for B1 and a task from P5 or P6 cannot be used for Science.

New tasks have been added to the Interchange website in June 2007 and June 2008 to provide even more choice. There will be a continuing programme for the addition of new topics year by year to keep the specification up-to-date. No task will be removed from the listing during the lifetime of the specification but teachers may decide that some of the tasks have become less relevant with the passing of time. In this way it is hoped that OCR will be able to reflect any changes in the way in which the contents of the course are linked to current scientific issues.

At the initial INSET training sessions '*Should smoking be banned in public places?*' was used as an exemplar task for discussion and development but this was not included in the listing of the tasks available for assessment because it was felt it had lost relevance since the decision had been made and become law. A few centres still used this task for assessment this year and it was accepted so that candidates were not disadvantaged. However, it will not be accepted in future years.

There is the facility for centres to write their own Science in the News tasks. No centre has done this yet and obtained the necessary approval. Centres are reminded that if they want to develop their own SinN tasks they should seek advice from OCR before writing them, and that topics need to be approved before they are used.

There were some problems where centres were attempting to double enter from Entry Level. Tasks that were suitable for Entry Level e.g. Chocolate are not appropriate for GCSE Science.

### **Administration matters - Supervision of Skills Assessment**

Another of the strengths of Gateway Skills Assessment is that the assessed work is under the direct control of the teacher. All SinN are written under controlled conditions where the teacher can sign the Centre Authentication Form (CSS160) with confidence.

The teacher should give the candidates the OCR stimulus material for a task after the topic has been studied so that they are fully equipped with the background to the task. The teacher can read through the stimulus material and explain any scientific words but they must not give any opinion. The stimulus material is not differentiated and the same task is presented to candidates across the whole attainment range. One approach with lower-attaining candidates is to provide only the appropriate parts of the stimulus material, rather than presenting them with the complete document. OCR provides a writing frame which could be used with lower-attaining candidates. Centres are allowed to use their own writing frames providing they are generic i.e. the same writing frame for all tasks. Writing frames are not recommended for more able candidates as it will tend to limit their approach.

There is considerable evidence that candidates do their best when they are given independence to study the topic and look at both sides of the argument. Too often when reports are read one gets the impression that the candidate has really not looked at both sides of the issue.

### **Administration matters – research time**

Each topic requires the candidates to undertake some research for themselves in a period of approximately one week. This research could be done in school, either in the laboratory or a computer facility or it could be done at home. The candidates do not need to be supervised during this preliminary research and they do not necessarily need to work on their own. If the preliminary research is done in school, teachers can provide some materials to get the candidates started with their task. However, it was felt that in some centres the candidates had been provided with a complete list of source material for use and the necessary element of choice and selection for relevant aspects on the part of the candidate had therefore been removed. With the previous POAE system it was often felt in Strand A that teachers did not give opportunities for students to select appropriate equipment, it is similar here. The best reports came where students had the freedom to investigate the question set.

Where there are a large number of candidates in the sample it is reasonable to expect:

- different source materials to be used,
- different processing to be done, for example, not all candidates having the same bar chart display,
- candidates to answer the question in different ways.

### **Administration matters – supervised session**

When the preliminary research has been completed, the SinN tasks are written up under controlled conditions in the classroom/laboratory. Candidates are required to work independently and, although a time of 1 hour is suggested, the centre may use more or less time as required. If it extends beyond one lesson, the work should be collected in between the sessions and stored securely.

A limit of 400-800 words is also suggested in the specification. There is no automatic penalty for reports that are longer but long reports, often including large sections copied from a website/book etc, may lose the tightly-focussed structure which is required for a clear match to the 6 mark standard in Quality A.

Candidates can bring into the session completed charts/graphs that they have done together with a completed bibliography. This will prevent time being wasted during the session.

Most of the reports submitted for moderation were hand-written and subsequently photocopied, but centres should ensure that it is possible to read the photocopy and that any annotation by the teacher explaining why particular marks have been awarded is visible. In cases where the photocopy is difficult to read the moderators will automatically return the work to the centre.

Some reports were word-processed and this is acceptable providing the centre can ensure:

- that no complete or largely complete report is brought into the writing session on a USB storage pen or in any other electronic format
- that no completed report is taken out or e-mailed to another person.

If these conditions cannot be guaranteed, it is not possible for the teacher to sign the Centre Authentication Form, and hand-written reports should be used.

## *Report on the Units taken in June 2008*

Under no circumstances should any Science in the News tasks be drafted and subsequently redrafted. The report produced at the end of the supervised writing session is what has to be submitted. If there are deficiencies, this should be reported to students and they should be told to avoid these when they do their next SinN. There was clear evidence that drafting and redrafting went on in a very small minority of Centres. Evidence of drafting and redrafting of candidates' reports or too much coaching will lead to the work not being accepted for moderation.

