

GCSE

**Science: Single Award
(Modular)**

March 2010

Mark Schemes

Issued: May 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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Rewarding Learning

General Certificate of Secondary Education

2009 – 2010

Science: Single Award (Modular)

Staying Alive
Module 1
Foundation Tier

[GSC11]

WEDNESDAY 24 FEBRUARY 2010, MORNING

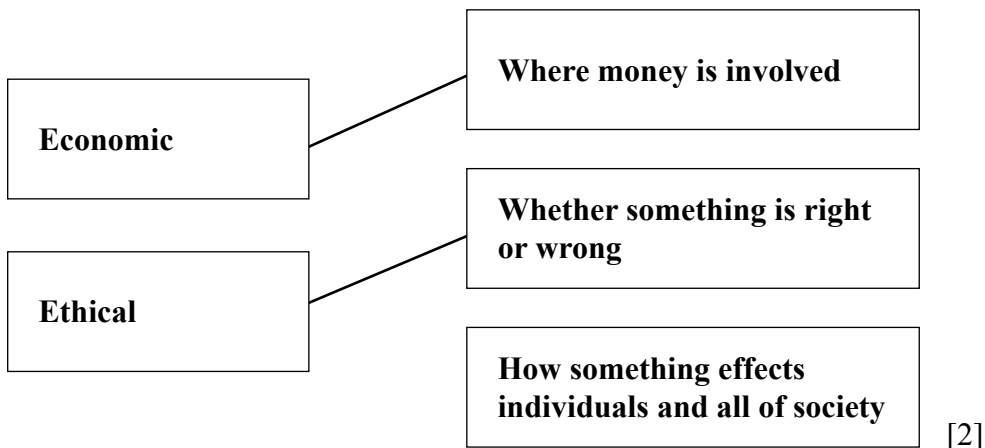
**MARK
SCHEME**

			AVAILABLE MARKS	
1	(a)	strong bones	[1]	4
	(b)	vitamin (D)	[1]	
	(c)	growing baby Take any ref to food as neutral	[1]	
	(d)	(citrus fruit) or named	[1]	
2	(a) (i)	oxygen	[1]	9
	(ii)	respiration; plants (leaf/grass)	[2]	
	(iii)	water	[1]	
	(b)	starts energy chain/provides food/we eat plants (✓)/no food/ plants/crops not grow	[1]	
	(c) (i)	increases	[1]	
	(ii)	1. 30 Rate 60, 90 2. gives highest rate/anymore no effect/ waste of money is cheaper (only one makes diff) (Any two)	[1] [2]	
3	(a) (i)	3	[1]	5
	(ii)	1	[1]	
	(b)	bb	[1]	
	(c)	gene, chromosome; nucleus, sperm [2] Any 3 correct order [1]	[2]	
4	(a) (i)	voluntary	[1]	7
	(ii)	eyes	[1]	
	(iii)	effector	[1]	
	(b) (i)	any combination of numbers between 9 and 6	[1]	
	(ii)	got shorter; practice/know what to do/get used to/ more ready for/or stated in numbers	[2]	
	(c)	brain, spinal cord	[1]	

5 (a) cystic fibrosis or any correct Heart disease (X)
Downs Syndrome [1]

(b) whether to have it aborted or not [1]

(c) Type of issue Explanation



4

6 (a) (i) All 8 bars correct [2]
6 or 7 correct [1]
less 6 [0] [2]

(ii) builder needs more; as more active gives numbers [2]

(b) measure out water
record starting temperature/set food alight using BB/
place under the water in the boiling tube/calculate rise in temp [3] max.
Same water volume/food held same distance from water/
same food mass/repeat [1] max.
burn for same time [1] [4]

8

				AVAILABLE MARKS
7	(a) (i)	3% [1]; 6 [2]	gives Flora – 96 Lurpak – 90	arrow without if nos in correct order [2]
	(ii)	Ad implies that a lot of people preferred Flora but only small amount actually did/more people showed no preference/only small numbers/small print (Any two) 7% showed no preference/could have been Lurpak lot buying Lurpak as well more/7% liked either		[2]
	(iii)	High in fat/cholesterol		[1]
	(b) (i)	Any two from: Increasing obesity/less exercise/ more processed or sugary foods/fast food		[2]
	(ii)	Blood pressure/blindness/kidney failure/amputation/ circulatory		[1]
Total				8
				45



