

**GCSE**

**Science: Single Award  
(Modular)**

**End of Module Tests**

**May 2010**

**Mark Schemes**

Issued: October 2010



**NORTHERN IRELAND GENERAL CERTIFICATE OF SECONDARY EDUCATION (GCSE)  
AND NORTHERN IRELAND GENERAL CERTIFICATE OF EDUCATION (GCE)**

**MARK SCHEMES (2010)**

**Foreword**

***Introduction***

Mark Schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

***The Purpose of Mark Schemes***

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of 16- and 18-year-old students in schools and colleges. The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes therefore are regarded as a part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

The Council hopes that the mark schemes will be viewed and used in a constructive way as a further support to the teaching and learning processes.



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**General Certificate of Secondary Education**

**2009–2010**

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**Science: Single Award (Modular)**

Staying Alive  
Module 1

Foundation Tier

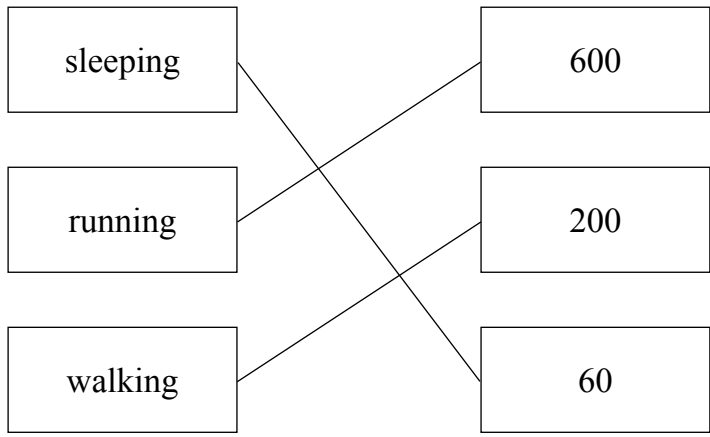
[GSC11]

**THURSDAY 20 MAY 2010, MORNING**

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**MARK  
SCHEME**

1 (a)



[1] each activity [3]

(b) (i) fats/carbs not any named food (ignore a correct name with fat/carb) fatty foods [1]

(ii) more : heart [2]

(iii) diabetes (ignore answer with heart) [1]

7

2 (a)

contracts to push baby out	uterus
dilates to make room for baby's head	cervix
carries food and oxygen to baby	umbilical cord
ruptures so waters break	amnion/amniotic sac

[4]

(b) (i) 5 bars correct [2] 3/4 bars correct [1] [2]

(ii) 12 and 13 (accept 4–7) [1]

(iii) pubic, body, underarm hair/voice deepens/facial hair/moody, feel down, emotional/sex drive more muscular (✓) sperm produce/penis enlarge/ testes bigger (✓) puberty (✓) no ref. to female traits any **two** [2]

9

AVAILABLE MARKS



- 3 (a) (i) chemical/stored [1]  
(ii) thermometer [1]  
(b) DACE [3]  
ACE correct 2 mk DAC – 2 mk/BD, DA, AC, CE – 1 mk  
BDCEA [2]  
(c) 11, 20 [2]  
(d) (i) same amount of water [1]  
(ii) repeat/average [1]

4 (a) (i)

blond	Mrs
straight	Mr
receding	Mrs
attached	Mrs

1/2 mark each  
round down [4]

(ii)

b	Bb	bb
b		bb

F1 correct 1 mk  
Mother correct 1 mk  
If Mother (Bb)  
All F1 consequential (✓)

[2]

(b) variations, alleles [2]

5 (a) (i) 40 [1]

(ii) 125 Very poor [1]  
Allow 121+

(iii) Exercise (more) no ref. to diet/genetics/ill  
Stronger heart [1]

(b) (i) Stop smoking/reduce stress/exercise more, not alcohol [1]

(ii) Any valid (must relate to (b)(i))  
Happy with lifestyle/can't be bothered [1]

AVAILABLE  
MARKS

9

8

5

			AVAILABLE MARKS
<b>6 (a) (i)</b>	high in fat, grease, high energy/calorie Stored as fat Any <b>two</b>	[2]	
	<b>(ii)</b> Balanced diet [1], high in vitamins [1] to keep her healthy (named problem) [1] reduce risk of heart attack [1]	[2]	
<b>(b)</b>	iron, red (blood) cells	[2]	
<b>(c)</b>	bulimia – binge eating/vomiting	[1]	7
<b>Total</b>			<b>45</b>



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**Science: Single Award (Modular)**

Human Activity and Health

Module 2

Foundation Tier

[GSC21]

