GCSE

Gateway Science Suite J640-J645

Report on the Units

June 2007

CONTENTS

General Certificate of Secondary Education

Science B (Gateway) (J640-J645)

REPORTS ON THE UNITS

Gateway Science Suite B621 /01 Foundation Tier

General Comments

The level of difficulty was **appropriate** for the ability range of the candidates.

Candidates performed to a satisfactory to good standard throughout the paper. Levels of performance in the three sections of the paper were comparable and candidates gained a good spread of marks across the paper. Most candidates attempted all the paper and there was no indication of candidates not reaching the end in the time allowed.

The majority of candidates were able to display a good level of knowledge and understanding partly because of the question structure used throughout the paper.

Very few scripts were seen where the mark was below 20, although a handful below 10 were in evidence. At the top end of the mark range the best candidates scored over 50 and it is likely that these candidates should have been entered for the Higher tier.

Comments on Individual Questions

Q 1   (a)   This question was generally well answered.

       (b)   A number of candidates incorrectly gave meat as an answer to part (i). Candidates incorrectly answered 'orange juice' in part (ii); some may have not realised they could use the same answer twice.

Q 2   (a)   Most candidates chose 'long –sighted' as a correct answer.

       (b)   The majority of candidates gave the correct answer to part (i). However, in (ii) & (iii) the function of the lens as a means of focussing was not well understood on the evidence of the poor responses to these part-questions.

Q 3   (a)   Most candidates knew about prevention of pregnancy. However a number of candidates thought the contraceptive pill prevented sexually transmitted diseases.

       (b)   This question was generally well answered.

       (c)   Very few candidates could correctly answer part (i) and in part (ii) they confused secondary characteristics with inherited characteristics giving examples such as eye colour. Others incorrectly suggested mood changes.

       (d)   Most candidates had the right idea but found it difficult to put into words.

Q 4   (a)   The majority answered this correctly.

       (b)   Although the vast majority gained this mark those that did not became muddled with 'legal' points or thought that prescription drugs treat illnesses (and by implication over-the-counter drugs do not).

       (c)   Most candidates scored one mark for understanding that Class A drugs are more harmful. However they failed to show that they understood that different laws apply to Class A and Class C drugs.

Q 5   (a)   All but a few candidates gained the first mark in the Chemistry section.

       (b)   Many candidates went on to identify propanol in part (b), errors were in not completing the explanation (i.e. referring to starting/final temperature without mentioning <u>highest</u> **change**).

       (c)   Very few candidates knew what an exothermic reaction was.

Q 6   (a)   The majority answered this correctly although some candidates only gave one answer instead of two.

       (b)   Most candidates knew what changes they would see in part (i). However they did not understand what a chemical change was. The most common incorrect answer involved changes of state.

Q 7   (a)   Few candidates knew the word cracking.

       (b)   Candidates knew very little about this whole process. Bitumen was the most common incorrect answer in part (i) and carbon dioxide in (ii).

       (c)   Only a minority of candidates knew this was a catalyst. A number of candidates tried to explain why the porcelain was broken not why it was porcelain.

Q 8   (a)   Few candidates could answer this question, confusing letters and elements and giving $Ca(OH)_2$ as an answer.

       (b)   Few candidates could answer this question, confusing letters and atoms and giving $NaHCO_3$ as an answer.

       (c)   More candidates correctly answered this part of question 8 than parts (a) and (b).

Q 9   (a)   The majority answered this correctly.

       (b)   A common error was to merely repeat the 'degradable' part of the question or even more often refer to 'can't be reused' or 'recycled'.

       (c)   Candidates who scored poorly often failed to understand the term 'property'. For example they said 'it stops you getting a shock' but did not give 'insulator' as the property.

Q 10   (a)   The majority answered this correctly.

       (b)   Incorrect choices were usually metal pan and wooden handle, although a small number got the correct answers reversed as they mixed up insulator and conductor.

       (c)   Few candidates were able to apply knowledge of 'change of state'. References to the peas melting or a description of the graph (temperature not changing) were regularly seen misconceptions or misunderstandings.

       (d)   This was very poorly answered, possibly as it's a new area for testing in this syllabus but the term 'specific heat capacity' was not well known.

Q 11   (a)   Surprisingly poor answers in both parts; the frequent errors being C and A respectively.

       (b)   Despite the prompts most only gained one mark for the 'idea of light travels quickly'. About half the candidates knew about Morse code.

       (c)   A reasonable number of correct responses and the incorrect 'radio' is an understandably wrong answer but too many candidates answered 'gamma ray'.

       (d)   One mark was more often attained than two, zero was rare. Many candidates thought that aluminium was an insulator rather than it trapping a layer of air but still went on to gain partial or full credit.

Q 12   (a)   The vast majority gained the first mark but far too many responses of 'ammeter', 'anemometer' or even 'barometer' were seen in (ii).

       (b)   Candidates found this the most difficult part of section C. A large number of them gained one mark for 'solid' but very few could name longitudinal and transverse waves.

Gateway Science Suite B621 /02 Higher Tier

General Comments

The paper was judged by almost all assistant examiners to be of an appropriate level of difficulty. Candidates completed the paper and there was no evidence of lack of time. The mean mark for the paper was 29.5 compared to 34.2 for the equivalent paper in January 2007. A mark of 17 was required to gain grade C on this component and a mark of 35 was required to gain grade A.

The biology section of the paper was marginally harder than the chemistry and physics sections. A wide range of marks was seen. Most candidates appeared to have been adequately prepared for the examination, which is of great credit to centres given the early examination date. A small number of candidates would have benefited by being entered for the foundation tier.

Comments on Individual Questions

Q 1 (a) (i) This question was generally well answered. A common error included confusing the cornea with the iris and stating that the cornea controls the amount of light entering the eye. Other errors included the idea that the cornea reflects light or protects the eye.

(a) (ii) Again, this was generally well answered.

(b) Better candidates answered this question by correctly referring to the existing lens' inability to focus on distant objects. Weaker candidates often gave vague answers such as 'the lens isn't working properly' or 'so they can see better' and failed to score.

(c) Almost all candidates stated 'laser surgery' and gained the mark.

(d) More able candidates recognised that colour blindness is inherited or is due to a lack of specialised cells in the retina. Weaker candidates referred to a damaged or abnormal retina and failed to score.

Q 2 (a)(i) Only the most able candidates stated a correct female secondary sexual characteristic. References to moods, release of eggs and changes to the uterus were common but failed to score.

(a)(ii) This question was usually either well answered or omitted. Most candidates who attempted it correctly named progesterone (although with a wide range of spellings!) Oestrogen and insulin were common among the incorrect responses.

(b) Few candidates scored two marks on this question. Better candidates referred to preventing ovulation but often failed to gain the mark for mimicking pregnancy. Many incorrect answers referred to barriers to sperm, changes to periods or changes to the lining of the uterus.

(c) Almost all candidates scored this mark usually for references to animal cruelty.

Q 3 (a) This question was well answered by most candidates.

(b) The correct answer was that there is no correlation between diastolic blood pressure and height. A considerable number of candidates tried to find a pattern as they were obviously expecting there to be one.

(c) The majority of candidates stated that the higher the weight the higher the blood pressure would be.

(d) The effects of high and low blood pressure were well known by the majority of candidates. More scored the high blood pressure mark. A common incorrect response for low blood pressure was 'tiredness'.

Q 4   (a)   This was generally well answered, although a surprising number of candidates incorrectly stated 'ecstasy'.

(b)   Most candidates scored the first mark for recognising that some drugs are more harmful than others. Only the better candidates then correctly linked this to penalties or illegality for the second mark.

(c)   This question was poorly answered by all except the best candidates. Some candidates referred to synapses and gained one mark. Very few candidates gave answers including blocking neurotransmitters or blocking receptor sites and hence few gained two marks. Most candidates described the effect of alcohol on behaviour e.g. slower reactions rather than its effect on the nervous system mechanism.

Q 5   (a)(i)   The meaning of exothermic reactions was generally well known, although weaker candidates often referred to 'gas being given out'.

(a)(ii)   Only better candidates could carry out the calculation correctly. A number of candidates scored one mark for 126J, having used the mass of fuel rather than the mass of water. 630J (1.5 x 4.2 x 100) was a common error and did not score.

(b)   This was poorly answered by all but the best candidates. Large numbers of candidates used 'transferred' rather than 'given out' and failed to score the second mark.

Q 6   (a)   This question was generally well answered with most candidates referring to an irreversible change. Weaker candidates often referred to changes of state.

(b)   This was again well answered by most candidates. Common answers included improved taste, killing microbes, improved texture and easier to digest.

(c)   This question discriminated well at grade A. Better candidates understood denaturing of proteins as change of molecular shape, whereas weaker candidates offered only vague answers often referring to colour change or change of state.

Q 7   (a)(i)   Almost all candidates correctly stated 'gas oil'.

(a)(ii)   This question discriminated well at grade A. Better candidates correctly described the use of cracking to match supply with demand. Weaker candidates suggested mixing other fractions with petrol, using other fractions instead of petrol or increasing the price of petrol.

(b)   This question was not well answered even by candidates who had scored well in part (a)(ii). Carbon dioxide was frequently offered.

Q 8   (a) $Ca(OH)_2$ was correctly stated by only higher ability candidates. $NaHCO_3$ was a common misconception. Is it possible that some centres have not given due weight to the fundamental chemical concepts item in the specification?

(b)   This was also poorly answered. Common errors were ethane and chloroethene.

Q 9   (a)   Many candidates scored two marks on this question, either for two properties or for one property and a linked explanation, e.g. 'PVC is a poor conductor of electricity (1) so you don't get a shock (1). Being flexible was a popular correct answer.

(b)   Most candidates scored at least one mark on this question. Marks were lost for vague answers such as harmful or dangerous gases in relation to burning plastics or references to damage to the ozone layer.

Q 10   (a)   The weakest candidates failed to score on this question. The vast majority, however, scored the first mark for the idea of the ice melting, but only the best candidates grasped the idea that energy is needed for this process. They often went on to give higher level answers involving the breaking of intermolecular forces.

(b)   The definition of specific heat capacity was not well known and did not necessarily correlate with the overall candidate's score on the paper.

(c)   This was very poorly answered with the vast majority of candidates offering **C** as their response. The correct answer was **A**.

Q 11   (a)   Almost all candidates correctly stated Morse code. Although light, analogue, Da Vinci and post were also seen!

(b)(i)   The size of the numbers proved a stumbling block for weaker candidates who struggled to manipulate them. Two marks were frequently scored for the correct working but then an answer of 5^{14} was given losing the third mark. $(3 \times 10^8) \times (6 \times 10^{-7})$ was also a common error.

(b)(ii) Only better candidates scored both marks on this question. Two marks were frequently awarded from a diagram. Almost no candidates managed to get two marks from a written explanation alone.

Q 12   (a)   Many candidates scored one mark for solids. Only the best candidates correctly stated longitudinal and transverse. Seismic was a common incorrect answer.

(b)   Most gave carbon dioxide as the main pollutant, with only better candidates correctly naming CFCs.

Q 13   (a)   Many candidates confused infrared radiation with microwaves and talked about heating the top one centimetre of the food. The mark for the idea of conduction or convection as the way that the centre of the food is heated was the most commonly awarded mark.

(b)(i)   This question was generally well answered. Most candidates referred to the reflection of heat. Fewer mentioned the reduction of radiation.

(b)(ii) Weaker candidates stated that the air trapped in the vacuum prevented conduction. The mark scheme required candidates to recognise that there is a reduction in conduction and/or convection (1) since there are no particles present (1). A number of the better candidates were not precise enough in their answers and stated that a vacuum contains no air, without reference to particles.

Gateway Science Suite B622 / 01 Foundation Tier

General Comments

This was the second time that this examination was able to be sat by Candidates. In January 2007 only a handful of Centres entered candidates for this component but this June there was a very large entry. The entry policy of centres was very well targeted with only a very small proportion of candidates whose performance suggested that they should have taken the Higher Tier examination paper.

The mean mark for the examination paper was 34.2 and the highest mark awarded was 60 out of 60. The examination paper successfully discriminated between the target grades (C to G). The examination paper allowed candidates to effectively demonstrate their understanding of scientific principles. In addition there were opportunities for candidates to evaluate and interpret data, communicate scientific ideas and to describe some of the implications of science to society.