### **C Can-Do tasks**

Can-Do tasks are an important part of the Gateway Science specification. They are motivational for students at all attainment levels. The Tasks ensure that practical Science is an important aspect of the specification, and they can also ensure that ICT is used appropriately.

They are not expected to differentiate candidates at Grade C and above.

The Tasks can be used throughout KS3 and KS4 and candidates at an earlier stage will clearly benefit from having their positive achievements rewarded. All the teacher needs to do is to record the tasks each candidate achieves. These tasks must be credited for individual work and not for a group of candidates collectively completing a task. All aspects of a task must be completed before credit is given and it is not possible to award 1 or 2 marks for a 3 mark task.

Centres are not expected to provide any evidence for the moderator to support the awarding of marks for Can-Do tasks.

It is pleasing to see that candidates are taking these seriously and centres are reporting the benefits of motivation of candidates at all levels but especially with lower-attaining candidates.

### **D Science in the News**

#### **Approach**

Since Can-Do tasks will not differentiate at Grade C and above, it is essential that the necessary differentiation between the levels of attainment of candidates is obtained using Science in the News.

The mark descriptors need to be applied hierarchically. They can only be awarded when the whole statement is fully matched.

It was still clear that in some centres the candidates had not been fully prepared, and they had been given the task to do without a clear idea of what was required. It is also clear that in some centres only one SinN task has been attempted. This does not provide an opportunity for candidates to improve their performance. Some centres conduct SinN under examination conditions. There is nothing wrong with this but it is not essential.

It has always been OCR policy to encourage teachers to annotate coursework. As candidates may attempt several SinN this represents a burden on teachers when, in reality, very little of the work will be seen by a moderator. It is recommended that the emphasis should be given to reporting back to students so they can improve in the future. When the sample is requested by the moderator, a little time should be spent annotating the reports that have to be sent. In particular annotation should concentrate on why intermediate marks (i.e. 1, 3 and 5) have been awarded. The aim of annotation is to provide evidence that the moderator is able to accept in support of the marks awarded by the centre.

## Report on the Units taken in June 2008

It is important that internal standardisation is carried out and the moderator informed of the way in which it has been done. Several Centres had clearly not internally standardised the marks and consequently the rank order was not valid. In such cases the sample had to be returned to the centre, and it is not desirable for the teachers at centres, for moderators or for OCR if work has to be returned at the beginning of June to be re-marked. It is possible that the marks of a whole centre could be reduced if one or two teachers have over-marked and internal standardisation has not taken place.

### Quality A (Approach to the Task)

Candidates who do not undertake any research of their own cannot be awarded a mark in Quality A since the use of the OCR source material does not count for research purposes. However, candidates who do not do any research for themselves are able to gain marks in the other five Qualities.

It is important candidates read and prepare to use the source material before entering the supervised session. This could be compared with the way they would prepare for an exam with pre-release material. Reports sometimes show that nothing has been done with the source material before the supervised session. Criticisms of exams with pre-release material are often centred on candidates not using pre-release material fully. This is certainly the case here.

For 2 marks candidates only need to use one source - from a book, newspaper, Internet etc. The source does not have to be referenced.

For 4 marks, however a candidate must use more than one source. Two sources are sufficient and it helps later in their report if one source is for and one source is against the question posed. It is essential that not only that each of the sources is fully referenced so that it can be checked, but also that it is clearly identified where it has been used in the report. A reference such as [www.bbc.co.uk](http://www.bbc.co.uk) does not provide sufficient information but [www.bbc.co.uk/science/hottopics/cannabis](http://www.bbc.co.uk/science/hottopics/cannabis) does. Without this level of referencing it is very difficult to support a match to 4 marks.

For an award of 6 marks it has to be clear that the sources have been used correctly to produce a structured and balanced report. A good 6 mark report will look at evidence for both sides of the argument. Centres are reminded that 6 marks are awarded for the quality of the research and how it is used, rather than the quantity of research which has been done. Little credit can be given where large amounts from a website are just pasted in but not used even if the work is fully referenced.

It is recommended that candidates attach their preliminary research to the back of the report which has been produced during the supervised session. This will assist the teacher in marking the report since it will save having to go back to the sources to check the information. This preliminary work may also be sent to the moderator as supplementary information, but this is not a requirement. Moderators are expected only to moderate the report. They are not required to look for evidence in research material as this was not produced in the supervised session.

### Quality B (Analysis of the data)

The award of marks for this quality is dependent on the candidates actually processing the information/data which they have collected.