**THURSDAY 20 MAY 2010, AFTERNOON**

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**MARK  
SCHEME**

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			AVAILABLE MARKS	
1	(a) (i)	Bacteria – salmonella; Virus – Flu	[2]	5
	(ii)	Fungi	[1]	
	(b)	Penicillin – bacteria	[2]	
2	(a) (i)	Endangered	[1]	6
	(ii)	Humans	[1]	
	(b) (i)	B	[1]	
	(ii)	Nets with larger mesh sizes; limiting the number of days fishing can take place	[2]	
	(c)	Reduce the number of grey squirrels	[1]	
3	(a)	All points correct [2]; 3-4 correct [1]	[2]	8
	(b)	decreases – water/light – roots	[3]	
	(c)	Any <b>two</b> from: Plants left for same length of time; same type of plant; named condition; same size pots; same nutrients / same compost/amount of compost; given same amount of water	[2]	
	(d)	Plants not grow / die	[1]	

			AVAILABLE MARKS	
4	(a)	(i) lakes become acidic / fish live in lakes / fish cannot escape / fish food affected	[1]	8
		(ii) filters / alternative fuels / burn less fossil fuel / hybrid cars / catalytic converters	[1]	
	(b)	(i) Combustion / burning	[1]	
		(ii) one mark for cause (e.g. ice caps melting, water levels rise) and one mark for effect (e.g. no habitat / animals drown – cause needed before second mark) ( <b>not</b> kill)	[2]	
	(c)	(i) The rate of increase is rising	[1]	
(ii) Any <b>two</b> from: Better nutrition / better medicines / better sanitation		[2]		
5	(a)	UV ( <b>not</b> sunlight)	[1]	4
	(b)	Any <b>two</b> from: Avoid hottest part of day / cover up / use sunscreen	[2]	
	(c)	chromosomes / genes / alleles	[1]	
6	(a)	Prevents entry of microbes / barrier; Catch/traps microbes that have gained entry	[2]	5
	(b)	Any <b>three</b> from: Dead / modified microbes injected: causes lymphocytes / white blood cells; to produce antibodies; antibodies latch on to microbes / complementary shape; immobilised; creation of memory cells	[3]	
7	(a)	(i) Cannabis does less harm than alcohol/ no more than smoking; any comparative value(s) from table	[2]	9
		(ii) Adults better able to make decisions concerning lifestyle / risks / duty of care / children still developing	[1]	
		(iii) nicotine – tar	[2]	
	(b)	(i) 12 – 10 – 4	[1]	
		(ii) Tony	[1]	
		(iii) Greater harm to health specified; harm to society specified	[2]	
<b>Total</b>				<b>45</b>





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**Science: Single Award (Modular)**

Chemical Patterns and our Environment  
Module 3

Foundation Tier

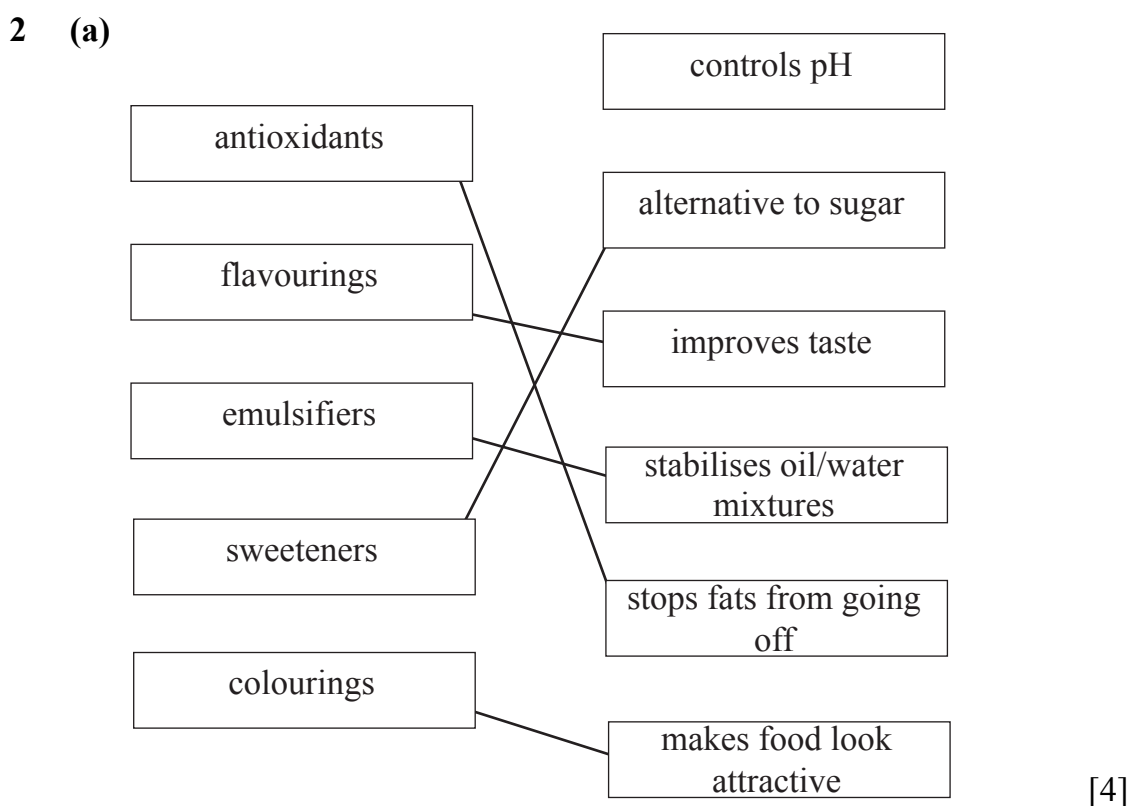
[GSC31]