Statistical analysis shows that Sections B (Sc3) and C (Sc4) were more demanding than Section A (Sc2). Nevertheless the same statistical analysis demonstrated that all three sections discriminated effectively.

There was very little evidence that candidates did not have time to finish although there was a small proportion of candidates that did not attempt many questions. These candidates did not seem prepared to take a guess if they did not know the answer.

Comments on Individual Questions

Q 1   This question was about the Orca and herring. Although the context of the question was probably new to the candidates there was no evidence that any candidate was disadvantaged.

    (a)   Although many candidates correctly chose vertebrates, a common misconception was to choose invertebrates.

    (b)   Although a significant proportion of candidates were able to link all three terms with their descriptions other candidates were less successful. Common misconceptions were that the community was the number of herring in the fjord or that the habitat was all the animals and plants. The most common correct link was that the Orca was a predator.

    (c)   This question was more demanding than its low demand targeting. Many candidates failed to state that the Orca had no food or that they had to follow the herring so that they could eat them. It was not sufficient just to refer to the lack of herring.

  (d) (i)   The majority of candidates were able to recognise that the herring were built for speed.

  (d) (ii)   Candidates often referred to size or chose from the list in the previous question. Good answers referred to camouflage or that there are shoals of herring. No marks were awarded for stating that herring were small and so could hide in small crevices.

Q 2   This question focused on the increase in the world's population and statistics show that this was the easiest question on the examination paper (highest facility level).

    (a)   A large proportion of candidates were able to analyse the data in the graph. Unfortunately some candidates gave Africa which was already given in the text.

(b) (i) Only a very small proportion of candidates could not give a gas made when a fossil fuel burns. Carbon dioxide and carbon monoxide were the most common correct responses.

(b) (ii) Many candidates scored maximum marks and almost all scored at least one mark.

Q3   This question focused on mammals and endangered species.

(a) A mammal having hair or fur was by far the most common correct response. Only a very small proportion of candidates referred to the presence of external ears. A small proportion of candidates referred back to question 1 and stated that mammals had a backbone.

(b) Candidates gave a range of possible reasons including it was an endangered species, it was timid, it was camouflaged and it is difficult to explore the dense forests.

(c) (i) Although many candidates gave correct responses referring to a very low population or that the species was close to extinction a significant proportion of candidates stated that the animal was dangerous. Another misconception given by some candidates was that it was an animal whose population was falling with no reference to the actual population being very small.

(c) (ii) The giant panda was extremely well known as an endangered species.

Q 4   This question was about pollution and the population of dark and pale moths. This had the lowest question facility of all the questions in Section A.

(a) There were some excellent answers referring to camouflage and the inability of predators to see the dark moths. A common misconception was that the moths were dark because the 'pollution' was transferred from the environment onto their wings.

(b) Many candidates found the calculation difficult. Full marks were given to an answer of 4000 with or without working out. A common misconception was to use the total numbers i.e. 967 caught the first time and 931 caught the second time. There was evidence that a significant proportion of candidates did not have access to calculators.

Q5   This question was about building materials and included topics that had not previously been included in GCSE Science specifications. Nevertheless this question had the highest question facility in Section B.

(a) The majority of candidates gave two acceptable building materials. If a candidate scored just one mark it was normally because they used a material excluded by the mark scheme such as iron or used one of the two materials given in the stem of the question.

(b) (i) Although a significant proportion of candidates recognised steel as an alloy, others thought it was a compound or an element.

(b) (ii) Many candidates referred to protection or rust protection and were awarded a mark. Other candidates referred to decoration and this was also given a mark.

(c) This was a very demanding question. A large proportion of candidates did not mention the use of a metal rod to reinforce concrete. Often candidates referred to use of more layers of concrete or the use of stones.

Q 6   This question was about gases in the air and assessed two items of the specification.

(a) (i) A large proportion of the candidates were able to recall the role of photosynthesis.

(a) (ii) A significant proportion of candidates thought that respiration increased the level of oxygen. Other candidates referred to changes in the level of nitrogen in the air.

(b) (i)		Almost all of the candidates could use the data provided to recognise that nitrogen was the gas present in the greatest percentage in exhaust gases.
(b) (ii)		A slightly smaller proportion of the candidates than in part (i) could identify a gas whose percentage went down.
(b) (iii)		Only the most able candidates could state that the percentage of carbon monoxide went down and at the same time the percentage of carbon dioxide went up. Typical answers were imprecise and referred to the percentage of carbon dioxide being greater than that of carbon monoxide.
(c)		Only a very small proportion of candidates scored maximum marks. Most candidates did not mention surface area at all. The most common correct response referred to more collisions between particles.

7   This question focused on volcanoes.

(a) Most candidates recognised lava as the name of liquid rock that erupts out of a volcano.

(b) Although the majority of candidates realised that igneous rock is formed when lava cools down a significant proportion of candidates referred to metamorphic rock.

(c) Many candidates found it difficult to articulate the correct answer. They referred to the soil being good or containing nutrients. The most frequent correct response was to refer to the fertility of the soil; however socio-economic responses were also given credit.

8   This question was focused on the familiar reaction of magnesium ribbon and hydrochloric acid. Nevertheless it had the lowest question facility of any question on the examination paper.

(a) Although this was a low demand question candidates of all abilities found this difficult. Many candidates gave names rather than the formula; correct names of products were given full credit. A common misconception was to give magnesium or to write an equation such as $Mg + 2HCl \rightarrow MgCl_2$.

(b) Many candidates did not describe another way of speeding up the reaction; they just expanded on the information given in the stem. The most likely correct responses were stirring or adding a catalyst. Adding more of one of the reactants was not given credit in the mark scheme.

(c) Only a very small proportion of the candidates were awarded full marks for this question. Candidates had several misconceptions including referring to faster collisions and particles having faster reactions. Candidates very rarely used collision theory and only an extremely small proportion mentioned more successful collisions. The most likely mark awarded was that the particles had more energy or were moving faster.

9   This question focused on nuclear radiation. It had the lowest question facility in Section C.

(a) The most frequent correct answers referred to causing cancer. Vague references to brain damage were not given credit.

(b) Although a large proportion of candidates referred to curing cancer or treating cancer a significant proportion referred to energy production which was not given credit. Only an extremely small number of candidates referred to tracers or non destructive testing.

(c) Alpha radiation was well known by many candidates.

(d) Although all possible combinations of answers were seen, the correct yes and no was the most popular response.

10		This question focused on aspects of electricity and had the highest question facility in Section C.
	(a)	Many candidates successfully completed the sentences about electricity generation and scored maximum marks. Hardly any candidate scored no marks.
	(b) & (c)	Although these questions were targeted at low demand, candidates found them much more demanding than expected. The majority of candidates did not recognise direct and alternating current. If a candidate realised that these were the answer they almost invariably got them the correct way round. Some misconceptions included fast and slow electricity or amps and voltage.

11		This question was about the cost of using electrical appliances.
	(a)	Candidates needed to make a comparative statement to be awarded a mark. The cooker has a higher power rating and is used for the longest length of time. Many did not make this type of answer and referred to it needs a lot of power and it takes a long time.
	(b) (i)	Candidates had to use the formula kilowatt hours = power × time but only a small proportion of candidates actually quoted the formula. A much larger proportion of candidates obtained the correct answer of 12 kWh.
	(b) (ii)	Candidates found this question very difficult. An error carried forward from part (i) was applied but nevertheless very few candidates realised that they had to use the formula cost = kWh ×10. The correct answer was 120 p or £1.20. A large proportion of candidates did not attempt this question at all.

12		This question was about magnetism.
	(a)	A very large proportion of candidates recognised the north and south poles of a magnet.
	(b)	Candidates found this question very difficult even though this was targeted at low demand. Even grade C candidates were unlikely to score more than one mark. The marks most accessible were that it was detected by using a magnet or a compass and that the poles were at the north and south. Most candidates did not mention the presence of iron in the core or that the iron was moving. A common misconception was that gravity caused the magnetic field that surrounds the Earth. A significant proportion of candidates did not attempt this question.

13		This question was about the origin of the Universe.
	(a)	Many candidates recognised that the Universe was getting bigger.
	(b)	Candidates often confused the origin of a star with comets, asteroids or meteors.

Gateway Science Suite B622 /02 Higher Tier

General Comments

This higher paper was of an appropriate level and there was a good range of marks to grade the paper. There were challenging questions for appropriate candidates at the A and C boundaries which discriminated candidates' responses well. There was some evidence to suggest that a significant number of candidates were incorrectly entered for this tier and failed to achieve more than twenty marks. These low scores can be demoralising for candidates. Clearly such candidates would be and feel more successful attempting a foundation paper.

Most candidates finished the paper and very few candidates seemed to run out of time. Lower attaining candidates, however, left some questions unanswered. These tended to be the extended prose questions on the higher demand content.

Comments on Individual Questions

Q 1   (a)   This question was well answered with most candidates choosing fur [1] or hair [1]. Occasionally candidates would unadvisedly choose another characteristic (not in the picture) e.g. gives birth to live young [0] or 'has a backbone' [0].
       (b)   Most candidates got this correct.
       (c)   Most scored a mark here by referring to loss of habitat [1] or food [1]. Many then continued their answers to suggest the negative effect on the population [1]. Answers such as 'they destroy their habitat so they can't breed properly' would score [2].

Q 2   (a)   This was quite well answered with most candidates at least hinting at camouflage [1]. Clearer answers stating that black moths can't be easily seen on dark or polluted trees scored [2]. A few gave the reverse argument for pale moths and this was also acceptable.
       (b)   Mostly scored [2] in part (i) by calculating the population correctly.
              In part (ii) many thought that sampling had to 'collect **all** the moths in the wood' [0]. Better answers referred to the low sample size [1], sampling at different times of day [1] or moths leaving or entering the woods [1].
              Part (iii) gave better answers and most thought painting the underside would not spoil the camouflage [1].

Q 3   (a)   This question illustrated the misconceptions of some candidates. Many did not identify the pollutant on the first line so they could not get the second mark. Many stated that more carbon dioxide [1] caused global warming (or gave a consequence of global warming e.g. polar ice caps melt) [1].
              More commonly candidates gave the answer 'cars' as contributing to the pollution. Some went on in the second line to mention CO_2 so still scored. Sulphur dioxide linked with acid rain was also a common answer.
       (b)   Most answered part (i) correctly.
              Part (ii) was vaguely answered by many who failed to secure both marking points. Many candidates talked about more economically developed countries (MEDC) and less economically developed countries (LEDC) but the answers were not written clearly enough to score marks. The most common answers related to more cars [1] and factories [1]. Burning more fossil fuels was also a common answer. Vague answers referred to 'being more developed' [0].

Q 4   (a)   Higher ability candidates scored well on this mainly for mentioning mutation and genes being passed from one generation to the next. Many candidates referred to the 'best adapted survive' [1].
Weaker answers suggested that the creatures 'learned to swim faster' [0].

(b)   Poor answers in part (i) such as 'stop fishing' failed to score. Most candidates, however, convinced markers with the idea of quotas e.g. 'put some fish back'/ 'stop fishing in that Fjord' [1].
In part (ii) better candidates scored well. Others failed to understand the question and did not relate the Orcas to herrings. Many incorrect responses focused on the livelihood of the fishermen and the lack of fish for people to eat and sell. Good answers stated that the Orcas will leave and this will be bad for the tourist industry [2].

Q 5   (a)   Less than half of the candidates scored 2 for stating that concrete was hard and steel was strong [2]. The remainder generally struggled to word their answers convincingly. Often in longer answers it was possible to see that 'steel makes it stronger' [1].

(b)   There were many low scores on this question. Most did not understand the question and failed to tackle it purposefully. Higher candidates scored well realising the correct metamorphic or sedimentary nature of each rock [1] and that marble (was limestone) that was subject to 'extra heat and pressure' [1]. Some understood sedimentary and metamorphic [1] but did not relate them for the 2nd mark.

Q 6   (a)   This was nearly always correct with nitrogen [1] and 20 – 22% [1] for oxygen. Occasionally water vapour was given as the first answer [0].

(b)   This was quite well answered by most.

(c)   In part (i) most who attempted a word equation were successful. Others attempted a symbol equation but usually gave incorrect symbols such as 'N' so failed to score.
In part (ii) some candidates talked vaguely about reaction rate but failed to mention the significance of particles. Lots of full marks were attained here with clear answers referring to increased surface area leading to more collisions. Some got sidetracked into faster particles [0].