Rewarding Learning

General Certificate of Secondary Education

February 2010

Science: Single Award (Modular)

Human Activity and Health

Module 2

Foundation Tier

[GSC21]

THURSDAY 25 FEBRUARY 2010, MORNING

**MARK
SCHEME**

1 (a) do not drink more than the recommended amount (units); never drink and drive [2]

(b) Cannabis – makes users feel relaxed or ‘chilled out’
Cocaine – gives users a ‘high’ [2]

(c) tar; carbon monoxide; addictive [3]

7

2 (a) (i) all points correct 2; 3-4 points correct 1 [2]

(ii) 5000 million [1]

(b)

	acid rain
land	
water	

[3]

6

3 (a) (i) discontinuous [1]

(ii) only Belfast; small sample size [2]

(b) (i) 47 [1]

(ii) Down’s syndrome [1]

(c) (i) uncontrolled cell division [1]

(ii) UV light [1]

7

4 (a) (i) red numbers only start to fall after grey squirrels arrive / as grey squirrels number rise red numbers fall [1]

(ii) become endangered / extinct [1]

(iii) culling / hunting / erect barriers / introduce predator of grey squirrels [1]

(b) (i) high reproductive rate / spread rapidly; at expense of other species; difficult to control; introduced by man (any two) [2]

(ii) rhododendron / zebra mussel [1]

6

			AVAILABLE MARKS	
5	(a) (i)	kills it / stops growth / destroys	[1]	5
	(ii)	penicillin	[1]	
	(iii)	gonorrhoea / salmonella / tuberculosis / MRSA / STI / bronchitis / or any bacterial disease	[1]	
	(b)	hygiene; resistant	[2]	
6	(a)	will not run out; fast growth / short life cycle	[2]	5
	(b)	carbon dioxide both produced and used; amount used = amount produced	[2]	
	(c)	carbon dioxide in atmosphere doesn't increase / doesn't affect global warming	[1]	
7	(a) (i)	phagocytosis	[1]	9
	(ii)	antibodies	[1]	
	(iii)	white blood cells / lymphocytes; produce antibodies; antibodies join with antigen / microbe; reference to complementary shape (any three)	[3]	
	(b) (i)	fall around 1998 then rise back to original level; scare about autism / side effects; further research shows that MMR vaccination is safe	[3]	
	(ii)	worry about side effects / personal choice / logistic issues / already had disease	[1]	
Total				45



Rewarding Learning

**General Certificate of Secondary Education
2009–2010**

Science: Single Award (Modular)

Chemical Patterns & Environment

Module 3

Foundation Tier

[GSC31]

WEDNESDAY 24 FEBRUARY 2010, MORNING

**MARK
SCHEME**

			AVAILABLE MARKS
1	(a) They are harmful/irritant	[1]	7
	(b) Any suitable (name must match symbol)	[4]	
	(c) Easier to see/Greater visual impact Internationally understood Easier to understand than words (any 2)	[2]	
2	(a) Phosphoric acid (not acid on its own)	[1]	4
	(b) Orange	[1]	
	(c) More accurate/specific/quicker	[1]	
	(d) Alkaline/base	[1]	
3	(a) Magma – lava – crater – tsunami	[4]	6
	(b) Houses swept away/people killed Idea of destruction	[2]	
4	(a) Shell, electron, neutron	[3]	7
	(b) 3	[1]	
	(c) Protons + neutrons	[1]	
	(d) Lithium Li	[2]	
5	(a) (i) Emulsifiers	[1]	5
	(ii) Antioxidants	[1]	
	(b) Foods can go bad/off [1] Bacteria/fungus/mould/microbes [1] Health and safety [1]	[3]	