**THURSDAY 20 MAY 2010, MORNING**

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**MARK  
SCHEME**

- 1 (a) **hazard** [1]
- (b) Greater visual impact  
Understood internationally  
Easier to understand than reading      **Any one** [1]
- (c) (i) D [1]
- (ii) B [1]
- (iii) Toxic/poisonous [1]



(b) E [1]

(c) hyperactivity/allergies/headaches (any)/cancer [1]

- 3 (a) (i) iron, zinc (must have both) [1]
- (ii) hydrogen [1]
- (iii) zinc [1]
- (b) safety goggles/face masks/**not** gloves/**not** glasses alone [1]

AVAILABLE MARKS	
5	
6	
4	

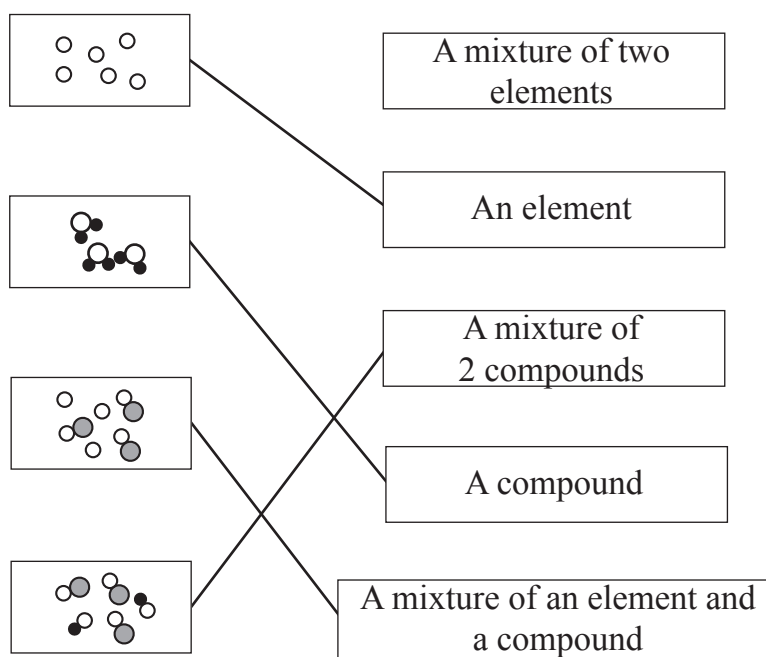


- 4 (a) (i) Fossils [1]
- (ii) Sedimentary/Limestone any named sedimentary rock  
e.g. mudstone, sandstone [1]
- (iii) Metamorphic [1]
- (b) granite [1]  
sedimentary [1]  
marble [1]

AVAILABLE  
MARKS

6

5



[3]

3

- 6 (a) pH = 1 [1]
- (b) burette, syringe, **not** measuring cylinder  
graduated pipette **not** dropper [1]
- (c) 15 cm<sup>3</sup> [1]
- (d) neutralisation [1]
- (e) liquid X – hydrochloric acid/or any suitable [1]  
liquid A – sodium hydroxide/or any suitable [1]

6

		AVAILABLE MARKS
7	(a) B accept carbon	[1]
	(b) C accept neon	[1]
	(c) A, D	[1]
	(d) Sodium	[1]
8	(a) All 6 points correct [2] 5/4 points correct [1] < 4 points [0] line of best fit [1]	[3]
	(b) decreases [1] then levels off [1]	[2]
	(c) hydrochloric acid	[1]
	(d) CO <sub>2</sub> produced/gas given off/escapes	[2]
	(e) to stop acid spray escaping (soak up liquid)	[1]
	to let gas escape/prevent explosion idea of free movement of gas	[1]
	(f) repeat the experiment/take more readings	[1]
<b>Total</b>		<b>45</b>



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**2010**

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**Science: Single Award (Modular)**