Q 7   (a)   This was a challenge to most and not fully understood by many. Many failed to even use the idea of density in their answers. Top and mid-range candidates scored well stating that the 'magma was less dense than the crust' [1].

(b)   Some scored well on this. Those who did not do well on this question talked about plates or densities. There were some very good answers which mentioned iron and silica rich magmas or different viscosities [1].

(c)   This was well answered with most candidates writing about being able to predict eruptions to save lives [1].

(d)   This was a challenging A* question which naturally for most non-A* candidates was difficult to score 2 on. Many were aware of the presence of convection currents. However diagrams often missed the direction of plates and descriptions failed to drag the plates. There were lots of answers giving a description of subduction. This could have been due to the question being initially about volcanoes.

Q 8   (a)   This was a B grade question and was poorly answered by candidates.
Most made errors in the basic formulae of substances and so their attempts to balance were irrelevant. Common formula errors were HCl_2, Hcl and MgCl, MgCl2, mg, Mg_2 or H.

(b)   This was a C/D grade question about the effects of temperature and rate of reaction and was common to the foundation paper. It was well answered with many gaining full marks writing correctly about the behaviour of particles.

Q 9   (a)   This was a standard demand question where the sentences needed completion. Most scored full marks on this. Occasionally only 1 mark was attained but this was rare.

(b)   This was an A* high demand question which offered challenge at the intended level. High attaining candidates scored well others rewrote the question stem and failed to score.
Examiners were seeking to award answers that stated that the higher voltage would lead to a lower current [1] and that this would reduce the temperature or heat loss [1].

(c)   In part (i) most knew that off peak was 'cheaper' [1].
In part (ii) those who scored did so for inconvenience i.e. 'had to be used at night' [1]. One common misconception was that some candidates thought that people who had off peak electricity could not use electricity in the daytime.

(d)   This calculation was well answered but at grade C / D demand one expected more secure answers. Part (i) was generally correct [2] but more tended to make mistakes when calculating the cost in pence (120p). £1:20 was also acceptable. Common wrong answers were 1 200p.

Q 10   (a)   This grade C question was well answered. A few thought that the radiation penetrated aluminium [0] or that it was absorbed by paper [0].

(b)   Higher candidates scored well with some candidates getting a mark for leakage into water or harm to animals. Some correctly referred to its longevity and long half-life [1]. Incorrect responses concentrated on comments about landfill sites.

(c)   The majority understood this with encasement in glass or lead underground [1]. Some merely wrote about the protection of people by wearing gloves or suits. Some did not say underground.

Q 11   (a)   Higher candidates scored well on this grade C / D question. Many others lost
       &   marks through lack of clarity. Examiners were instructed to mark (a) and (b)
       (b)   together for the candidates' benefit.
                Examiners were seeking to award marks for answers that covered the ideas that nearby galaxies moved away [1] and that distant galaxies moved away [1] more quickly [1]. But if candidates stated that nearby galaxies were slower then this qualified for the speed mark. A significant number gave no response to parts (a) and (b) and others were clearly guessing. This was clearly unfamiliar territory for many candidates from some centres and it needs to be addressed for future assessments.

(c)   Higher candidates scored well knowing that the radiation came from all parts of the universe [1]. Others took a guess with random success, even those who had made no response to parts (a) and (b).

Q 12   This was a challenging A* question answered well by the very able candidates only. Most candidates found it difficult to score marks. Most stated that heat gets in and cannot get out. Most did not use reflect in the answer talking instead about glass trapping the heat/ rays etc. Many said it heats up the conservatory instead of the **inside** of the conservatory. A few scored for objects inside absorbing. A few candidates scored two marks, some scored one but most scored zero. There were a few answers referring to the correct changes in wavelength.

Examiners were seeking to award marks for answers that covered the ideas that after going through the glass

- (IR) with a short wavelength [1] was absorbed [1] (by floor, walls, inside conservatory).
- Longer wavelength (IR) was emitted [1] and reflected back by the glass [1].

Common misconceptions were that light was absorbed, waves were attracted rather than absorbed and waves were absorbed by the glass.

Gateway Science Suite- Skills Assessment B625

A.   General Comments

This was the first year of assessment of this entirely new specification.

The Skills Assessment for Gateway is very different from the previous Sc1 Coursework component of GCSE which had a 'common assessment element' for all Awarding Bodies.

Teachers have worked hard to acquaint themselves with the requirements of this new scheme. As part of the familiarisation process, a series of well-attended one-day Inset courses was provided, at a variety of locations in autumn/spring in 2006/2007. Additionally support was provided to other teachers by trained cluster coordinators. It is clear that the training proved helpful to teachers in understanding what was needed to meet the innovative requirements of this new course.

All the Skills moderators appointed by OCR were required to undergo retraining in the new requirements, and it is very pleasing to report that the process of moderation went very smoothly.

There is evidence to suggest that many of the centres using the specification with their candidates had entered them for the written Units but had decided to delay entry for this Unit until June 2008. This decision, reflecting the additional flexibility of approach associated with the introduction of the Gateway Suite, provided centres with the opportunity to develop further their candidates' skills.

Over 40 000 candidates, from a wide variety of centres, were entered.

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.

There were somewhat more arithmetical errors this year than would normally be expected.

These errors included:

- additions in the totalling of the marks for the Can-Do tasks
- additions of the SinN marks
- adding together the Can-Do tasks mark and SinN marks
- recording only the Can-Do task mark or the SinN mark on the MS1.

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 but these additional choices of task were not permitted to be used for GCSE Science; they are intended only for use with candidates following the separate Sciences options within the Suite.

At the 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 to ban smoking had already been made. A few centres had used this task for assessment this year and it was accepted so that candidates were not disadvantaged. It will not, however, be accepted in future years.

Some new tasks have been added to the Interchange website in June 2007 to provide even more choice and there will be a continuing programme to add new stimulus materials on a yearly basis. In this way it is hoped that the materials will up –to- date reflecting current scientific issues which are linked to the specification content. 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.

There is the facility for teachers to write their own Science in the News tasks. Teachers are reminded that if they want to develop their own SinN tasks then they should seek advice from OCR before writing them, and that topics need to be approved before they are used.

Administration matters - Supervision of Skills Assessment

All Science in the News reports should be completed by candidates in supervised sessions so that 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. Although this approach is unusual for Science assessment, it has been used over many years in other curriculum areas. Teachers may gain considerable insight by discussing with History colleagues, for example, who regularly use undifferentiated source material with all students across the whole range of likely attainment. 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.

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, and it is emphasised that 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 on the part of the candidate for relevant aspects had therefore been removed. This was not penalised this year but in the future the moderators will be looking carefully at the work from centres which use exactly the same sources for all their candidates.

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 and, for example, not all candidates having the same bar chart display
- candidates answering the question in different ways.

Administration matters – supervised session

When the preliminary research has been completed, the Science in the News 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 used on these aspects of the report 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
- no competed 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.

Under no circumstances should any Science in the News tasks be drafted and subsequently redrafted. What is 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 Science in the News task. There was clear evidence that drafting and redrafting went on in a very small minority of Centres.

In the future if evidence of drafting and redrafting of candidates' reports is seen then this will result in 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.

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.

For the candidates in the sample chosen, a record of all the tasks each candidate has completed must be submitted. If a candidate has completed 8 three-mark tasks the record must also include all of the 1 and 2 mark tasks achieved. The moderator will check the arithmetic and if an error is found the centre will be asked to check all candidates for similar errors.

It is vital that centres integrate their selection of Can-Do tasks into their Schemes of Work at appropriate times since this will support their candidates' learning. It is a matter for concern that in some Centres all the candidates appeared to have completed eight 3 mark tasks in a single day or two days at the end of the course. This suggests they have been used as mini-practical examinations, and this is not what was envisaged when the course was devised.

Centres are not expected to provide the moderator with any evidence to support the awarding of marks for Can-Do tasks.
Some centres did include residual evidence and this highlighted certain concerns that must be considered.

Example 1

A three mark task should take a great deal of time to do properly. Task 71 *'I can permanently dye a piece of cotton'* involves more than dipping a piece of cotton in a dye bath of onion skins. The important word is *'permanently'*. Once the cotton has been dyed, the dyed cotton should be cut in half and one half washed. The two pieces should then be compared and, almost certainly most of the dye will have been washed out. The student may then try the dyeing process with a mordant and check that the dye does not wash out. Only then is the statement fully matched.

Example 2

Task 68 requires students to do some research on the **work** of Carl Linnaeus. Some reports which were seen simply consisted of potted life-stories with no mention of his work. These had been simply downloaded from the Internet without any consideration of the relevance.   This Can-Do Task could be a PowerPoint that a candidate presents to the class.

Example 3

Task 74 *'I can measure the rate of reaction that produces a gas'.* The candidate has to set up the apparatus, collect results, draw a suitable graph and then calculate either the initial rate using the gradient or an average rate. Some candidates had collected and recorded data which was not acceptable. For example, recording time as 1.40 minutes instead of 100s (or 1 minute 40s) and the graphs subsequently produced would not have been acceptable in previous Sc1 coursework, and sometimes no calculations had been undertaken.

When this task is done properly it is demanding but achievable.

It should be remembered that a three mark Can-Do Task is equivalent to 4 marks on a Gateway written paper. It should therefore take a considerable amount of time and effort to complete successfully.

It is pleasing to see that most centres are taking these seriously and are reporting the benefits of candidate motivation at all levels.

D. Science in the News

The mark descriptors for Science in the News need to be applied hierarchically. They can only be awarded when the whole statement is fully matched. In some Centres seeing the word *'anomalous'*, or something similar, resulted in the incorrect award of 6 marks in Quality B.

It was 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. The emphasis during the Training sessions stressed the need to ensure that aspects of the Science National Criteria (How Science Works) have to be taught. Science is the News represents 20% of the total assessment and should be allocated that proportion of time. It was also noted that in some centres only one Science in the News Topic had been attempted and this approach does not provide an opportunity for candidates to improve their performance.

When a task is downloaded from Interchange, a writing frame will be attached. While this might be appropriate for candidates below grade C, it is likely to restrict the performance of higher-attaining candidates. A generic writing frame, constructed by teachers for their candidates is acceptable, but a writing frame written for a particular task should not be used if it provides specific prompts for candidates.

It is recommended that any Science in the News reports which are submitted for moderation should be annotated to show how marks for the different qualities have been decided upon. 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.

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.

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.

For 2 marks candidates only need to use one source - from a book, newspaper, Internet etc. 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 is each of the sources 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 does not provide sufficient information but 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 and logically. For example, providing a list of 10 sources in a bibliography and only using a couple of them in the report will not enable a match to 6 marks to be supported. Centres are reminded that marks are awarded for the quality of the research and how it is used, rather than the quantity which has been done.

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.

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. The moderators reported that large numbers of candidates failed to do this, and many simply *'quoted but did not use'* what they had obtained.

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.

For 4 marks there must be evidence of more trends and some processing, at a standard approximating to GCSE grade C level, must be done. 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 etc. 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. To do this, candidates must do some further processing to identify some new information or to identify anomalies. It is not enough, for example, to look at the results of surveys on cannabis use in different years (page 3 of the OCR stimulus) and say that 2002 results are anomalous, as these are separate surveys that are not necessarily linked. In the same way, this data could be displayed in a bar chart but not a line graph.

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 with skin cancer and uses the information to work of 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. This pattern is the same for any year considered. 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.

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 ability to identify the accuracy, reliability and validity of data is one of the skills that students are expected to develop but many Centres appeared to have devoted insufficient time to ensuring that their candidates have understood these ideas. There were significant numbers of very able candidates who made no mention of accuracy, reliability and validity in their reports and in consequence scored zero in Quality C.

Moderators accepted a low level comment about reliability as an alternative to a comment about accuracy. Such a comment might be '…*it must be reliable as it was written by a doctor...*'. 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 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)

Recognising the social, economic and environmental aspects of a topic is an important aspect of How Science Works.

Different Science in the News 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.

One good idea used by a centre was to suggest that students go through their research material in advance of the supervised writing-up session and to highlight social ideas with a red highlighter pen, economic with a blue and environmental with a green.
Often these ideas were diffused throughout reports.

Quality E (Justifying a conclusion)

All of the tasks are posed as questions and therefore need an answer. Some candidates, having given both sides of the argument, then left the reader to make the decision. No marks can be awarded in such cases.