For 2 marks the candidate needs to identify a simple trend or pattern e.g. '*....more women get skin cancer than men...*'. It is not sufficient to quote just a fact e.g. '*...7000 women in England get skin cancer...*'. Trends can come from the OCR source material or from the candidate's research. There are always ample trends and/or patterns within the OCR source material. The trends quoted must be correct.

## Report on the Units taken in June 2008

For 4 marks there must be evidence of more than one trend, although which is the main trend may not be obvious, and some processing done by the candidate. This could be by drawing a graph, pie chart or bar chart from the data, calculating averages or percentages, or extracting data from a graph. It is important that the processing is correct. A poorly drawn graph with incorrect scales or incorrect average calculations will not gain credit.

Few candidates progressed beyond 4 marks. It is not sufficient just to pick out an apparent anomaly in data. To secure above 4 marks the candidate must do some further processing to identify some new information or to identify anomalies. In a few cases it was apparent that a candidate was told to take a particular approach to get 6 marks but did not fully understand what they were trying to do.

One example of a true 6 mark response is when a candidate looks up the population of women in England, Wales, Scotland and Northern Ireland and uses the information to work out the number of cases in each country per million women. They find out that the rate is the same in England and Wales but significantly more than in Scotland and Northern Ireland. The rate is identical for women in Scotland and Northern Ireland. Candidates are not expected to give a reason why this difference exists but just to identify this information. It is appreciated that this represents a high level of processing of data above the level of processing used for 4 marks.

The moderator does expect to see different approaches to the same Task from different candidates within the Centre.

### **Quality C (Evaluation of the data)**

The accuracy, reliability and validity of data are important aspects of Science National Criteria and they are assessed in Science through SinN. There are still some reports where these are totally ignored and so a mark of zero has to be awarded. Candidates found consideration of accuracy difficult in SinN.

For 2 marks the candidate needs to make some comment about the quality of the sources used or the data within them.

For 4 marks the candidate must compare the reliability of different sources and explain why one source is likely to be more reliable than another. There were still few marks above 4 because candidates did not understand what is meant by validity and appreciate that validity can only be considered when reliability has been established.

### **Quality D (Relating Data to the issues)**

Again social, economic and environmental aspects of the topic are an important part of Science National Criteria and which some centres did not develop sufficiently with their candidates.

Different SinN tasks provide different opportunities for consideration of social, economic and environmental aspects, and it is difficult to link all three of them in some tasks. Teachers should remember that the 2, 4 and 6 mark descriptors are loosely linked to performance at F, C and A respectively. So when awarding 2 marks teachers should ask whether the response matches the expectation from an F grade candidate. Similarly, performance at C and A can be the evidence for awarding 4 and 6 marks. It is not necessary to cover all three aspects even at 6 marks providing the approach to these aspects is at a suitably high level.

Often these social, economic and environmental aspects were diffused throughout reports rather than in a separate section. This does not affect the mark awarded but makes it more difficult for both the teacher and the moderator.

### **Quality E (Justifying a conclusion)**

All of the tasks are posed as questions and therefore need an answer. There are fewer examples of candidates not attempting an answer to the question this series. No marks can be awarded where no decision is reached. In some cases it is obvious that the decision has been made before the question was studied. The aim is candidates come to a decision as a result of their studies.

For 2 marks the candidate needs to decide 'yes' or 'no' and then give a reason. The use of the word '....because....' in the candidate's response is useful but not essential. For a match to 4 marks the candidate does need to link clearly their choice to two particular sources. For 6 marks a candidate needs to decide which source is more significant. It was still the case that few candidates could do this. It is here that researching sources with different viewpoints becomes helpful.

### **Quality F (Quality of written communication)**

Centres were quite good assessing this Quality. However, the use of a scribe to write the report for the candidate could limit the mark that can be awarded.

For 2 marks there could be many mistakes but it would still be possible to read the report.

For 4 marks there should start to be the use of scientific vocabulary correctly used.

For 6 marks there are few errors and a good use of scientific words.

Some reports had been word-processed and a spell-checker obviously used. Candidates do need to take care when using spell-checkers since it can result in significant errors, for example '...defiantly..' instead of '..definitely..'.

## **E Summary Comments**

The job of moderators is to try to support the decisions of centres. Where the marks are outside tolerance and adjustments have to be made, the work was always considered by at least two moderators.

Moderators were encouraged to provide useful reports for Centres. The moderation was accomplished efficiently and effectively, despite the new scheme and many totally new moderators. Much of the success was due to the work of Team leaders in co-ordinating their teams.