**Materials and their Management**

**Module 4**

**Foundation Tier**

**[GSC41]**

**FRIDAY 21 MAY 2010, MORNING**

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**MARK  
SCHEME**

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			AVAILABLE MARKS		
1	(a)	ceramic/floor tiles [1], copper/electrical wire [1], fibre/shirts [1], iron/bridges [1]	[4]	9	
	(b)	strong [1], unreactive [1], transparent [1]	[3]		
	(c)	lighter/safer/ flexible/easy to dye/low cost/easy to mould, any <b>two</b>	[2]		
2	(a)	refinery gas/gas cookers [1], paraffin/liquid fuel [1], tar/roads [1]	[3]	6	
	(b)	fractional distillation [1]	[1]		
	(c)	(i)	carbon and hydrogen [1]		[1]
		(ii)	global warming or effect/greenhouse effect [1] ( <b>not</b> air pollution/produces CO <sub>2</sub> )		[1]
3	(a)	(i)	16%	[1]	6
		(ii)	cloth (any valid) ( <b>not</b> metal/food on own)	[1]	
	(b)	(i)	can be broken down/decompose/rot [1] by microbes/bacteria/fungi [1]	[2]	
		(ii)	saves resources [1], saves energy [1] accept reduces landfill sites litter/don't rot/safer for wildlife (do <b>not</b> accept saves money)	[2]	
		(a)	Loop/B [1], Whorl/C [1]	[2]	
4	(b)	Gently press finger on paper [1], sprinkle some talcum/aluminium powder on the paper [1], use a <b>paintbrush to rub off</b> /blow off/tap off excess powder [1], place a piece of (stick) tape on the fingerprint and remove [1]	[4]	9	
	(c)	flame test/ chromatography/ DNA/ fibres [1]	[1]		
	(d)	safe or idea of locking away/ lock doors (windows)/ out of sight [1]	[2]		
		alarm system/ security mark [1]	[2]		

			AVAILABLE MARKS	
5	(a)	(i) light [1]	[1]	7
		(ii) show if bottle <b>food</b> is warm [1] won't burn the baby [1]	[2]	
	(b)	(i) smaller <b>particle</b> size [1] new material properties [1]	[2]	
		(ii) wound dressing/sun creams/bandages/plasters/clear oil spills or other example [1]	[1]	
		(iii) $10^9$ [1]	[1]	
6	(a)	(i) does not lather [1] with soap [1]	[2]	8
		(ii) calcium sulphate or chloride/magnesium sulphate or magnesium chloride	[1]	
	(b)	(i) B [1]		
		(ii) C [1]		
		(iii) B [1]	[3]	
	(c) calcium carbonate [1], carbon dioxide [1]	[2]		
<b>Total</b>				<b>45</b>





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**Science: Single Award (Modular)**

Electricity, Waves and Communication

Module 5

Foundation Tier

**[GSC51]**

**THURSDAY 20 MAY 2010, AFTERNOON**

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**MARK  
SCHEME**

- 1 (a) (i) voltmeter [1]  
(ii) series [1]  
(iii) increase in voltage / increase in current / stronger  
brighter bulb / hotter bulb / more power / more energy /  
blown bulb  
(any **two**, [1] each) [2]  
(b) 6 / 2 [1]  
3 ohms [2]  
(c) bulbs in parallel [1]  
+ complete circuit [1]  
bulbs in series = [0] [2]

8

- 2 (a) (i) microwave / mast [1] each [2]  
(ii) cell [1]  
(iii) cancer or tumour [1]  
(b) (i) B [1]  
(ii) more interference [1]

6

- 3 (a) (i)
- | Pin     | Colour of wire |
|---------|----------------|
| Earth   | Blue           |
| Neutral | Green / yellow |
| Live    | Brown          |
- All lines correct = [2]  
2/1 correct = [1] [2]
- (ii) fuse / cable grip / insulation of live, neutral pin / longer earth pin /  
made of plastic / made of insulation (**not** double insulated)  
(**not** plastic on wires) [1]



			AVAILABLE MARKS	
	(b) (i)	Can't be wrongly wired up / wires can't be pulled out easier to replace fuse / come with correct fuse rating can't be opened / no loose wires / can't be tampered with (any <b>two</b> , [1] each) (not fully sealed)	[2]	7
	(ii)	5A	[1]	
	(iii)	Earth wire	[1]	
4	(a) (i)	Between 11.00 am and 5.00 pm [1] 6 hours [2]	[2]	9
	(ii)	1000	[1]	
	(iii)	cloud cover or shadow / shower (not changing weather)	[1]	
	(iv)	line under summer [1] starting later + finishing earlier than summer [1]	[2]	
	(b) (i)	will not run out / can be replaced / always be there / can be used again / <b>neutral</b>	[1]	
	(ii)	less fossil fuels burned (or names); less carbon dioxide / less greenhouse gases / no carbon emissions (not incorrect symbol)	[2]	
5	(a) (i)	bending / refraction [1] Inwards / together [1] Focus [1]	[2]	6
	(ii)	concave / diverging	[1]	
	(b)	Can't see near things clearly or Can only see far things clearly [1] lens [1] weak / thin [1] Light focused behind retina [1]	[3]	

			AVAILABLE MARKS
<b>6</b>	<b>(a)</b>	<b>(i)</b> all 5 points [2] 4/3 [1] [1] for smooth curve No tolerance on points	[3]
		<b>(ii)</b> noise levels decrease with distance	[1]
		<b>(iii)</b> from graph 1.46 → 1.54	[1]
		<b>(iv)</b> from graph 1.32 → 1.38	[1]
	<b>(b)</b>	acts as a sponge / absorb sound [1] prevents echoes / reverberation [1] or converse	[2]
	<b>(c)</b>	Ultrasound / ultrasonic	[1]
<b>Total</b>			<b>9</b>
			<b>45</b>