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 their choice to particular sources. For 6 marks a candidate needs to support their answer by writing what two conflicting sources say and then decide which source is more significant. 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 at assessing this Quality.

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

For 4 marks some scientific vocabulary should be being correctly used.

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 is significant errors, for example *'...defiantly...'* instead of *'...definitely...'*.

E.   Summary Comments

Moderators spent a great deal of time and effort attempting to support the decisions made by teachers. When decisions involved adjusting the marks awarded by the teachers at the centre, the work was always considered by at least two moderators.

Cluster group meetings, OCR INSET meetings and in-house training all provide teachers with an appropriate awareness and understanding of the new framework for skills assessment. In addition, centres should have copies of the Science Support booklet (available on Interchange). Useful up-to-date information can be found on www.gcse.com which is a 'dedicated' website for OCR GCSE Sciences.

The popularity of Gateway Science means that OCR will be recruiting a large number of moderators during the autumn term for both the science and additional science skills. These newly recruited moderators will receive training in March and will then attend a standardisation meeting in April. Moderators gain a unique insight into the ways in which different centres approach skills assessment, often picking up useful examples of good practice to take back to their own centres. It is therefore very useful for centres who are entering students for the Gateway Sciences if a member of the science team is a moderator.

To access materials for the skills assessment, centres need to be registered to use OCR Interchange. This website, used by Examinations Officers, not only provides a means of delivering Science in the News tasks, but also provides materials for Additional Science (Data Tasks and Research Studies).

Over 100 Centres have already used the free OCR Coursework Consultancy service. Each year a Centre can submit good quality photocopies of three marked Science in the News reports to the Gateway Sciences Subject Officer at OCR. The centre will then receive a written report from a senior moderator that provides feedback on the marking. In this way centres can determine whether or not they are judging the level of the candidates' work correctly.

F.   2007 Grade Thresholds for B625

The number of Centres requiring an adjustment of marks was slightly more than for the previous Sc1 scheme but this can be expected initially when a new specification is introduced.

There were many centres that did not have their marks adjusted but were very close to the tolerance limits.

The centre report from the Moderator provides detailed information about the moderator's judgements and advice on how to assess the different qualities.

		Grade threshold						
	Max. mark	A*	A	B	C	D	E	F
Can-Do tasks and SinN	60	55	**50**	45	**40**	35	30	**25**

The grade thresholds have been decided on the basis of the work that was presented for award in June 2007. It should be noted that this was the first cohort of candidates to take these new assessments. Thus, the threshold marks will not necessarily be the same in subsequent awards. Some adjustments may be expected as experience with the mark descriptors grows, and a wider range of Centres becomes involved.

Gateway Science Suite B623 /01 Foundation Tier

General Comments

The level of difficulty was **appropriate** for the ability range of the candidates.

Candidates performed to a satisfactory to good standard throughout the paper. Levels of performance in the three sections were comparable. Most candidates attempted all the paper and there was no indication that candidates did not have enough time to complete the paper.

The majority of candidates were able to display a good level of knowledge and understanding partly because of the question structure used throughout the paper.

Comments on Individual Questions

Q 1 (a) This question confused a number of candidates who seemed to think maturity came before adolescence.

(b) Some candidates had problems with the scale on the graph. A large number misinterpreted part (i) believing they should give the number of years Steve grew faster than Kate, not his own fastest rate of growth.

Q 2 (a) Few candidates were able to get the order entirely correct. Many had the plantlets growing roots before the buds had turned into runners. However most candidates knew why they were genetically identical in part (ii).

(b) Candidates found it difficult to put into words what they meant. The candidates that tried to explain about disease incorrectly assumed the plants were all immune from all disease.

Q 3 (a) Most candidates were able to correctly identify the parts of the cell. However a few tended to link the word control to the nucleus in part (iii).

(b) Few candidates knew about diffusion.

Q 4 (a) Candidates found it difficult to apply their knowledge a number of them knew blood travelled faster in arteries but they could not link this to increased blood loss.

(b) Most candidates knew that the blood would clot but few knew about platelets.

Q 5 (a) All but a few candidates gained both marks for this question.

(b) The majority answered this question correctly.

Q 6 (a) The majority answered this correctly although some candidates did not follow the instructions and gave iodine as an answer, which was not on the list.

(b) The most common incorrect answer for this question was sulfur.

(c) Most candidates answered this question correctly.

(d) Those candidates that got this wrong tended to give boron as an answer.

(e) Only the more able candidates correctly identified the transition element.

Q 7 (a) The incorrect answer anode appeared as frequently as cathode in part (i). In part (ii) a number of candidates simply said 'pop test' without describing how it was done. The question did not ask them to name the test and they should be advised that a two mark question needs more detail.

(b) Few candidates knew oxygen formed at the anode. Most commonly, answers included carbon dioxide and a word from the list such as anode.

Q 8 (a) The majority answered this correctly.

(b) Few candidates could answer this question, most seemed to think it was a fast conductor.

(c) The majority of candidates were able to gain one mark for copper being an electrical conductor. However, few candidates went on to give a second reason.

Q 9 (a) The majority of candidates knew that H_2O was a molecule but they could not identify the atom and the ion.

(b) Most candidates could write out the symbols correctly but only the more able could balance the equation. Some candidates realised they needed to put a 2 in so they tended to change the formula of MgO. Candidates should also be encouraged to make it clear when they are using capital letters.

Q 10 About half the candidates got this question correct. If they got part (a) they tended to get part (b) correct as well.

Q 11 Candidates tended to score two out of the three marks. The majority were unable to give the correct units.

Q 12 (a) Candidates found it difficult to put into words what they meant. Very few candidates described thinking distance in terms of distance travelled by the car while the driver is reacting. Most candidates incorrectly described it in terms of time taken.

(b) Again, candidates tended to talk in terms of time taken not distance travelled.

(c) Most candidates managed to write down at least one factor, with drugs or alcohol the most common answer. However, candidates should be reminded that alcohol is just an example of a drug and cannot score a separate mark.

(d) Only the more able candidates knew about ABS brakes. Most candidates seemed to think it made the driver stop quicker.

Q 13 (a) Most candidates answered this correctly but those that got it wrong chose motorbike because it had the largest number.

(b) Candidates divided the numbers instead of multiplying them correctly.

Q 14 (a) Most candidates answered this correctly.

(b)   The more able candidates answered both parts of this question correctly.

(c)   Those candidates that knew about potential energy also knew about kinetic energy. Incorrect answers tended to include gravitational energy.

(d)   Most candidates incorrectly thought power had something to do with strength.

Q 15   (a)   Most candidates answered this correctly.

(b)   Most candidates seemed to incorrectly think airbags were a passive safety feature.

(c)   The majority of candidates understood that the seatbelts might be damaged in some way.

Gateway Science Suite B623 /02 Higher Tier

General Comments

This higher paper was of an appropriate level and although there were only a few high scores up to 54 marks, no candidate scored the full 60 marks. The mean for the paper was 35.5. The lowest score was 6 marks. Most scores fell between the mid teens and the upper forties. This gave a good range of marks to grade the paper. There were challenging questions for appropriate candidates at the A and C boundaries which discriminated candidates' responses well. There was some evidence to suggest that a few candidates were incorrectly entered for this tier and failed to achieve more than twenty marks. These low scores can be demoralising for candidates. Clearly such candidates would be and feel more successful attempting a foundation paper where they could demonstrate more positive achievement.

Most candidates finished the paper and very few candidates seemed to run out of time. Weaker candidates, however, left some questions unanswered. These tended to be the extended prose questions on the higher demand content.

Comments on Individual Questions

Q 1   (a)   Most candidates correctly used the graph and gave 5 years [1]. Part (ii) was rather more poorly answered. 0 – 1 year [1] was not given by most. Instead between 0 and 2 years [0] or 14 to 20 [0] were popular wrong answers.

      (b)   Most got 1 mark for a correct graph with positive gradient. Some levelled off their graphs [0]. This B grade question (ii) showed few correct answers. 'Tips' of roots or shoots [1] were rarely seen. Leaves, roots, stem were common wrong answers.

Q 2   (a)   The examiners were looking for the idea of variation. Many wrote of 'if one type was diseased the others may not be' [1]. Other ideas about fruiting at different times, different tastes or textures, different colours or shelf lives scored also [1]. References to smell or size were ignored.

      (b)   This was a grade A and B question. It certainly discriminated between able candidates. Most able candidates got the idea of a small sample being taken (e.g. a small cutting / a few cells) [1]. Not many candidates went on to gain 2 or 3 marks. Marks were available for taking many pieces [1], aseptic or sterile techniques [1], suitable growth medium (e.g. agar) [1] and suitable conditions [1].

Q 3   (a)   The majority of candidates scored 1 mark with diffusion.

      (b)   In this genetics question a high proportion of answers gained 1 mark for the completed left strand. Only about half the candidates got the right strand correct.
In part (ii) most answers were correct in choosing 'before cell division' [1].

Q 4   (a)   The majority of candidates scored at least 1 mark with 2 or 3 boxes correct.

      (b)   Most chose plasma as the correct answer. 'Red blood cells' were also common and acceptable [1]. 'White blood cells' [0] was a frequent wrong answer.

(c) Louder heartbeats prompted many different responses. Some were too vague or incorrect. Many thought the larger side pumped more blood [0]. Many referred to higher pressure [1] or stronger muscle [1].

Q 5 (a) Most candidates scored full marks on the box diagram on hormones. It was well answered.

(b) The auxin question proved a challenge for many. Often candidates thought it grew towards the light in part (i) rather than upwards [0].
In part (ii) very few realised that the auxin is distributed evenly on all sides of the shoots.

Q 6 (a) Most answered correctly with chlorine [1].

(b) About half answered correctly with copper [1]. Nickel, although rarely seen, was also acceptable [1].

(c) Most answered correctly with phosphorous [1].

(d) Most answered correctly with nitrogen [1].

Q 7 (a) About half of all answers were correct with oxygen [1].

(b) Balancing the ionic equation is set at grade A and A* demand. Candidates of that ability tended to answer this well. Most answers from other candidates fell short of the marking points.

Q 8 (a) About 25% of candidates knew that metals had electrons that could move [1].

(b) Most grade C candidates scored [1] with 'a good electrical conductor'. Many others went on to pick a property from the diagram – e.g. flexible or bendy [1]. Some unfortunately mentioned that copper was a good **heat** conductor [0].

(c) Very few knew of superconductors. There were many answers such as 'fast at conducting' or 'brilliant conductors' [0]. Good answers referred to low resistances [1].

Q 9 (a) Two marks were available for a correctly balanced symbol equation using the correct formulae for both products and reactants. Many failed or attempted the balancing but gained [1] for the correct formulae. Typical incorrect formulae were $MgO2$, Mg_2, MG and Mg_2O and so these responses failed to score.

(b) There were some pleasing attempts at dot and cross diagrams. Common errors were covalent bonding diagrams [0]. Another error was donated electrons appearing in both O^{2-} and Mg^{2+}. One mark was for the correct charges O^{2-} and Mg^{2+} [1] and a correct diagram [1]. Many very able candidates scored 2 marks here.

Q 10 (a) This grade C / D question was well answered on the higher paper.
Marks were available for potassium floating on water [1], causing fizzing / bubbling / spitting / popping or any indication of a violent reaction [1]. Some scored by referring to the flame being lilac or pink or coloured [1]. Occasionally answers in terms of melting or turning into a molten ball were seen [1]. Some wrote of hydrogen gas being produced [1] but no candidates mentioned a colourless solution [1] or a colourless gas [1] being produced.

(b)   This was an A* question and some able candidates referred to potassium losing electrons more easily [1]. Marks were also available for the idea that potassium needs less energy to lose an electron [1] but this was rarely seen. Most incorrect answers were to do with losing electrons faster [0] or losing more electrons [0].

(c)   This was a well answered grade B question.

Q 11   (a)   Most were able to give one factor that would increase thinking distance. Most answered with drugs or alcohol [1]. Tiredness [1] or lack of concentration [1] was also seen. Many described how the latter could happen e.g. talking on mobile = lack of concentration [1]. Greater speed was also worth [1] mark but speed on its own scored [0].

(b)   Most of the correct answers on this wrote about ABS brakes reducing the chances of skidding or it stops the wheels locking [1]. Also acceptable was the reduced chance of losing control [1].