		AVAILABLE MARKS
6	(a) (i) Sodium melted to form a ball/yellow spark	[1]
	(ii) It floats on water surface/moves across water surface	[1]
	(iii) Hydrogen gas	[1]
	(iv) Sodium hydroxide	[1]
	(b) Potassium or any correct	[1]
7	(a) All 6 points correct [2]	[2]
	4, 5 correct [1]	
	<4 [0]	
	Joining points correctly	[1]
	(b) increases/goes up/CO ₂ given off goes up [1]	
	idea of speed/faster/quicker/vigorous reaction [1]	[2]
	(c) (i) 10/11 minutes [1]	
	(ii) Some calcium carbonate left [1]	[2]
	(d) Measure volume every 30 s.	[1]
	(e) Repeat information	[1]
	(f) Calcium + Water	
	Chloride	
	[1] [1]	[2]
	Total	11
		45



Rewarding Learning

General Certificate of Secondary Education

2009 – 2010

Science: Single Award (Modular)

Materials and their Management

Module 4

Foundation Tier

[GSC41]

THURSDAY 25 FEBRUARY 2010, MORNING

**MARK
SCHEME**

			AVAILABLE MARKS
1	(a) strong [1], insulator [1] and easy to mould [1]	[3]	9
	(b) Any two from: good conductor [1] and does not rust [1] idea of unreactive [1] or high melting point [1]	[2]	
	(c) (i) silk/wool/cotton/fur/leather [1]		
	(ii) superior properties [1] cost [1] doesn't crease (synthetic)	[3]	
(d) disposal/non-biodegradable/fills landfill sites/uses up resources/uses up energy	[1]		
2	(a) sodium; yellow [1] potassium; lilac/purple/violet [1]	[2]	6
	(b) calcium chloride	[1]	
	(c) acid	[1]	
	(d) copper	[1]	
	(e) wear safety goggles/wear gloves/fumecupboard/tie hair back/ no spillage of acid	[1]	
3	(a) lather [1], soap [1], stalactites [1], calcium carbonate [1]	[4]	8
	(b) tastes good [1] and good for making beer [1]	[2]	
	(c) distillation [1] ion exchange [1]	[2]	
4	(a) 5 correct [2], 3/4 [1]	[2]	7
	(b) $70 - 28 [1] = 42 [1]$	[2]	
	(c) plastic [1]/paper [1]/glass [1]/aluminium foil [1] or other suitable	[1]	
	(d) to save resources [1]/to save energy [1]/saves money [1]/ saves landfill sites [1]	[2]	
5	(a) 5 units [1], $5 \times 20 = 100 [1]$	[2]	5
	(b) (i) $160 - 40 = 120$	[1]	
	(ii) could be over the legal limit [1], over 80 idea of slow reaction time [1] (judgement/concentration) cause accidents or death [1] Max 2	[2]	

			AVAILABLE MARKS
6	(a)	(i) same amount [1]	[1]
		(ii) as the number of carbon increases the amount of energy released increases or as the number of hydrogen increases the amount of energy released increases	[1]
		(iii) 3510	[1]
	(b)	(i) 3	[1]
		(ii) a hydrocarbon is a molecule that contains H and C only [1], ethanol contains H, H, C and O [1]	[2]
		(iii) carbon dioxide [1] and water [1]	[2]
	(c)	(i) ethene	[1]
		(ii) non-biodegradable	[1]
Total			10
			45



Rewarding Learning

General Certificate of Secondary Education

2009 – 2010

Science: Single Award (Modular)

Electricity, Waves and Communication

Module 5


Foundation Tier

[GSC51]

THURSDAY 25 FEBRUARY 2010, MORNING

**MARK
SCHEME**

			AVAILABLE MARKS	
1	(a) (i)	resistance	[1]	8
	(ii)	toaster / hair drier / fire / cooker / straighteners / shower / tumble dryer not microwave / lamp (any 2 = 1 mark each)	[2]	
	(b) (i)	$1000 / 250 = 1$ mark $4 = 2$ marks	[2]	
	(ii)	5A c.m.	[1]	
	(iii)	cable grip / plastic (insulated) cover / earth wire / longer earth pin not plastic wire covering (any 2 = 1 mark each)	[2]	
2	(a) (i)	B	[1]	7
	(ii)	A	[1]	
	(b)	stay lit / gets brighter / nothing	[1]	
	(c) (i)	$A_2 = 2A$	[1]	
	(ii)	ammeters	[1]	
3	(a)	The amplitude is the length of one complete vibration The wavelength is the maximum height of a wave	[1] [1]	8
	(b)	vibrations / energy / longitudinal (1 mark each)	[3]	
	(c) (i)	A	[1]	
	(ii)	D	[1]	
	(iii)	A + B	[1]	