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**General Certificate of Secondary Education  
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**Science: Single Award (Modular)**

Road Safety, Radioactivity  
and Earth in Space  
Module 6

Foundation Tier

[GSC61]

**FRIDAY 21 MAY 2010, MORNING**

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**MARK  
SCHEME**


- 1 (a) (i) Venus, Mars [2]  
(ii) Nearer to **the Sun** [1]  
(iii) Jupiter [1]  
(b) Galaxy, Solar System, Sun, Earth  
3–4 correct = [3], 2 correct = [2], 1 correct = [1]  
Correct position only [3]  
(c) Water needed to live [1] **or** implied  
They don't have to carry it with them [1] **or** implied [2]
- 2 (a) (i)  $13+7+7+9+35 = 71$  [1]  
29% [2] [2]  
(ii) Oil; coal [2]  
(iii) (natural) gas/lignite/peat/turf **not** petrol/diesel [1]  
(b) C; D any order [2]  
(c) Carbon dioxide / CO<sub>2</sub> [1]
- 3 (a) (i) D [1]  
(ii) ice; oil; gravel; stones; water no ref. tyres  
smooth track; mud less weight [2]
- (b)
- |                   | Decrease | No change | Increase |
|-------------------|----------|-----------|----------|
| Reaction time     |          |           | ✓        |
| Thinking distance |          |           | ✓        |
| Braking distance  |          | ✓         |          |
- [1] each [3]
- 4 (a) (i) **Most** (black full) **stars** (for front and side impact) [1]  
(ii) Seat Altea [1]  
(b) crumple zones; head rests; side impact bars; S.R.S; air bags; seat belts  
Any **two** [2]

AVAILABLE  
MARKS

9

8

6

			AVAILABLE MARKS
(c) (i)	slow cars down [1]: if there is an accident less chance of <b>serious</b> injury or less chance of accident	[2]	7
(ii)	Speed bumps; speed camera	[1]	
5 (a)	Vehicle A [1] Steepest implied gradient (slope) Ref. to Dist/Time [1]	[2]	7
(b) (i)	120 J	[1]	
(ii)	40/160 [1] 0.25 (if 25 must be %) [2] with incorrect unit [-1]	[2]	
(c)	Brakes increase friction more (friction implied in terms of braking) [1] Larger braking force than forward force [1]	[2]	
6 (a)			
	If first box shaded no marks mark vertical columns		
	3 correct columns [2], 2 correct columns [1]	[2]	
(b)	radiation causes damage to (living) tissues / cells; may lead to cancer [1] each	[2]	
(c) (i)	radiation that is in the air, always around us, natural from source, from the earth	[1]	
(ii)	rocks; space; cosmic ray; sun; nuclear power stations; nuclear waste	[1]	
(d)	The combinations of neutrons and protons [1] are unstable [1]	[2]	8
<b>Total</b>			<b>45</b>





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**General Certificate of Secondary Education**

**2009–2010**

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**Science: Single Award (Modular)**

Staying Alive  
Module 1

Higher Tier

[GSC12]

**THURSDAY 20 MAY 2010, MORNING**

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**MARK  
SCHEME**

- 1 (a) (i) 40 [1]
- (ii) 125 Very poor [1]  
Allow 121+
- (iii) Exercise (more) no ref. to diet/genetic/illness [1]  
Stronger heart
- (b) (i) Stop smoking/reduce stress/exercise more/not alcohol [1]
- (ii) Any valid (must relate to (b)(i)) [1]  
Happy with lifestyle/can't be bothered
- 2 (a) (i) high in fat, high in energy/calories [2]  
Stored as fat – any **two**
- (ii) Balanced diet [1] – 1 mk, high in vitamins [1] Any one 1 mk [1]  
to keep healthy (named problem) [1]  
reduce risk of heart attack [1] [2]
- (b) iron, red (blood) cells [2]
- (c) bulimia – binge eating/vomiting [1]
- 3 (a) (i) Pedigree mk as Punnet
- F1 only shown [1]

**or**

	F	f
F	FF	Ff
f	Ff	ff
- Parents [1] each  
2 × [1] = [2]  
F1 [1]
- c.mk.  
(poss 2 mks) [3]
- (ii) higher cost/not accepted/life expectancy/threat to life [2]
- (b) egg cell, haploid [2]