(c)   In part (i) most could do the simple calculation on stopping distance [1].
In part (ii) the more able candidates could correctly calculate the time of 0.75(s) [2].
Part (iii) was an extended prose 2 mark question. Only a few answers illustrated that the thinking distance needed is greater than 15m [1].
Some did state that they were driving within thinking distance [1].
Most referred to driving too close (to car in front) and so there was a collision risk [1].
Part (iv) was an A* question on braking distances and kinetic energy. Only very able candidates gained marks here. Marks were awarded for KE being absorbed when braking [1]. Also available was reward for the idea that when the speed doubles the braking distance quadruples / more than doubles [1].
Occasionally candidates also wrote that when the speed doubles the KE quadruples / KE α v^2 [1].

Q 12   (a)   Most knew that the seatbelt would stretch in a crash [1]. Some mistakenly thought it would shorten. [0].

(b)   Most knew that the seatbelt would absorb energy in a crash [1].

Q 13   (a)   Most correctly calculated 15 x 30 = 450 km [1].

(b)   Candidates were asked in this 2 mark question to suggest reasons why the fuel consumption for the van varied. Some unfortunately wrote about different vehicles [0]. Many referred to different loads [1] and different speeds [1]. Rather fewer referred to different driving styles [1] or journey lengths [1]. One other marking point rarely seen was the effect of different road conditions [1].

Q 14   This calculation on work done was well answered. Most correctly selected the correct formula from page 2 then went on to calculate the answer of 1 000J [2].

Q 15   This was a 3 mark extended prose question about terminal speed. The context was a little different from the usual parachute questions. Many able candidates were able to apply their knowledge and understanding to this different context. Examiners were seeking to award marks for the ideas that the roof box created more drag [1] lowering the terminal speed [1] and that the forces balanced at terminal speed [1].

Gateway Science Suite B631/01 Foundation Tier

General Comments

The level of difficulty of the paper appeared to be appropriate for the ability range of the candidates. Candidates appeared to have had sufficient time to complete the paper, with most attempting all, or almost all, questions. The quality of candidates' spelling, punctuation and grammar was generally good and there were only a few cases where it was really difficult to interpret a candidate's writing.

Comments on Individual Questions

Q 1　(a)　　Most candidates knew that normal body temperature is 37°C. The most common incorrect response was 27°C.

　　　(b)　　Although many candidates knew that shivering and faster respiration help to keep the body warm, it was not uncommon for candidates to only get one of the two marks available. In questions of this type, if more than the correct numbers of boxes are ticked, candidates will lose marks.

　　　(c)　　If candidates didn't get all three marks, they almost always got at least one, for knowing that the heart beats faster during exercise. Most knew that muscles need to receive oxygen and glucose, although some thought that carbon dioxide is needed.

Q 2　(a)　　Many candidates did gain all four marks, although they were in a minority. Most gained at least two though.

　　　(b)　　Most candidates knew that mistakes in copying genetic instructions are called mutations. 'Variation' was the most common incorrect choice.

Q 3　(a)　　Almost every candidate correctly chose the lettuce as being able to prevent scurvy.

　　(b)(i)　　Although many candidates correctly calculated the number of meals as 3, a very common error was to simply apply the formula given. Many candidates gave a final answer of 60, without appreciating that a further step in the calculation was necessary.

　　(b)(ii)　　Most candidates knew that protein is needed for growth or repair, although the mark was not awarded for answering that it helps bones grow. A noticeable number thought that protein supplies energy.

　　(b)(iii)　　Virtually no candidates knew what 'first class proteins' are, with most giving answers along the lines of the proteins simply being 'very good'.

　　(b)(iv)　　Most candidates knew that alcohol can cause damage to the liver or brain. Perhaps the most common incorrect answer was the kidney.

Q 4　(a)　　Many candidates did not seem to appreciate that the question was asking for the name of another 'type' of pathogen, such as virus or fungi, and instead tried to give specific examples, although even then, they often gave the name of the disease, such as malaria, instead of the pathogen.

(b)   Candidates generally correctly matched the chemicals to their meanings.

Q 5   (a)(i)   Almost all candidates knew that trees make food by photosynthesis.

        (a)(ii)   Acceptable answers were, for example, that glucose is used for energy, growth, or storage. In questions like this, candidates should try to give clearly different answers. For example, saying glucose is used for the growth of leaves and of roots would only gain one mark. A noticeable minority thought that it is used for photosynthesis. 'Food' was a vague answer that was not credited.

        (b)   Although the only sustainable resource in the list was the fish, relatively few candidates chose this option, with perhaps coal being the most common incorrect choice.

Q 6   (a)   Although most candidates knew that polar bears are mammals, some thought they are amphibians.

        (b)   Virtually all candidates correctly gave predator for (i) and prey for (ii), although there were a few who chose answers from the list in part (a).

        (c)   Many candidates clearly explained adaptations such as the bears' sharp claws, sharp teeth or camouflage. Unqualified answers such as 'teeth' or 'nose' were insufficient for a mark, as were descriptions of adaptations for keeping warm.

Q 7   (a)   Virtually all candidates demonstrated correct use of the key.

        (b)   There many acceptable responses as to what the ducks might compete for, with most candidates gaining the mark, usually for 'food' or 'mates'.

        (c)   Although many candidates knew that only birds have feathers, with a few giving the also correct response of 'beak', there were also many candidates who did not gain credit, usually for the answer 'wings'.

        (d)(i)   This question discriminated well between candidates. A quantitative description, such as 'the population fell then rose' gained one mark, with a correct reference to numerical data gaining the second. For some reason, a surprising number of candidates stated that the population rose from 1982, whereas the actual low point was 1977.

        (d)(ii)   With a variety of acceptable answers, most candidates gained the mark. Common responses included that the ducks could have been helped by breeding them in captivity (although simply putting them in captivity was insufficient), or by protecting their habitat in some way.

Q 8   (a)   Most candidates understood the term 'extinct'.

        (b)   All of the species given were regularly chosen as being extinct, although the correct response, dodo, did frequently appear.

        (c)   Very few candidates could correctly describe the stages of fossilisation, with many simply making vague references to leaving imprints in rock. A small number referred to the pterodactyl being covered in 'sediment', although there were descriptions of being covered in sand or mud which were credit-worthy. Being covered in rock, earth, or soil were not acceptable answers. Almost no candidates explained that soft parts decay and are replaced by minerals.

Q 9 (a)(i) The most common answer correctly explained that sperm cells have tails to help them swim. Other candidates gave acceptable answers such as being small to enter the egg. The statements that sperm cells are 'long' or 'thin' were not acceptable responses.

     (a)(ii) Although this was a more difficult question than (i), many candidates did appreciate that having lots of sperm cells increases the chance of fertilisation.

     (b) A minority of candidates correctly worked out that kangaroos have 6 chromosomes in their sperm cells. Many gave the human answer of 23.

Q 10 (a) Most candidates answered at some length, making use of the bullet point prompts and the space allowed. Weaker answers simply described putting some seedlings in the light and some in the dark. Better answers described a way of ensuring some seedlings had light from one side only, as well as the observations or measurements that would be made. Although most candidates attempted to give a valid example of fair testing, e.g. by giving the seedlings the same amount of water, a minority of candidates suggested giving them the 'same light'. Some candidates thought that fair testing and repeating for reliability were the same thing.

     (b) Although many candidates did correctly choose 'positive phototropism', the other options were regularly seen.

Q 11 (a) This proved to be more difficult than expected. The most common correct answer was 'lungs' or 'alveoli' in the first line. Many thought that digested food is absorbed in the stomach. A surprising number left at least one of the boxes empty.

     (b) Very few candidates realised that diagram B correctly showed the diffusion of oxygen.

Q 12 (a) Generally this was answered well.

     (b)(i) Although most candidates correctly plotted most points, the one at (6, 4.2) proved to be difficult for many, with the point, understandably, often being plotted at (6, 4.4) instead. Although many did correctly draw a curved line of best fit, a large number lost the mark through not going through all the points. A surprising number, despite having correctly plotted the points, then lost the second mark by drawing a straight line, or in fewer cases, by extending the line to the origin.

     (b)(ii) Even among those who had incorrectly drawn the line, many still correctly gave the optimum pH as 8. Other answers such as 2 or 3.5 were also regularly seen.

Q 13 (a) Most candidates correctly chose high milk production and resistance to disease as the best features to select for.

     (b) Most candidates appreciated that breeding the two types of apple trees together could give rise to apple trees producing a variety of types of apples.

Gateway Science Suite B631/02 Higher Tier

General Comments

This was the first time that this paper was sat in this specification and it was pleasing to see a number of excellent scripts. It may be, however, that a small number of the candidates would be better served by a foundation tier entry.
Candidates appeared to have sufficient time to complete this paper and there did not appear to be obvious problems with the rubric. The grammar and punctuation were appropriate to this level of examination and, with a few exceptions, there were no problems in interpreting the writing of the candidates.
Questions which appeared to provide candidates with the most difficulty included 7a and 7b, 8d, 9bi and 10ci.
The graph plotting was generally excellent, however, the incorrect choice of a straight line rather than a curve was seen many times.

Comments on Individual Questions

Q 1   (a)   Candidates generally answered correctly with no trends in the small minority of incorrect responses.

       (b)   About half the cohort achieved this mark with reference to resistance or the idea that the pathogen may be a virus. A minority of scripts contained some correct reference to insufficient dose. Most answers unworthy of a mark contained some mention of immune/immunity.

       (c)   There were a number of correct qualifications to resistance but again, many candidates referred to immunity. There were many allusions to antibodies although a few candidates correctly referred to problems associated with the immune system and other side effects including the detrimental effect on 'friendly bacteria'.

Q 2   (a)   Rarely incorrect with no trends in the wrong answers.

       (b) (i)   Most candidates achieved this mark with a minority suggesting '24', '6' and '32'.

       (b) (ii)   Few candidates really knew what is meant by the term first class protein. Most answers revolved around proteins with reference to high quality, proteins needed by the body or proteins that cannot be made by the body. Rarely was the term essential amino acids encountered and, although many candidates did achieve a mark for 'coming from an animal', the impression was that the candidates did not understand the importance of the statement.

       (c)   Many candidates had some understanding of the liver's function. Of the remaining answers, there were few references to the idea of blood passing through the liver rather the idea that the liver is a filtering device.

Q 3   (a)   Many candidates achieved this mark and the spelling was predominantly correct. A few hyperthermia references were observed.

       (b)   Vasodilation was possibly the most common suggestion but a significant number of answers included an incorrect qualification e.g. vessel movement. Most candidates referred to feeling hot or warm rather than an increase in body temperature.

Q 4   (a)   About three quarters of the candidates correctly identified the term fertilisation although with some interesting spellings.

       (b)   About half the cohort suggested protein with some of the remaining answers including references to amino acids and rarely enzymes. DNA was the most commonly encountered incorrect response and given by many of the candidates.

       (c)   Most candidates achieved one mark for some reference to DNA change. Qualifications such as base changes were seen in fewer answers. References to changes in proteins were often credited.

Q 5   (a)   Rarely incorrect with wings being observed in a small minority of scripts.

       (b) (i)   Few candidates failed to achieve a mark and about half the cohort scored a second mark. The number of candidates who could not pinpoint the appropriate years when trends change was significant.

       (b) (ii)   Difficult not to achieve a mark for this part; unqualified reference to zoos and really impracticable suggestions were rare.

Q 6   (a)   About half the candidates achieved a mark with marking points one and two equally common and many of these also gained a second mark. Marking point three was less common but not rare. A significant number of candidates did not gain the sediment mark for a sole reference to rock. Too many answers included a suggestion that the bones decay.

       (b)   All answers were equally common and most candidates achieved a mark. A paucity of candidates included a reference to components of the skeleton being missing or claimed that the skeletons had not been identified. There were also various references to animals being not old enough to be fossilised.

       (c) (i)   Most candidates answered in terms of Lamarck, few approached the answer from Darwin's perspective. The majority of answers unworthy of a mark were lacking in clarity rather than being definitely incorrect. Nevertheless, a significant number of candidates included references to God and spontaneous generation.

       (c) (ii)   All marking points were observed with adapt/adaptation being the most common.

Q 7   (a)   Few candidates did not achieve a mark for this part with most marking points being equally frequent (except for anther/stigma which was rarely observed). Reference to bright with omission of colour was a significant reason for some candidates not achieving both marks. The few incorrect responses included reference to leaf size, petal landing strips, sticky stigmas and light pollen.