			AVAILABLE MARKS	
4	(a)	(visible) light / radio (waves)	[1]	
	(b)	(i) looking at fractures/looking for cracks in pipes / bongs / teeth	[1]	
		(ii) damage cells / cause cancer / harms baby or mum in pregnancy / damages tissues or organs	[1]	
	(c)	carry energy / transverse / travel at (same) speed of light Can travel through a vacuum (any 2 = 1 mark each)	[2]	
	(d)	(i) radio (waves) / visible (light) / infra red (any 1)	[1]	
		(ii) 	[1]	7
5	(a)	it shrinks = 1 mark / lessens / decrease not loudness / gets worse / lower we can't hear high pitch (frequencies) = 2 marks or implied	[2]	
	(b)	(i) $1500 \times 4 = 1$ mark $1500 \times 2 = 2$ marks not 6000 3000m = 3 marks	[3]	
		(ii) (sound / sonar / echo returns) = 1 mark quicker = 2 marks decrease in depth = 1 mark	[2]	7
6	(a)	all points correct = 2 marks 6/5/4 points correct = 1 mark Correct line of best fit = 1 mark	[3]	
	(b)	power output increases with speed = 1 mark not converse Up to a maximum = 1 mark	[2]	
	(c)	less acid rain / less air pollution / less carbon dioxide / less sulphur dioxide not fossil fuels Less global warming (any 2 = 1 mark each) / less greenhouse gases	[2]	
	(d)	will run out / can't be replaced / implied limited not can't be used again	[1]	8
Total				45



Rewarding Learning

General Certificate of Secondary Education

2009 – 2010

Science: Single Award (Modular)

Road Safety, Forces, Radioactivity
and Earth in Space

Module 6

Foundation Tier

[GSC61]

FRIDAY 26 FEBRUARY 2010, MORNING

**MARK
SCHEME**

			AVAILABLE MARKS	
1	(a)	(i) 3rd planet in from Sun	[1]	7
		(ii) Saturn	[1]	
		(iii) Furthest away from the Sun (not far away 7)	[1]	
		(iv) Solar System	[1]	
	(b)	(i) Universe	[1]	
		(ii) Milky way	[1]	
	(c)	Life on other planets in space	[1]	
2	(a)	18N	[1]	7
	(b)	(i) 4 bars correct [2]; 3 bars correct [1]; Max [2]	Must have a top [2]	
		(ii) Concrete floor	[1]	
		(iii) Oil/grease or similar Polish/wax/water	[1]	
	(c)	More friction implied	[1]	
	(d)	Thermal / heat only	[1]	
	3	(a)	A = proton B = electron C = neutron	
(b)		(i) Make sure radiation source is the same distance from the material / radiation counter is the same distance from the material / same source used / thickness (not size) Material in same position	[1]	
		(ii) Gamma	[1]	
		(iii) Background	[1]	

	Decreases	Stays the same	Increases
Braking distance			3
Thinking distance		3	
Stopping distance			3

1 mark each max [3] [3]

(b) Gets bigger / increases [1]

(c) Increases reaction time [1]
Thinking distance increased [1] or implied [2]

(d) (i) Stopped [1]

(ii) 15m [1]

(iii) 5 m/s [1]

9

5 (a) (i) 1 Electricity (battery)
2 Petrol / diesel (not biodiesel) [2]

(ii) less fossil fuel **used**; less carbon dioxide CO₂ / greenhouse gases produced;
less global warming
or implied [3]

(b) to conserve fossil fuels; more demand (implied) cheaper (7) [2]

7

6 (a) (i) COBE [1]

(ii) Lovell [1]

(b) clouds of dust / gas / hydrogen; held / **pulled** together by gravity;
fusion begins
helium forms [3]

(c) (i) The distance [1] light travels in one year [1] [2]

(ii) Too far away [1] or implied
would not live long enough [1] [2]

9

Total

45



Rewarding Learning

General Certificate of Secondary Education

2009 – 2010

Science: Single Award (Modular)