AVAILABLE  
MARKS

5

7

7



			AVAILABLE MARKS
4	(a) (i) Carbon dioxide + Water $\longrightarrow$ Glucose/food/sugar Any order 3 for [2] 1/2 for [1]	[2]	9
	(ii) decrease, photosynthesis slows, less light only if linked to photosynthesised	[2]	
	(iii) so oxygen can be seen	[1]	
	(b) upper part of leaf so (more) light/unless qualified	[2]	
	(c) uses oxygen or produces carbon dioxide [1] uses glucose or release energy [1] (Only accept reverse if process specified) Any relation to equation	[2]	
5	(a) liver no longer reacts to insulin; so glucose not converted to glycogen	[2]	8
	(b) short term; still passed on to next generation	[2]	
	(c) pancreas; cells can't produce insulin/glucose not stored in liver/muscles	[2]	
	(d) variation that promotes resistance being inherited more/more sugary (processed) food available/obesity or less exercise [1] Internet/medical/surveys [1]	[2]	
6	(a) stimulus in foot/pain; spinal cord; through sensory neurone; relay neurone; motor neurone; muscle contracts any <b>four</b>	[4]	5
	(b) protection/speed	[1]	
7	(a) Wilkins, Franklyn	[2]	4
	(b) bases/base pairs only	[1]	
	(c) 6	[1]	
<b>Total</b>			<b>45</b>





*Rewarding Learning*

**General Certificate of Secondary Education**

**2009 – 2010**

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**Science: Single Award (Modular)**

Human Activity and Health

Module 2

Higher Tier

[GSC22]

**THURSDAY 20 MAY 2010, AFTERNOON**

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**MARK  
SCHEME**

			AVAILABLE MARKS	
<b>1</b>	<b>(a)</b>	Prevents entry of microbes / barrier; Catch/trap microbes that have gained entry	[2]	5
	<b>(b)</b>	Any <b>three</b> from: Dead / modified microbes injected; causes lymphocytes / white blood cells; to produce antibodies; antibodies latch on to microbes / complementary shape; immobilised; creation of memory cells	[3]	
<b>2</b>	<b>(a)</b>	<b>(i)</b> Cannabis does less harm than alcohol/ no more than smoking; any comparative value(s) from table	[2]	9
		<b>(ii)</b> Adults better able to make decisions concerning lifestyle / risks / duty of care / children still developing	[1]	
		<b>(iii)</b> nicotine – tar	[2]	
	<b>(b)</b>	<b>(i)</b> 12 – 10 – 4	[1]	
		<b>(ii)</b> Tony	[1]	
		<b>(iii)</b> Greater harm to health specified; harm to society specified	[2]	
<b>3</b>	<b>(a)</b>	<b>(i)</b> A and D	[1]	7
		<b>(ii)</b> Bacteria / Fungi	[1]	
		<b>(iii)</b> Pasteur	[1]	
		<b>(iv)</b> Rows 1, 2, 5, 6 (all correct = [2]; 2/3 correct = [1])	[2]	
	<b>(b)</b>	Process used in culturing microbes; to avoid contamination	[2]	

			AVAILABLE MARKS	
4	(a)	(i) 4000 million	[1]	9
		(ii) Development of the first antibiotics; affected more people / greatest increase on graph	[2]	
	(b)	(i) increase (no plateau)	[1]	
		(ii) Species that out-competes /more successful than native species; and spreads through native habitats	[2]	
	(c)	(i) Cutting by man / disease	[1]	
		(ii) cover land / spread / reduce light / take space; damage / kill orchids	[2]	
5	(a)	Rays get reflected back within atmosphere / at greenhouse boundary	[1]	6
	(b)	example, e.g. ice field and named effect	[2]	
	(c)	less photosynthesis; less carbon dioxide removed from the atmosphere or burning forest; produces carbon dioxide	[2]	
	(d)	Some countries opted out / not all countries signed up / targets too low	[1]	
6	(a)	(i) Any <b>three</b> from: resistant form increased; non resistant form <b>eliminated</b> ; resistant form able to survive antibiotic; non-resistant form killed by antibiotic	[3]	9
		(ii) change in chromosome / gene / DNA	[1]	
		(iii) Resistance to other antibiotics	[1]	
	(b)	(i) C–D–A–B	[1]	
		(ii) Any <b>two</b> from: scientists’ salaries; expensive equipment / chemicals; trial and error effect	[2]	
		(iii) side effects	[1]	
<b>Total</b>				<b>45</b>





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**2009–2010**

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**Science: Single Award (Modular)**

Chemical Patterns and our Environment  
Module 3

Higher Tier

[GSC32]

**THURSDAY 20 MAY 2010, MORNING**

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**MARK  
SCHEME**

			AVAILABLE MARKS
<b>1</b>	<b>(a)</b> All 6 points correct [2] 5/4 points correct [1] < 4 points [0] line of best fit [1]	[3]	
	<b>(b)</b> decreases [1] then levels off [1]	[2]	
	<b>(c)</b> hydrochloric acid	[1]	
	<b>(d)</b> gas given off/escapes	[2]	
	<b>(e)</b> CO <sub>2</sub> produced to stop acid spray escaping, soak up liquid [1] to let gas escape/prevent explosion, idea of free movement of gas [1]	[1] [1]	
	<b>(f)</b> repeat the experiment/take more readings	[1]	11
<b>2</b>	<b>(a)</b> B accept carbon	[1]	
	<b>(b)</b> C accept neon	[1]	
	<b>(c)</b> A, D	[1]	
	<b>(d)</b> Sodium	[1]	4
<b>3</b>	<b>(a) (i)</b> Archbishop Ussher	[1]	
	<b>(ii)</b> He counted up the different generations	[1]	
	<b>(iii)</b> 6 000 years	[1]	
	<b>(b)</b> Used to find age of rocks [1] uses radioactivity [1] radio isotopes U238, K40 idea of daughter elements Pb 206 } [1]	[3]	6