       (b) (i)   Few incorrect responses were seen.

       (c)   This proved to be a difficult question with very few correct responses seen, with 'nitrate' being slightly more common than 'sugar and glucose'.

Q 8   A number of candidates gave **descriptions** rather than **explanations** and so lost marks.

Q 9   (a) (i)   Most candidates achieved this mark although 12, 24 and 6 were rarely observed and a minority of answers referred to the human chromosomal complement.

       (a) (ii)   This was even better answered than the previous question with very few incorrect responses.

       (b) (i)   Mostly correct with some reference to A and very few to B and C.

       (b) (ii)   Very few incorrect responses, mainly D. There did not appear to be any correlation between incorrect answers for parts (i) and (ii).

Q 10   (a)   This was answered correctly by virtually all candidates.

       (b)   Many candidates were able to refer to auxin and most of these were able to identify the function of the growth factor. However, a significant number of these candidates did not achieve the mark for suggesting that auxin was broken down by light or is synthesised only in the shade region of the leaf. Many responses included reference to elongation but mostly to the stem of the plant rather than the cells.

Q 11   (a)   There were few incorrect responses with E being the most common of the wrong answers.

       (b) (i)   There were some interesting spelling examples but nevertheless most candidates achieved this marking point. The few responses unworthy of a mark were either due to totally unacceptable spelling or some reference to other parts of the pulmonary apparatus e.g. lung.

       (b) (ii)   Most candidates achieved one mark for this part with the first two marking points being equally common, rarely was the third marking point given. Many responses were awarded both marks. Most candidates would have achieved both marks if they had included a comparator. A minority of responses made reference to lungs or longer capillaries.

Q 12   (a) (i)   Most candidates gained the plot marks with pH 8 and 6 being the only incorrect attempts. However, many candidates attempted to draw the best straight line.

       (a) (ii)   A minority of candidates gave values outside the acceptable range mostly pH 2 or 3.5.

       (b)   Few candidates gained a mark for this part, predominantly for marking point one. Most candidates suggested reasons which involved rate loss outside the optimum range.

Q 13   (a)   About half the candidates achieved a mark and of those that did, most gained the second mark for breeding. Most answers unworthy of a mark omitted reference to fastest substituting fast or best. A minority of candidates took the cloning approach or artificial insemination.

       (b)   Most candidates misread the question; those that did not, tended to emphasise problems of mutation and sterility. Few candidates achieved a mark for this part and it was rare for two marks to be awarded.

Gateway Science Suite B641 / 01 Foundation Tier

General Comments

It was gratifying to note that more than half the candidates entered for this paper scored well over half the marks available and that all candidates had been entered for the correct level of paper. Most candidates attempted each question, although some of the questions requiring extended writing or more detailed explanations were left blank e.g. questions 1(c) and 10c(i). Most candidates appeared to have sufficient time to complete the paper. In general the rubric was well interpreted although a significant number of candidates wrote symbol equations in place of word equations and vice versa. Many of the extended questions tended to elicit rather vague answers. Questions 1(c) about cracking, 6(c) about sulfur dioxide pollution, 8(c) about alloys and 9(b) about the formation of chloride ions provided particular difficulties for a wide range of candidates. Only a few candidates could explain why aluminium does not corrode easily (question 8(d)). However, it is encouraging to note that aspects of chemistry such as distillation, the composition of the air and some terminology such as 'exothermic', 'ion' and 'molecule' were well known. On the other hand, very few candidates could explain the term 'alloy'. Many candidates seemed to have difficulty in explaining environmental aspects of Chemistry e.g. disposal of plastics (question 2(d)), the origin of sulfur dioxide in the atmosphere (question 6(c)). Most, however, were able to give an account of the problems arising from oil pollution (question 1(b)) .Most candidates could undertake simple calculations and extract data from tables e.g. questions 4(a) and (b) and 6(a) and most appeared to use their Periodic Tables to identify elements in Group 7.

Comments on Individual Questions

Q 1   Most candidates performed well on this question, gaining at least three of the five marks available. Full marks for part (c), however, were rarely obtained, only the best candidates realising the importance of cracking.

   (a) (i)   Most candidates chose the correct answer, the commonest error being to suggest 'decomposition'.

   (a) (ii)   A minority of candidates failed to gain the mark here by suggesting incorrectly that fractions from crude oil were separated according to their melting points.

   (b)   Few candidates failed to gain the mark for this part. Most candidates referred to 'harming wildlife'. A minority of candidates referred correctly to oil spills or damage to beaches.

   (c)   Very few candidates gained a mark for writing about cracking despite the guidelines given by the bullet points. Of those who attempted it, there were many vague answers. Those candidates who realised that cracking involves a breakdown, failed to gain the mark by referring to 'breakdown of substances' rather than 'breakdown of hydrocarbons' or 'breakdown of alkanes'. Very few candidates realised that cracking produces smaller or more useful alkanes such as petrol. Statements such as 'makes useful substances' were regarded as too vague to warrant the mark.

Q 2   This question provided good discrimination between candidates with a wide range of responses for each part. Part (c) proved to be the easiest while only a few candidates scored both the marks for the extended writing in part (d).

   (a) (i)   Just over half the candidates scored the mark for this part. The commonest error was to suggest that the small molecules were called 'polymers'.

(a) (ii)   Just under half the candidates scored this mark through suggesting, incorrectly, that the large molecules in plastic are 'catalysts' or elements. A significant number of candidates merely muddled the terms 'monomer' and 'polymer'.

(b)   Polystyrene was a very common incorrect answer with PVC and polyethane appearing as well.

(c)   Nearly all candidates realised that hydrocarbons contain carbon and hydrogen. Oxygen and carbon dioxide were the commonest incorrect answers.

(d)   Many candidates provided very vague responses, often just rephrasing the question. Common vague responses included 'don't biodegrade' or 'don't disintegrate'. Many candidates failed to obtain the marks by mentioning landfill sites without further qualification such as 'fill up quickly'. A significant number of candidates just mentioned harm to animals without further qualification.

Q 3   Most candidates scored at least two of the marks available for this question. Part (b) proved a stumbling block to many candidates especially the fact that the combustion product of hydrogen is water.

(a)   Most candidates realised that oxygen was involved in burning. Many, however, obviously misread the question and wrote the name of the fuel (methane) instead of the name of the gas necessary to burn the methane. Other incorrect responses included carbon dioxide, nitrogen and hydrogen.

(b)   Most candidates realised that the carbon dioxide was produced from the burning of the carbon in hydrocarbons but far fewer appreciated that water was also produced. Common incorrect answers included hydrogen and carbon monoxide. These candidates presumably think that only the carbon is burnt.

(c)   The correct response, 'carbon monoxide' was usually seen but weaker candidates often gave the incorrect response 'carbon dioxide' through not taking note of the stem which stresses that there is a shortage of air.

Q 4   This question was the best answered in the paper, most candidates being able to extract and analyse simple information from a table and many could apply their knowledge of the concept of molecular formulae.

(a)   Most candidates gained a mark for the correct answer ($6^{o}C$). The commonest incorrect responses were 7 and $11^{o}C$.

(b)   Nearly all candidates were able to select which fuel gave out most energy.

(c)   Most candidates recognised that an exothermic reaction gives out energy. The commonest incorrect response was endothermic with only a few suggesting 'decomposition'.

(d)   Over half the candidates were able work out the molecular formula of ethanol from a displayed formula. It was, however, not uncommon for a Candidate to lose the mark because of a failure to use subscripts for the '2' and '5' in the formula. The commonest incorrect formula was C_2H_5O.

Q 5   This question proved challenging for many candidates especially parts (b)(i), which involved writing a symbol equation and (b)(ii) which accessed the idea of thermal decomposition. The question allowed good discrimination between the candidates.

(a)   Water and sand were the most popular correct responses, although many candidates suggested materials such as 'clay' and 'limestone' perhaps through not understanding the difference between cement and concrete.

(b) (i)   Many candidates found writing the balanced symbol equation demanding. Those who wrote the correct symbols often tried to balance the equation incorrectly, usually placing a 2 in front of the $CaCO_3$ and CaO only. Others lost marks through poor writing of the formulae, with upper case letters being used instead of lower case. Some started with CaO and CO_2 as the reactants and others wrote a word equation instead of a symbol equation.

(b) (ii)   About half the candidates realised that the reaction involved thermal decomposition. Combustion was the commonest incorrect answer, despite the fact that there was no oxygen on the left.

Q 6   Most candidates could identify the most abundant gases in the air but few realised how the pollutant sulfur dioxide was formed. The identification of the processes involved in adding and removing carbon dioxide from the air proved to discriminate well between candidates.

(a)   Most candidates were able to extract the relevant information from the table, although a few suggested that carbon dioxide or water were the most abundant gases (usually in place of nitrogen rather than oxygen).

(b) (i)   Although about two-thirds of the candidates realised that photosynthesis removes carbon dioxide from the air, many suggested incorrectly that rusting did this.

(b) (ii)   Candidates who gained the mark for part (b)(i) generally gained this mark as well. A number of candidates reversed the order of respiration and photosynthesis in these two questions but a significant minority suggested that polymerisation was responsible for adding carbon dioxide to the air, perhaps thinking about the burning of plastics.

(c)   Very few candidates understood that burning is involved in the formation of sulfur dioxide. Where burning was mentioned, many candidates gave vague answers such as 'burning in cars' or 'from power stations' rather than specifying fossil fuels or specific fuels. Many suggested that sulfur reacted with carbon dioxide to form sulfur oxides. Hardly any candidates mentioned sources such as volcanoes or geysers.

Q 7   Although most candidates could extract information from the graph, few understood the factors involved in determining the final amount of gas produced in a reaction. Only one fifth of the candidates gained two marks for parts (b) and (c).

(a)   Nearly all candidates were able to read off the volume of gas from the graph.

(b) A wide range of candidates had difficulty gaining both marks for this part. Those who realised that the reaction would be faster at the beginning often failed to appreciate that the quantities of reagents had not changed and drew lines ending well above the final volume at 20°C. A considerable number of candidates started their line half way up the volume axis and made their line run parallel to the one already present.

(c) A variety of correct suggestions as to how to increase the reaction speed were seen. Common correct responses were to increase the surface area of the tablet or to increase the concentration (often of an unspecified substance). Some candidates failed to read the stem of the question properly and suggested adding more tablets.

Q 8   Parts (a) and (b) were well answered by the majority of candidates. Few candidates, however, understood the nature of an alloy (part (c)) and hardly any could explain why aluminium does not corrode easily (part (d)).

(a) Most candidates chose plastic, rubber or glass as a suitable material. Those who gave incorrect responses usually failed to read the stem of the question and gave the name of a metal such as iron or aluminium.

(b) Over two thirds of the candidates correctly identified oxygen/ air and water as requirements for iron to rust. Carbon dioxide was the commonest incorrect answer. Several candidates wrote 'salt' alone, without any reference to water or air.

(c) Many candidates described the properties of alloys rather than composition. Only a few appreciated that an alloy is a mixture of metals or a metal and non-metal. Most candidates who realised that two elements were involved wrote vague statements such as 'two metals together' (omitting the idea of a mixture) or 'a mixture of substances' (omitting the idea of a metal being involved).

(d) This was the least well answered question on the paper. Many candidates gave answers relating to rusting and air/ water not being present for the reaction to occur on the surface or merely stated that 'aluminium is unreactive'. The few correct responses that were seen usually referred to a protective layer or oxide layer.

Q 9   This question provided a wide range of responses by the candidates. Many candidates did well in part (c)(i) but only half scored both the marks for part (a) whilst most candidates found parts (b) and (d) demanding.

(a) Most candidates realised that K^+ is an ion but a surprisingly high number linked atom to oxygen. There were only a few instances of multiple lines being drawn from any one box.

(b) The mode of formation of a negative ion was not appreciated by the majority of candidates and many had difficulty in distinguishing between ions and atoms. Many failed to mention electrons and it was not uncommon to see incorrect answers such as 'the chloride ion gains electrons' or 'chlorine gains atoms from the sodium'.

(c) (i) The commonest incorrect answers suggested that compounds are formed when 'substances' or 'molecules' combine.

(c) (ii) Candidates were just as likely to answer with the incorrect 'ionic' bonding as with the correct 'covalent'. Other vague answers such as 'double bonding' or 'chemical bonding' were often seen, through candidates not understanding the implication of the word 'type' in the stem of the question.