Staying Alive

Module 1

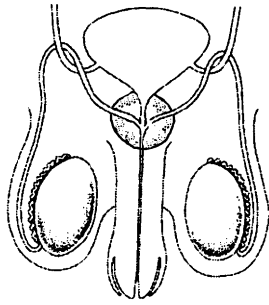
Higher Tier

[GSC12]

WEDNESDAY 24 FEBRUARY, MORNING

**MARK
SCHEME**

3 (a) (i)



[1]

© Illustrated Biology by BS Beckett, published by Oxford University Press, 1978, ISBN 0199140448

(ii) adds fluid to sperm/so can swim to egg/to form semen/
sperm can flow

(Any two)

[2]

(iii) reserve

[1]

(b) Vasectomy/sperm ducts cut or cut near testes/tubes (7)

[2]

(c) Unnatural

Religious; ethical; encourage promiscuity (Any two)

Safety sided effects/stops life/implied – people think as abortion/
don't think it's right

[2]

8

4 (a) More vol blood pumped (7)

increases cardiac output (7)

increases demand for energy

more respiration/more food or oxygen/more blood around body
to body cells

heart muscle used more/strengthened

[3]

(b) (i) 60ml

[1]

(ii) Any two from: higher volume pumped at rest/is higher/
less extra blood needed/shorter recovery time/

Alan's didn't rise as much

[2]

6

				AVAILABLE MARKS		
5	(a)	(i)	A same as T – 1:1 C same as G – 1:1	increase by 1 decrease by 1	[1]	
		(ii)	A = 31 C = 17		[1]	
		(iii)	chromosomes or genes		[1]	
		(iv)	23 chromosomes half the (chromosomes) if above genes (7)		[1]	
	(b)	Wilkins and or Franklin/helical shape and or bases inside [2] Watson and or Crick/double helix and or bases paired [2]			[4]	8
6	(a)	(i)	Light traps energy/in glucose/makes food/transferred to animals/ by feeding/implication of animals able to live because of it/ gives us oxygen (Any three)		[3]	
		(ii)	Carbon dioxide through stomata/from air [1]; water through root hairs/from soil/when rains [1]		[2]	
		(b)	Reverse or example e.g. uses CO ₂ releases CO ₂ [1] Respiration releases energy and Photosynthesis uses energy [1] produce food a store of energy ref. to time day anytime		[2]	
Total						45



Rewarding Learning

General Certificate of Secondary Education

2009 – 2010

Science: Single Award (Modular)

Human Activity and Health
Module 2

Higher Tier

[GSC22]

THURSDAY 25 FEBRUARY 2010 MORNING

**MARK
SCHEME**

			AVAILABLE MARKS	
1	(a)	will not run out; fast growth / short life cycle	[2]	5
	(b)	carbon dioxide both produced and used; amount used = amount produced	[2]	
	(c)	carbon dioxide in atmosphere doesn't increase / doesn't affect global warming	[1]	
2	(a)	(i) phagocytosis	[1]	9
		(ii) antibodies	[1]	
		(iii) white blood cells / lymphocytes; produce antibodies; antibodies join with antigen / microbe; reference to complementary shape (any three)	[3]	
	(b)	(i) fall around 1998 then rise back to original level; scare about autism / side effects; further research shows that MMR vaccination is safe	[3]	
		(ii) worry about side effects / personal choice / logistic issues / already had disease	[1]	
3	(a)	(i) 40	[1]	6
		(ii) discontinuous	[1]	
	(b)	(i) Down's syndrome	[1]	
		(ii) uncontrolled; cell division	[2]	
		(iii) UV light	[1]	