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**Science: Single Award (Modular)**

**Materials and their Management**

**Module 4**

**Higher Tier**

**[GSC42]**

**FRIDAY 21 MAY 2010, MORNING**

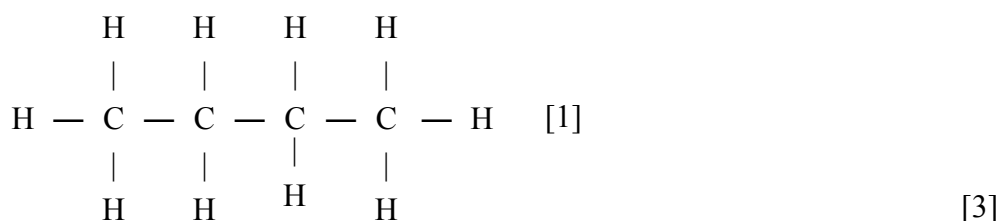
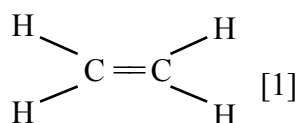
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**MARK  
SCHEME**

			AVAILABLE MARKS	
1	(a)	(i) light [1]	[1]	7
		(ii) show if bottle food is warm [1], won't burn baby [1]	[2]	
	(b)	(i) smaller <b>particle</b> size [1], new materials / properties [1]	[2]	
(ii) wound dressing/plaster/bandages/sun cream/tennis ball hydrogel/clear oil spills/or other example [1]		[1]		
(iii) $10^9$ [1]		[1]		
2	(a)	(i) does not lather [1] with soap [1]	[2]	
		(ii) calcium sulphate or chloride/magnesium sulphate or magnesium chloride	[1]	
	(b)	(i) B [1]		
		(ii) C [1]		
		(iii) B [1]	[3]	
(c) calcium carbonate [1], carbon dioxide [1]	[2]			
3	(a)	1 ( <b>bottle</b> bank and <b>doorstep</b> collection)	[1]	6
		2 transport of glass to reprocessing facility	[1]	
		3 reprocessing of cullet / cullet produced / glass broken - crushed	[1]	
		4 furnace, heat/melt, remoulding and use	[1]	
		Not in correct order – max [3]		
(b)	Saves resources [1] and energy [1]			
	Reduce landfill sites Reduce CO <sub>2</sub> emissions	[2]		
4	(a)	(ii) circle around 2nd equation [1]		5
		(iii) circle around the first equation [1]	[2]	
	(b) combustion [1] precipitation [1] neutralisation [1]	[3]		
5	(a) A = loop [1] and B = composite [1]	[2]	4	
	(b) unique [1] reference to cutting crime faster / solve crime faster [1]	[2]		

- 6 (a) low cost/flexible/lightness [1] explanation related to property given [1] [2]  
 (b) high strength [1] and not as stiff [1] kevlar [1] [3]  
 (c) Composite material as it combines the **properties** of more than one material [1]; to give a more useful material [1] [2]

- 7 (a) using heat [1] to break large hydrocarbons into smaller (more useful hydrocarbon) molecules [1] [2]  
 (b) CH<sub>4</sub> [1]



- (c) 3CO<sub>2</sub> + 4H<sub>2</sub>O  
 [1] for products  
 [1] for correct balancing [2]  
 (d) does not produce polluting gases/ does not produce greenhouse gases/  
**only** produces water [1]

**Total** **45**





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**Science: Single Award (Modular)**

Electricity, Waves and Communication  
Module 5  
Higher Tier

**[GSC52]**

**THURSDAY 20 MAY 2010, AFTERNOON**

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**MARK  
SCHEME**

			AVAILABLE MARKS	
1	(a) (i)	bending / refraction [1] Inwards / together [1] Focus [1]	[2]	6
		(ii) concave / diverging	[1]	
	(b)	Can't see near things clearly or Can only see far things clearly [1] lens [1] weak / thin [1] Light focused behind retina [1] ( <b>not</b> image formed behind retina) Eyeball too short	[3]	
2	(a) (i)	all 5 points [2] 4/3 [1] [1] for smooth curve No tolerance on points	[3]	9
		(ii) noise levels decrease with distance	[1]	
		(iii) from graph 1.46 → 1.54	[1]	
		(iv) from graph 1.32 → 1.38	[1]	
	(b)	Acts as sponge / absorb sound [1] prevents echoes / reverberation [1] or converse	[2]	
(c)	Ultrasound / ultrasonic	[1]		
3	(a) (i)	A = series [1] B = parallel [1]	[2]	9
		(ii) Each bulb less current [1] Because less voltage [1] Because voltage shared [1] Bigger resistance	[3]	
	(b)	one bulb out, rest stay lit or number of lights switched on has no effect lights are brighter / independent switching of lights	[1]	
	(c) (i)	$9 = 1.5 \times r$ or $9/1.5$ [1] 6 [2]	[2]	
		(ii) ohms / $\Omega$	[1]	