Q 10 This question also provided a wide range of responses by the candidates but high marks were rarely achieved, part (c) being particularly challenging.

(a) About two-thirds of the candidates recognised Group 1 metals as being alkali metals. The commonest incorrect answers were halogens followed by transition metals.

(b) Many candidates reversed the order of reactivity. A considerable minority of candidates knew that potassium was the most reactive of the three metals but failed to recognise that there was a pattern down the Group and suggested that lithium was more reactive than sodium.

(c) (i) A minority of candidates were able to describe the practical procedure for a flame test but many just stated that the metals were placed in the flame rather than referring to a metal compound being placed on the end of a cleaned wire and this being put in the flame. Many failed to gain the mark because of vague statements such as 'put the metal over a Bunsen flame' (compounded by diagrams with the metal shown well above the flame rather than in the flame). The mark usually obtained was for a statement about the flame colour changing. Many candidates, however, failed to gain this mark by not making it clear that it was the flame that changed colour and not the metal (compound).

(c) (ii) Just fewer than half the candidates gave the correct flame colour for sodium. Although a wide range of incorrect colours was given, green and blue were foremost, suggesting that candidates had remembered the flame colour of copper compounds.

Q 11 This question was fairly well answered, most candidates obtaining the mark for part (b) and over half achieving 3 marks for part (a).

(a) Nearly all candidates knew that chlorine was used for killing bacteria, but a surprisingly large number could not link sodium chloride and iodine with their correct uses. Sodium chloride was often linked with filling balloons (suggesting that some candidates have no real idea of the nature of sodium chloride) or as an antiseptic whilst iodine was often linked to food flavourings.

(b) Practically all candidates were able to name a halogen other than chlorine or iodine.

(c) Many candidates could not access the language of Chemistry when elements react to form compounds. The incorrect reactant 'chloride' or incorrect product 'sodium chlorine' were frequently seen. A large number of candidates disadvantaged themselves by writing symbol equations rather than word equations. This often resulted in incorrect formulae e.g. Cl rather than Cl_2 or $NaCl_2$ as the product.

Q 12 Few candidates knew the test for hydrogen but over two thirds were able to correctly identify the name of the positive electrode.

(a) Only about a fifth of the candidates were able to gain both marks for explaining the hydrogen test. Many gave answers relating to electrolysis or the electrodes e.g. 'test the amount of gas at negative electrode – if there is more gas hydrogen is present'. Of those that did realise that a test for a gas was required, the statement 'pop test' was quite common, as was the 'glowing splint test' (muddled with the test for oxygen). Only a handful of candidates obtained the first mark only.

(b) The commonest error was to confuse the cathode with the anode.

Q 13 Most candidates scored at least one mark for this question. The equation proved a stumbling block for many.

(a) Well over half the candidates realised that bauxite was an ore of aluminium most of the others giving the incorrect answer 'haematite'.

(b) About half the candidates gave the correct word equation. Common errors included (i) aluminium oxide + oxygen as reactants (ii) aluminium oxide + liquid aluminium as reactants (iii) the inclusion of electrolysis or heat in the equation (iv) reversing the equation. A considerable number of candidates disadvantaged themselves by trying to write a symbol equation. This invariably led to the use of incorrect formulae e.g. AlO or AlO_2 for aluminium oxide.

Gateway Science Suite B641/02 HIGHER Tier

General Comments

This is the first examination of the new Chemistry exam as part of the Gateway Science suite. Candidates appear to have been well prepared which can be quite difficult when an exam is new and nobody knows what to expect. Candidates were well prepared for balancing equations but many were careless in the sizing of letters in symbols and the sizing and positioning of what should be a subscript number.

Comments on Individual Questions

Q 1 (a) Most answers to this question were along the lines of can't be used again or used faster than is made and did not score. This question did not discriminate well at its intended level.

(b) (i) This was well answered but had one of the highest no response scores on the paper. It is assumed that this was because there was no line for the answer to be written and candidates missed it out. A few candidates placed their mark at the top of the column. A very few placed it outside the column at the bottom.

(b) (ii) This was well answered but also gave some discrimination at the D grade level.

(c) Most candidates had some idea of what cracking is although a few confused it with distillation. Many candidates were confused with molecule, atom, particle, hydrocarbon and chains of hydrocarbons which were all used interchangeably.

Q 2 (a) Virtually all candidates were able to correctly identify the double bond.

(b) (i) Large numbers of candidates got this right. Incorrect responses were mainly not giving a colour change or giving an incorrect colour change.

(b) (ii) A large number also got this right but not as many as (b) (i). Those not scoring wrote 'nothing' rather than 'no change'.
Some candidates got their answers to (i) and (ii) the wrong way round.

(c) This question was about disposal of plastic in landfill and not about other methods of disposal such as burning so those answers did not score. Quite a few candidates simply stated that plastics were non biodegradable which was in the question so they did not score. This question proved to be a good discriminator at its intended level.

Q 3 (a) This was well answered with the most popular answer being increasing population.

(b) This was very well answered.

(c) This was well answered with virtually everybody correctly identifying the species. A lot were then able to balance what was a not particularly easy equation.

(d)   This proved to be one of the most difficult questions on the paper. A lot restated the question about energy being taken in when bonds are broken. A few were able to state that energy is released when bonds are formed. Very few were then able to say that for this reaction energy release was greater than energy input. Some candidates put this in terms of numbers of bonds made or broken but this did not gain credit.

Q 4   (a)   Most got this right but there were examples of poor handwriting where it was difficult to distinguish between a 2 or a 3 for the carbon and a 5 or a 6 for the hydrogen. The size and positioning of what should be subscript numbers was also an area of concern with some candidates.

         (b)   This question scored well. The commonest wrong answer was to multiply rather than divide. Candidates are advised to show their working and this was a case in point. It was clear that some candidates did not have calculators so had tried a long hand calculation and had not worked to sufficient decimal places. The reciprocal of 0.3 is not 3 so 780 x 3 did not score but 780/0.3 would have scored 1 even if they couldn't then do the calculation.

Q 5   (a)   This scored well and therefore did not discriminate at the intended level.

         (b)   This was a question that would not have been asked on previous specifications. It did not score as well as was expected. Many answers were in terms of water, sand or stones.

Q 6   A wide variety of diagrams was seen, some better than others, but the vast majority showed what happened. Not quite as many could recall that the process was subduction.

Q 7   (a)   This was well answered with most getting the correct percentage. The most common incorrect percentage was 18. Most correctly identified the gas with the most common wrong answer being carbon dioxide.

         (b)   This proved to be a good discriminator but at a higher level than expected. A lot of incorrect answers gave factories, cars or car engines burning rather than a fossil fuel. A few correctly gave volcanoes as a source.

         (c)   The equation was well answered with most getting the species and the balancing mark. Where the species was wrong, carbon monoxide was often given as CO3.

Q 8   (a)   This line had to be sketched rather than plotted but some of the lines were extremely thick, wobbly or composed of several lines. Lines had been drawn in ink so could not then be erased for correction. In spite of this most candidates were able to draw a line that was steeper than the original. Fewer got the correct end point with over and under values being about equally represented.

         (b)   This question differentiated well. Most got the more energy mark and then some got the increased frequency with even less getting more successful collisions.

Q 9   (a)   It was clear that many students had attempted to learn this, frequently successfully. Those who had not could sometimes get the left hand side but often gave rust as their answer on the right.

         (b)   This was well answered.

(c) Virtually everybody was able to come up with a material that is used in the making of cars although some of them were very obscure but the reason for use did not always relate to the material. For example plastic light covers are used for their transparency not because they do not break-they do.

Q 10 (a) Well answered.

(b) Poor use of English was a problem here. The commonest answer was chloride ions or atoms gaining electrons rather than chlorine atoms. Some candidates talked about magnesium losing electrons but did not say where they went.

(c) This diagram was usually well drawn but some of the overlaps and positioning of electrons could have been better. A small degree of flexibility was given here but where shells were nowhere near touching no credit was given. A few candidates drew diagrams that could only be interpreted as showing ionic bonding.

(d) Well answered. Wrong answer was 2.8.9.

Q 11 (a) Most managed to score 2 out of the various possibilities. Common wrong answers were seeing a gas given off or the water changing colour.

(b) Most scored the flame colour mark in this question but some candidates talked about the metal changing colour.

(c) Electrons above arrows did not score as it was not usually possible to work out what was happening to them. A surprising number incorrectly added an electron to the sodium atom and still got a positive ion.

Q 12 (a) This scored well. Yellow was not accepted as a colour for bromine although it was accepted as a colour for bromine water in question 2.

(b) This scored well. A rare mistake was not to change the chlorine to chloride on the right hand side.

(c) This was a good discriminator at the intended level. Poor powers of expression let some candidates down. Others talked about chlorine having more electrons than bromine or chlorine losing electrons.

Q13 Most were able to get the species here but some placed the electron above the arrow. Fewer balanced the equation.

Q14 (a) This scored very well. Some tried to include cryolite or electricity into the equation and then did not score.

(b) This provided a wide range of answers including acting as the electrolyte, lowering the temperature (unspecified) and dissolving the aluminium.

(c) Generally well answered in terms of electrolysis costs.

Gateway Science Suite B651/01 Foundation Tier

General Comments

This paper was the first Gateway Single Subject Physics examination. Numbers were low with only 250 candidates taking the examination at foundation level but this was as expected, being the first year of what, for many is a two year course.

The paper performed well with a minimum mark of 13 and maximum mark of 53.

There was no evidence that candidates were short of time or finished too early.

Comments on Individual Questions

Q 1 (a) Candidates were able to answer this question correctly although several candidates drew more than one line to or from the boxes provided. Centres should advise candidates that giving a choice of answers will inevitably mean they lose that mark.

(b) Most candidates were able to calculate the payback time as 3 years.

Q 2 (a)(i) A surprisingly large number of candidates thought that D showed the amplitude whereas the correct answer was A.

(a)(ii) Candidates usually identified B as the wavelength.

(b) This section proved difficult for many candidates with less than half answering it correctly. The majority of candidates thought that the wavelength increases as the frequency increased.

(c)(i) Approximately half the candidates identified microwave as the wave used in mobile phones. Radio and IR were popular wrong answers.

(c)(ii) Candidates were able to answer this question, correctly choosing infrared.

(d) The majority of candidates scored at least one mark for the idea that it might damage the brain. The more able scored a second mark, usually mentioning the heating effect or its long term use. One or two candidates mentioned receiving unwanted phone calls which was not accepted.

Q3 (a)(i) About 90% of candidates correctly gave thermometer as the answer to this question.

(a)(ii) Surprisingly this question was not as well answered as expected. The most common correct answer was stop-clock. It seemed that many candidates had not investigated this in a practical manner.

(b) Only half the candidates were able to give the correct unit of energy.

Q4 This question was worth three marks. Most candidates scored 1 mark for stating that the polystyrene contained bubbles, better candidates went on to say it contained trapped air and that this prevented conduction and convection.

Q5   The vast majority of candidates gave the first word as digital but did not know that a laser produces an intense beam of light.

Q6   (a)(i)   The majority of candidates identified coal as the fuel for a fossil fired power station.

         (a)(ii)   Less than half the candidates were able to identify straw as the fuel for a renewable power station.

         (b)   Few candidates were able to explain how the energy in a power station was lost.

         (c)   About half the candidates gave AC as the type of electricity generated by a power station.

         (d)(i)   Very few candidates knew that the job of a transformer is to change the voltage.

         (d)(ii)   The majority of candidates were able to describe the job of the National Grid correctly.

Q7   (a)   This question proved to be the easiest on the paper with almost 100% correct answers.

         (b)   This was another badly answered question, examiners were looking for the ideas that stars are hot and give out light.

Q8   (a)   Candidates were able to identify two uses for artificial satellites.

         (b)(i)   Very few candidates knew about solar flares

         (b)(ii)   As expected, from the answers to part (i) candidates were unable to explain how they affected satellite signals. Examiners were lenient in marking this question and accepted answers such as 'solar flares block satellite signals'.

Q9   (a)   The stem of the question seemed to mislead candidates. Better candidates described the creation of craters with dust clouds and fires and a consequential drop in temperature. Weaker candidates on the other hand gave answers relating to the dinosaur in the stem such as 'killed or destroyed dinosaurs'.