Cluster group meetings, attendance at OCR INSET meetings and meetings arranged in-house all provided centres with an appropriate awareness and understanding of the new framework. Centres should have copies of the Science Support booklet (which is also available on Interchange).

Many Centres have used the free OCR Coursework Consultancy service. Each year a Centre can submit good quality photocopies of three marked SinN reports to OCR. They will then receive a written report from a senior moderator on the quality of the marking. This means centres can then enter candidates for moderation with some confidence.

*Report on the Units taken in June 2008*

**F 2008 Grade Thresholds for B625**

The distribution of marks for Science in 2008 was very similar to the distribution of marks for 2007.

**Grade boundaries for 2008**

|                       | Grade threshold |    |    |    |    |    |    |    |
|-----------------------|-----------------|----|----|----|----|----|----|----|
|                       | Max. mark       | A* | A  | B  | C  | D  | E  | F  |
| Can-Do tasks and SinN | 60              | 53 | 49 | 44 | 40 | 35 | 30 | 25 |

Since the same work can be submitted for Science in the News for Science and separate sciences the same boundaries apply for B635, B645 and B655. Approximately two thirds of the separate science cohorts used Science Skills Assessments rather than Additional Science Skills Assessments. A great deal of care was taken to ensure that performance by the two routes was comparable.

**The grade thresholds have been decided on the basis of the work that was presented for award in June 2008. The threshold marks will not necessarily be the same in subsequent awards. Some adjustments may be expected as experience with the mark descriptors grows.**

**Changes to Science in the News Level of Response Grid**

Following consultation with teachers and moderators, OCR has made a number of changes to the wording of the Level of Response Grid to assist teachers in interpreting the qualities to be assessed.

The revision to the wording will not have an impact on the number of marks awarded or the standard of the assessment for each quality assessed. This means that any work that has been marked already using the original Level of Response Grid for guidance does **not** need to be marked again.

Centres will be notified of the nature of these changes through a Notice to Centres in October and through our website ([www.ocr.org.uk](http://www.ocr.org.uk)).

# Grade Thresholds

General Certificate of Secondary Education  
Science B (Specification Code J640)  
June 2008 Examination Series

## Unit Threshold Marks

| Unit           |     | Maximum Mark | A* | A  | B  | C  | D  | E  | F  | G  | U |
|----------------|-----|--------------|----|----|----|----|----|----|----|----|---|
| <b>B621/01</b> | Raw | 60           | -  | -  | -  | 37 | 31 | 25 | 19 | 13 | 0 |
|                | UMS | 69           | -  | -  | -  | 60 | 50 | 40 | 30 | 20 | 0 |
| <b>B621/02</b> | Raw | 60           | 45 | 37 | 28 | 20 | 14 | 11 | -  | -  | 0 |
|                | UMS | 100          | 90 | 80 | 70 | 60 | 50 | 45 | -  | -  | 0 |
| <b>B622/01</b> | Raw | 60           | -  | -  | -  | 37 | 30 | 23 | 16 | 9  | 0 |
|                | UMS | 69           | -  | -  | -  | 60 | 50 | 40 | 30 | 20 | 0 |
| <b>B622/02</b> | Raw | 60           | 47 | 41 | 33 | 26 | 18 | 14 | -  | -  | 0 |
|                | UMS | 100          | 90 | 80 | 70 | 60 | 50 | 45 | -  | -  | 0 |
| <b>B625/01</b> | Raw | 60           | 53 | 49 | 44 | 40 | 35 | 30 | 25 | 20 | 0 |
|                | UMS | 100          | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 0 |

**B625** - The grade thresholds have been decided on the basis of the work that was presented for award in June 2008. The threshold marks will not necessarily be the same in subsequent awards.

## Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

|             | Maximum Mark | A*  | A   | B   | C   | D   | E   | F  | G  | U |
|-------------|--------------|-----|-----|-----|-----|-----|-----|----|----|---|
| <b>J640</b> | 300          | 270 | 240 | 210 | 180 | 150 | 120 | 90 | 60 | 0 |

The cumulative percentage of candidates awarded each grade was as follows:

|             | A*  | A    | B    | C    | D    | E    | F    | G    | U   | Total No. of Cands |
|-------------|-----|------|------|------|------|------|------|------|-----|--------------------|
| <b>J640</b> | 3.5 | 14.3 | 33.4 | 61.2 | 78.0 | 88.9 | 95.5 | 98.5 | 100 | 85669              |

**88723 candidates were entered for aggregation this series**

For a description of how UMS marks are calculated see:  
[http://www.ocr.org.uk/learners/ums\\_results.html](http://www.ocr.org.uk/learners/ums_results.html)

Statistics are correct at the time of publication.

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