			AVAILABLE MARKS		
4	(a)	(a) a substance diffuses / spreads from the fungus; which kills / stops growth of bacteria [2]	10		
		(b) (i) to prevent contamination / to ensure that only bacteria grown were those transferred [1]			
		(ii) temperature too low in incubator / loop not cooled after heating and hot loop kills bacteria [1]			
	(iii) lid left off for too long / microbes in air [1]				
	(c) (i) in vitro [1]				
	(ii) animal testing [1]				
	(iii) licensing [1]				
	(d) advantage – prevents disease / growth promoters disadvantage – encourages microbe resistance to antibiotics / not ethical / chemicals in food [2]				
	5	(a)		(a) (i) when antibiotics used microbe resistant favoured / survive; normal bacteria die; evolution is change in genotype / change in bacterial population with time [3]	8
				(ii) Charles Darwin [1]	
(iii) contradicts the teaching of the Church / people believe its flawed [1]					
(b) (i) artificial selection [1]					
(ii) better ‘heads’ / crop; more profit or shorter plants / more even heights; easier to harvest / less likely to suffer wind damage [2]					
6		(a)	(a) (i) important site for peregrines / endangered species / suitable habitat [1]	7	
	(ii) conserve food (ducks) / protect habitat of falcon [1]				
	(iii) safe from predators / persecution / able to see prey easily [1]				
	(b) no spraying fertiliser in winter; efficient storage of fertiliser / slurry; (excess) nitrate cannot filter into waterways / to pollute / change habitat; kill fish or other wildlife [4]				
	Total	45			



Rewarding Learning

**General Certificate of Secondary Education
2009–2010**

Science: Single Award (Modular)

Chemical Patterns & Environment

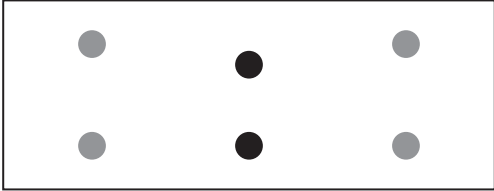
Module 3

Higher Tier

[GSC32]

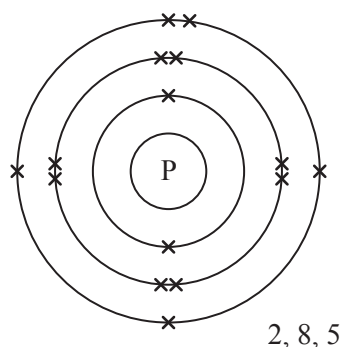
WEDNESDAY 24 FEBRUARY 2010, MORNING

**MARK
SCHEME**

			AVAILABLE MARKS	
1	(a)	All 6 points correct [2]	[2]	11
		4, 5 correct [1]		
	<4 [0]			
	Joining points correctly	[1]		
	(b)	Increases/goes up/CO ₂ given off goes up [1]	[2]	
		Idea of speed/faster/quicker/vigorous reaction [1]	[2]	
	(c)	(i) 10/11 minutes [1]		
		(ii) Some calcium carbonate left [1]	[2]	
	(d)	Measure volume every 30 s.	[1]	
	(e)	Repeat information	[1]	
(f)	Calcium + Water			
	Chloride [1] [1]	[2]		
2	(a)	Chromatography	[1]	
	(b)	Draw base pencil line on paper/put small spot of dye on line/ label in pencil/place paper in tank/allow to travel up paper/ remove and measure distance travelled by each dye. (any 4)	[4]	
		(c)	 <p style="text-align: center;">R₁ R₂ R₃</p> <p style="text-align: center;">R₃ should be level with R₁ and R₂ slightly lower</p>	[1]
3	(a)	Wegener's theory was that the continents were once all joined together [1] and they drifted apart [1]. They fitted together like a jigsaw [1]		
		Fossil records from America & Africa matched [1]/rock types [1] (any 3)	[3]	
(b)	Other scientists did not believe they could drift/one large mass/ fixed positions	[1]	4	

4 (a) Number of protons + neutrons in an atom [1]

(b)



[1]

(c) Two or more different elements [1] joined together [1] [2]

(d) Phosphorus is in group 5 [1]

Chlorine is in period 3 [1]

Phosphorus Chloride [1]

7

5 (a) (i) Carbon dioxide [1]

Citric acid \longrightarrow water + carbon dioxide [3]

(b) Using heat [1] to break down [1]

Bubbles of gas released by reaction cause cake to rise or CO_2 produced causes cake to rise [1] [3]

7

6 (a) Test tube 3 [1]

(b) Copper nitrate [1]

(c) Lead [1]

(d) Zinc [1]

(e) $\text{ZnSO}_4 + \text{Cu}$ [2]

6

7 (a) Sodium sulphate [1]

(b) 3 [1]

(c) 17 [1]