         (b)(i)   A large number of candidates did not know that comets were mainly ice and dust. The majority of candidates thought they were made of rock.

         (b)(ii)   Oval or a description was the most common answer for the orbit of a comet.

         (b)(iii) Most candidates scored 1 mark for knowing that the speed changed but few were able to describe the change correctly.

Q10   (a)   Most candidates correctly identified stop clock and measuring tape as the equipment needed to measure speed.

         (b)   This was a three mark question. Most candidates were able to score 1 mark but few managed to score all three. Examiners were looking for the idea that the time between pictures was known. The distance travelled in this time could be found from the road markings and speed calculated by dividing distance by time.

Q11 (a)(i)   Most candidates gave the correct answer, Fiat.

(a)(ii)   Candidates went for the answer with the increase in time rather than the reduction. The most common (incorrect) answer was Ford.

(b)(i)   Far too often candidates started their answer with "the time" rather than "the distance" or "how far" and then went on to describe time.

(b)(ii)   Vague answers such as weather were seen but about half the candidates gave a correct answer.

(b)(iii)   About half the candidates correctly calculated stopping distance as 25m.

Q12 (a)   A variety of answers was seen but most candidates correctly chose the aeroplane in flight.

(b)   The correct answer 'books on a shelf' was the most common answer.

Q13 (a)   The majority of candidates scored 1 mark for saying the seatbelt stopped your head hitting the windscreen etc.   Few candidates went on to explain how the force on the driver was reduced.

(b)   Most candidates stated that the belts may have stretched or been damaged.

(c)   Candidates were able to give a variety of correct active safety features.

Q14   The majority of candidates were able to correctly complete the calculation.

Gateway Science Suite: B651 /02 Higher Tier

General Comments

This was the first separate Physics examination in the Gateway syllabus with candidates being assessed in a number of new and unfamiliar areas. Consequently the performance of the candidates was very encouraging, there were consistently high marks achieved by a large number of candidates. Furthermore, very few low marks were recorded and Centres had clearly made the correct entry decision for the vast majority of candidates.

Centres had obviously prepared their candidates very well and the Item coverage across the three modules being tested (Modules P1, P2 and P3) appeared to be very thorough.

There were some areas of essentially new material that many candidates struggled with such as 'laser light' in question 2, passive solar heating in question 6 and solar flares in question 8.

In these questions candidates were often on the right track but answers were incomplete or failed to use the correct scientific term, or appropriate word to gain maximum credit.

The provision of the equations at the front of the examination paper obviously helped candidates as the standard in questions involving calculations was higher than expected or previously experienced.

Often better quality answers were succinct and homed in on the salient points quickly whereas poorer responses often rambled with very few relevant **scientific** points being covered.

There was no evidence that time was a problem for the candidates, very few 'no response' answers were in evidence and no unfinished scripts were seen.

Similarly there were no general misinterpretations of the rubric although in question 3 (b) candidates often thought more information was required in an answer than was actually needed. (See specific comments on this question).

Comments on Individual Questions

SECTION A- MODULE P1

Q 1   (a)   The vast majority of candidates got off to a sound start with this question. Good answers concentrated on bubbles/ air is trapped and air is a good insulator. Surprisingly few mentioned polystyrene or the cup being a (good) insulator. Very few mentioned convection in the correct context.

(b)   Very few candidates gained full credit in this question. Passing the energy on from one particle to the next was often the single mark awarded. Coffee particles having KE, coffee particles colliding with the cup wall or cup particles gaining KE were less frequent responses. Trying to compare to the polystyrene cup and talk about the thinner plastic cup being a better **conductor** often weakened answers and resulted in no mark being gained.

(c)   The vast majority of candidates calculated the payback time correctly. Rare errors were 'months' rather than years or subtracting 100 from 300.

Q 2　(a)　This was the most poorly answered question on the examination paper. The expected responses were not well known and candidates often answered in terms of the **use** of a laser beam in a CD or describing the colour. Some candidates gave answers that talked of laser light being a different colour from light from a filament lamp or that it contains 'different' frequencies.
Intense was not well know despite it being stated in the specification, concentrated was the popular choice that was heading in the right direction but did not gain credit. The idea of '**in phase**' was not widely known, or understood. Very few candidates answered by reference to the filament lamp.

　　(b)　The connection between frequency and wavelength was appreciated by large numbers of candidates. Indeed, some even used the wave equation to justify their correct answer. Incorrect choices were fairly evenly divided between 'increases' and 'stays the same'.

Q 3　(a)　A mixed bag of responses to the first part of question 3. Although there were many maximum marks, large numbers of 'refraction' for the first response were seen. The second response was better, the common error being to choose 'dispersion' or 'refraction'. The third response (interference) was generally correct.

　　(b)　Most candidates gained both marks in the first answer space. Although a general answer of 'harmful' or 'causes damage' (to humans) was accepted it is intended to require more specific reference to cancer or skin cancer in future assessments. Many candidates having gained the two marks in the first answer space thought that another response was needed. Usually they gave a second response in terms of global warming. Because of the apparent misunderstanding of what was required this was not penalised on this occasion.

Q 4　　The graph was usually correctly drawn.
The incorrect lines were either
- almost correct but not starting at $20\,^{\circ}$C
- above the first line but horizontal above $100\,^{\circ}$C, or
- below the first line becoming level at the correct temperature.

A **few** zero scores were given for the line below the original and horizontal below $100\,^{\circ}$C.

Q 5　(a)　The concept of an analogue signal being continuously variable or able to take any value was not well known. There was no predicable pattern to incorrect answers but references to varying frequencies or varying wavelengths or a poor or wrong comparison to digital signals were frequently given.

　　(b)　Some excellent answers which often gave four creditable points. (TIR {2 marks}, angle of incidence > critical angle and description of refraction in the fibre). The main misconception was **refraction** in the fibre or that the fibre contained tiny mirrors along its length.
Very few candidates successfully described the idea of **no** transmission of light at the sides of the fibre.

SECTION B – MODULE P2

Q 6   (a)(i)   A wide range of acceptable answers gained the mark. The few unacceptable answers were written in terms of low maintenance, power output, or cheap electricity.

        (ii)   Similarly good answers in the main, with references to maintenance or low power output being the popular wrong answers.

        (b)   Moving the panel out of the shade or to another part of the house were frequent answers that failed to gain credit, although the concept of tracking the Sun was reasonably well understood.

        (c)   This is a topic not previously taught in GCSE syllabuses. Many candidates thought that the question was about solar **heating** panels and talked about water in the pipes being heated or solar cells when they mentioned currents produced inside the glass. Other more common errors were to answer in terms of
- **light** entering
- failing to mention heat being **absorbed** (by objects in the 'room')
- thinking that the **glass** absorbed heat
- describing convection currents in the 'room'.

Q 7   (a)   Candidates were helped by the structure of this question and most were able to gain full marks.

        (b)   Again most candidates gained three marks for the correct calculation. Although the provision of equations may have helped the formula still had to be successfully manipulated to gain full credit.

Q 8   (a)   This was similar to question 6 (c) in the sense that it was testing essentially new material for many centres. Answers that were incomplete either failed to mention what was contained in the solar flare (**gas/particles/radiation** etc.) or the idea of sudden or violent **ejection** of material.

        (b)   The frequent error here was to merely repeat the idea of interference *in the question* without adding anything about distorting or **stopping** the signals. Damage to the electronics of the satellite was another common error.

Q 9   (a)(i)   The correct response was chosen by the vast majority of candidates, any incorrect choice usually being 'between Saturn and Neptune'.

        (ii)   Again correctly answered by the majority 'holes' rather than 'craters' being the incorrect response more often than not.

        (b)(i)   Most candidates mentioned 'ice' to gain this mark. A small number mentioned frozen gases, nitrogen or merely rock and failed to gain the mark.

(ii) Generally the elliptical (or oval) shape of a comet's orbit was known, circular and, less often oblong, were the incorrect answers.

(iii) Most candidates knew that there was a speed change and a large number correctly related it to the movement, or position, relative to the Sun. When only one mark was gained it was usually due to the answer being incomplete by failing to mention the relative position of the comet. A smaller number got the comet's relative position or movement the wrong way round or related the speed change to a planet.

SECTION C- MODULE P3

Q 10 (a)(i) An appropriate factor was correctly identified more often than not. Vague or unqualified references to **road, speed** or **brakes** without mentioning the actual condition or situation meant that the mark was not awarded.

(ii) Similar to the previous question, the mark was usually gained. Poor answers failed to be specific or reversed the desired answer (i.e. **not** drinking alcohol, concentration).

.   (b) Some excellent answers but two marks were in the minority in this question. Good answers focused quickly on stretch/absorb energy and increased stopping time/reduced force or preventing impact (with windscreen etc.) Poor answers repeated the prevention of impact in more than one way or went on at length about 'keeping you in your seat'.

(c) A lot of good answers; non-polluting and needing to be charged or slower being the most frequently given correct advantages/disadvantages. Some potentially acceptable disadvantages were incomplete in that 'electricity production' type of answers often failed to mention the pollution produced in the process or 'at the power station'.

Q 11 Very few candidates failed to gain all three marks although a few tried to convert the distance to a different unit, usually centimetres.

Q 12 (a)(i) Predominantly the correct choice was made.

(ii) In this part of the question a lot of candidates incorrectly chose B or D.

(b) As in earlier questions, succinct answers usually hit the target and rapidly gained the two marks along the 'twice the speed means quadruple the KE' line of argument. One mark responses were usually for the idea of energy transfer or mention of $\frac{1}{2}$ mv^2. Answers that scored zero were usually centred on more or even four times the **damage** but failed to relate this to the **K.E**.

Q 13 Some excellent answers where the correct factors specific to Colin or Cathy were given. Factors not, or wrongly, linked to the correct driver were quite common but the 'different cars' reasons did not answer the question as the first line states that they have **identical** cars. This undid many potentially good answers.

Q 14   (a)(i)   There were large numbers of answers that correctly related weight and air resistance as the unbalanced forces.

         (ii)   Although the names of the balanced forces were not essential in this part of the question, mention of **upthrust**, **energy** or **velocity** as one of the forces occasionally meant that this mark was not awarded.

         (b)   Large surface area and therefore greater air resistance were often rapidly identified as the crucial factors in many good answers. Failure to mention **large** surface area or **greater** air resistance often resulted in zero score.
Similarly a mention of a different speed rather than **lower** <u>**terminal**</u> (or steady/final speed) often failed to secure this particular mark.

General Certificate of Secondary Education
Gateway Science Suite
June 2007 Assessment Series

Unit Threshold Marks

Unit		Maximum Mark	a*	a	b	c	d	e	f	g	u
B621/01	Raw	60				34	28	22	17	12	0
	UMS	69				60	50	40	30	20	0
B621/02	Raw	60	44	35	26	17	10	6			0
	UMS	100	90	80	70	60	50	40			0
B622/01	Raw	60				39	32	25	19	13	0
	UMS	69				60	50	40	30	20	0
B622/02	Raw	60	45	37	29	22	14	10			0
	UMS	100	90	80	70	60	50	40			0
B625*	Raw	60	55	50	45	40	35	30	25	20	0
	UMS	100	90	80	70	60	50	40	30	20	0
B623/01	Raw	60				35	29	23	18	13	0
	UMS	69				60	50	40	30	20	0
B623/02	Raw	60	46	38	30	23	16	12			0
	UMS	100	90	80	70	60	50	40			0
B631/01	Raw	60				41	34	27	21	15	0
	UMS	69				60	50	40	30	20	0
B631/02	Raw	60	39	32	25	19	14	11			0
	UMS	100	90	80	70	60	50	40			0
B641/01	Raw	60				34	28	22	17	12	0
	UMS	69				60	50	40	30	20	0
B641/02	Raw	60	46	38	30	22	17	14			0
	UMS	100	90	80	70	60	50	40			0
B651/01	Raw	60				34	27	21	15	9	0
	UMS	69				60	50	40	30	20	0
B651/02	Raw	60	46	39	32	26	20	17			0
	UMS	100	90	80	70	60	50	40			0

*B625 - The grade thresholds have been decided on the basis of the work that was presented for award in June 2007. It should be noted that this was the first cohort of candidates to take these new assessments. Thus, the threshold marks will not necessarily be the same in subsequent awards. Some adjustments may be expected as experience with the mark descriptors grows, and a wider range of Centres becomes involved.

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

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