			AVAILABLE MARKS	
4	(a)	higher temperatures = more power or converse	[1]	5
	(b) (i)	900 / 1000 (W – kW) [1] 0.9 × 2 [2] 900 × 2 = [1] 1.8 [3]	[3]	
	(ii)	kilowatt hours (kWh / kWhr)	[1]	
5	(a)	microwaves [1] cancer / tumours [1] phone calls = longer time = higher dose [1] or converse or implied distance is less with calls = higher dose [1] or converse or implied (any <b>three</b> for [1] each)	[3]	6
	(b) (i)	TIR [1] less loss of signal / stronger signal at end / light travels faster / less boosting required / carry more information [1] (any <b>two</b> = [1] each)	[2]	
	(ii)	(visible) light or infra red	[1]	
6	(a)	chemical – heat [1] heat – kinetic [1] movement / kinetic – electrical [1] name <b>three</b> types = [1]	[3]	10
	(b) (i)	nuclear problems with waste [1] / radiation leak / cancer [1] (2/3) reference to cost of unit [1] greater output [1] cheaper coal has cheaper <b>generating</b> cost [1] by 0.9p [1] cheaper coal has cheaper <b>construction</b> cost [1] by £900 million [1] 2 out of 3	[4]	
	(ii)	18 wind turbines required [1] wind total = 72 (grams) / wind higher by 52 (grams) [1]	[2]	
	(iii)	damages habitats / lack of suitable sites / big rivers – implied	[1]	
<b>Total</b>				<b>45</b>





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**Science: Single Award (Modular)**

Road Safety, Radioactivity  
and Earth in Space  
Module 6

Higher Tier

[GSC62]

**FRIDAY 21 MAY 2010, MORNING**

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**MARK  
SCHEME**

- 1 (a) Vehicle A [1]  
Steepest implied gradient (slope) Ref. to Dist/Time [1] [2]
- (b) (i) 120 J [1]
- (ii) 40/160 [1]  
0.25 (if 25 must be %) [2]  
with incorrect unit [-1] [2]
- (c) Brakes increase friction more (Friction implied in terms of braking) [1]  
(Friction) is larger braking force than forward force [1]  
(Friction [1] is greater) [2]



mark vertical columns

- 3 correct columns [2], 2 correct columns [1] [2]
- (b) radiation causes damage to (living) tissues / cells; may lead to cancer [1] each [2]
- (c) (i) radiation that is in the air, always around us, natural from source, from the earth [1]
- (ii) rocks; space; cosmic rays; sun; nuclear power stations; nuclear waste [1]
- (d) The combinations of neutrons and protons [1] are unstable [1] [2]

AVAILABLE  
MARKS

7

8

			AVAILABLE MARKS
3	(a)	As the speed increases so does the braking distance (the faster the car the greater the braking distance); getting much greater as the speed increases [2]	
	(b) (i)	90 m [1]	
	(ii)	The driver needs to think before he applies his brakes; thinking distance <b>needs to be added</b> [1]	
	(c) (i)	Alcohol will slow down the driver's brain reaction time/increased thinking distance; increase stopping distance [2]	
	(ii)	If people were drinking the night before they may still have alcohol in their blood but still be under the current limit, if total ban they could still be convicted in the morning Alcohol based mouthwashes/medicines [1]	7
4	(a)	[2] for correct points, [-1] for each incorrect [1] for smooth curve. <b>Not</b> dot – dot [3]	
	(b) (i)	5G days $\pm$ G day tolerance From graph [1]	
	(ii)	150 [1]	5
5	(a)	heliocentric [1]	
	(b)	Matter originated from a single point (singularity); Huge explosion in which energy and elementary particles were formed; After millions of years gravity pulled this matter together to eventually form stars and galaxies [1] each, max [3]	
	(c) (i)	A [1]	
	(ii)	A [1]	6
6	(a)	Strong enough to prevent vehicle moving from one carriageway to another; weak enough to deform on impact to absorb energy from the collision [1] each, max [2]	
	(b)	Cheaper [1]	
	(c) (i)	20 000/1000 [1] 20 m/s [1] [2]	
	(ii)	Crumple zones [1]	

- (d) to save on fossil fuels; prevent less CO<sub>2</sub> release greenhouse gases;  
 reduce Global warming; prevent fossil fuels running out  
 [1] each, max [2]
- (e) Petrol comes from oil [1] which was made from dead animals/sea  
 creatures millions of years ago [2]
- (f) People unhappy (take strike action)/protests/vote against Government.  
 Food and energy costs increase/family poverty implied  
 Increase in fuel smuggling/illegal fuel [2]

**Total**

**AVAILABLE  
 MARKS**

12

**45**