(d) $\text{Ca}(\text{HCO}_3)_2$ [1]

4

Total

45



Rewarding Learning

General Certificate of Secondary Education

2009 – 2010

Science: Single Award (Modular)

Materials and their Management

Module 4

Higher Tier

[GSC42]

THURSDAY 25 FEBRUARY 2010, MORNING

**MARK
SCHEME**

			AVAILABLE MARKS		
1	(a)	5 units [1], $5 \times 20 = 100$ [1]	[2]	5	
	(b)	(i)	$160 - 40 = 120$		[1]
		(ii)	could be over the legal limit [1], idea of slow reaction time [1], cause accidents or death [1] Max 2		[2]
2	(a)	(i)	crude oil	[1]	10
		(ii)	as the number of carbon increases the amount of energy released increases	[1]	
		(iii)	3510	[1]	
	(b)	(i)	3	[1]	
		(ii)	a hydrocarbon is a molecule that contains H and C only [1], ethanol contains H, H, C and O [1]	[2]	
		(iii)	carbon dioxide [1] and water [1]	[2]	
	(c)	(i)	ethene	[1]	
		(ii)	non-biodegradable	[1]	
	3	(a)	(i)	water which does not lather readily with soap solution	
(ii)			calcium ion, hydrogencarbonate ion	[1]	
(iii)			limestone / magnesium carbonate	[1]	
(b)		(i)	take a given volume of water [1] test with soap solution for (a permanent lather) [1] boil and repeat [1] comparison [1] Any three but must have comparison	[3]	
		(ii)	CaSO_4 [1], MgCl_2 [1]	[2]	
(c)		caves [1] or other suitable	[1]		
4	(a)	CaCl [1], O_2 [1], Mg_2CO_3 [1]	[3]	5	
	(b)	(i)	C		[1]
		(ii)	D		[1]

			AVAILABLE MARKS
5	<p>(a) (i) properties change [1] change in surroundings [1] [2]</p> <p>(ii) 1. change colour [1] according to light intensity [1] 2. change colour [1] according to temperature [1] Any three [3]</p> <p>(b) sodium [1], brick-red [1] and copper [1] [3]</p>		8
6	<p>(a) (i) fractional [1] distillation [1] [2]</p> <p>(ii)</p> $ \begin{array}{ccccccc} & & \text{H} & & \text{H} & & \text{H} \\ & & & & & & \\ \text{H} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{H} \\ & & & & & & \\ & & \text{H} & & \text{H} & & \text{H} \end{array} $ <p>1 mark for correct Carbons 1 mark for correct Hydrogens [2]</p> <p>(b) (i) polymerisation [1]</p> <p>(ii) double bond breaks [1] long chain [1] of repeating units [1] (Full marks for correct equation) [3]</p>		
Total			45



Rewarding Learning

General Certificate of Secondary Education

2009 – 2010

Science: Single Award (Modular)

Electricity, Waves and Communication

Module 5

Higher Tier

[GSC52]

THURSDAY 25 FEBRUARY 2010, MORNING

**MARK
SCHEME**

		AVAILABLE MARKS
1	(a) it shrinks = 1 mark / lessens / decreases not loudness / gets worse / lower we can't hear high pitch (frequencies) = 2 marks or implied	[2]
	(b) (i) $1500 \times 4 = 1$ mark $1500 \times 2 = 2$ marks 3000m = 3 marks not 6000	[3]
	(ii) (sound / echo returns) = 1 mark quicker = 2 marks decrease in depth = 1 mark	[2]
2	(a) all points correct = 2 marks 6/5/4 points correct = 1 mark Correct line of best fit = 1 mark	[3]
	(b) power output increases with speed = 1 mark Up to a maximum = 1 mark	[2]
	(c) less acid rain / less air pollution / less carbon dioxide / less greenhouse gases not fossil fuels Less global warming (any 2 = 1 mark each) / less SO ₂ or NO ₂	[2]
	(d) will run out / can't be replaced/limited not can't be used again	[1]
	(a) (i) convex / converging	[1]
(ii) converges / bends / refracts light = 1 mark form image / focus on the retina = 1 mark	[2]	
3	(b) (i) too converging/too long/too strong/too thick; image focusses in front of the retina	[1]
	(ii) see close objects clearly / far objects blurry	[1]
	(iii) glasses have concave / diverging lens = 1 mark light rays are spread out = 1 mark come to a focus image on the retina = 1 mark	[3]
		7
		8
		8

		AVAILABLE MARKS	
4	(a) more wire in circuit = 1 mark Resistance increases = 1 mark Current decreases / ammeter reading falls = 1 mark Bulb gets dimmer = 1 mark (any 3 = 1 mark each)	[3]	
	(b) (i) 6V 60 or c.m.	[1] [1]	
	(ii) ohms (or symbol)	[1]	
	(c) (i) melts / heats up = 1 mark breaks / blows = 1 mark	[2]	
	(ii) stops electricity or current flowing / breaks (gap) circuit / prevents high current / limits current	[1]	9
5	(a) (i) light is refracted / bent; away from the normal	[2]	
	(ii) total internal; reflection	[2]	
	(iii) critical angle	[1]	
(b) (visible) light/infrared	[1]	6	
6	(a) conventional flows from +ve to -ve / converse = 1 mark Actual = flow of electrons = 1 mark Electrons are negatively charged = 1 mark	[3]	
	(b) power = $240 \times 6 = 1440 = 1$ $1440 \text{ W} = 1.44 \text{ Kw} = 1$ $15\text{mins} = 0.25 \text{ hrs} = 1$ $1.44 \times 0.25 \times 8 = 3 \text{ marks}$ $2.9\text{p} / 2.88\text{pence} (3\text{p}) = 4 \text{ marks}$	[4]	7
Total			45



Rewarding Learning

General Certificate of Secondary Education

2009 – 2010

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space

Module 6

Higher Tier

[GSC62]

FRIDAY 26 FEBRUARY 2010, MORNING

**MARK
SCHEME**

			AVAILABLE MARKS	
1	(a) (i)	1 Electricity (battery)	[2]	
		2 Petrol / diesel (not biodeisel)		
	(ii)	less fossil fuel used; less carbon dioxide CO ₂ / greenhouse gases produced; less global warming or implied	[3]	
	(b)	to conserve fossil fuels; more demand (implied) cheaper (7)	[2]	7
2	(a) (i)	COBE	[1]	
		Lovell	[1]	
	(b)	clouds of dust / gas / hydrogen; held / pulled together by gravity; fusion begins helium forms	[3]	
	(c) (i)	The distance [1] light travels in one year [1]	[2]	
		Too far away [1] or implied Would not live long enough	[2]	
3	(a)	Kills bacteria/microbes; food lasts longer / longer shelf life / fresher for longer.	[2]	
	(b) (i)	It can penetrate the fruit	[1]	
		Concrete shields stop the gamma / radiation rays.	[1]	
	(c)	Concern about radiation intake / reduce vitamins / concern about cancer health	[1]	
	(d)	The time taken for the radioactive / radioactivity / radiation count to fall by half	[2]	
4	(a)	Remains of dead plants and animals [1] Compressed (buried) for millions of years [1]	[2]	
	(b) (i)	67.62p	[1]	
		(ii)	Fuels may run out Less fuel used Less CO ₂ produced Conserve fossil fuels as less will be used. [1] Less global warming [1] Max [2]	

			AVAILABLE MARKS	
5	(a) (i)	Crater	[1]	
	(ii)	meteorite / asteroid / comet	[1]	
	(b) (i)	30,000 × 20,000 [1]		
		600,000,000 [2]	[2]	
	(ii)	Travelling very fast / The object will have a high velocity; it will also have a large momentum / this energy; will be passed to the ground / transferred to earth instantaneously on impact. Max [2]	[2]	6
6	(a)	Average speed measure speed over a longer distance; instantaneous measure the speed at one specific point in time.	[2]	
	(b) (i)	Correct plotting of points [2] 4 – 5 correct = 1		
		Smooth curve [1] Appropriate scale = 1 Must use full grid	[4]	
	(ii)	13	[1]	
	(iii)	Total journey average speed within limit [1] Times 3/4 seconds average over limit [1] Instantaneous needed at 3/4 seconds	[3]	
	(c)	Turn off / turn onto road at different junctions	[1]	
			Total	45

