

GCSE

**Science: Double 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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Rewarding Learning

General Certificate of Secondary Education

2009 – 2010

Science: Double Award (Modular)

Living Organisms and the Processes of Life

End of Module Test

Foundation Tier

[GDA01]

THURSDAY 20 MAY 2010, MORNING

**MARK
SCHEME**

			AVAILABLE MARKS						
1		Benedicts							
	Vitamin C								
	Meat, eggs, fish etc Milk/pulses/nuts/ chicken/soya		3						
		[3]							
2	<p>(a) Cell extension drawn in correctly; with two lines for cell wall Nucleus drawn in correct place (i.e. in cytoplasm) and labelled; Vacuole correctly drawn and labelled</p>		[3]						
	(b)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 5px;">Calcium/Ca</td> <td style="width: 50%;"></td> </tr> <tr> <td style="width: 50%;"></td> <td style="text-align: center; padding: 5px;">Chlorophyll Chloroplasts</td> </tr> <tr> <td style="width: 50%;"></td> <td style="text-align: center; padding: 5px;">Amino acids/proteins</td> </tr> </table>	Calcium/Ca			Chlorophyll Chloroplasts		Amino acids/proteins	[3]
Calcium/Ca									
	Chlorophyll Chloroplasts								
	Amino acids/proteins								
			6						
3	(a) Trachea/windpipe/ring of cartilage/cartilage		[1]						
	(b) Arrow points downwards from diaphragm		[1]						
	(c) (i) Tar		[1]						
	<p>(ii) Any two from: Binds to red blood cells/haemoglobin; Irreversible; Displaces oxygen/takes place of oxygen/less oxygen carried; greater affinity (for haemoglobin)</p>		[2]						
			5						
4	(a) (i) Urethra		[1]						
	(ii) Sphincter muscle drawn below bladder in correct position		[1]						
	(b) Control of water level/ regulation of water in body		[1]						
			3						

		AVAILABLE MARKS
5	A – stomach	
	C – large intestine/colon	
	B – duodenum/ileum/small intestine	
	E – gall bladder	[4]
6	(a) (i) Arrows enter vena cava, into right ventricle, up through pulmonary artery; Arrows in through pulmonary vein, into left ventricle, up through aorta 1 mark each side	[2]
	(ii) Vena cava/pulmonary artery	[1]
	(b) Transport/transport of food or waste/carry blood cells platelets/CO ₂ /vitamins/minerals/hormones	[1]
7	(a) Move lamp/stronger or weaker bulb	[1]
	(b) Oxygen/O ₂	[1]
	(c) Use a graduated tube; Measure volume of gas released/collect gas then measure volume Measure amount of gas [1] syringe	[2]
	(d) Carbon dioxide/temperature/ amount of chlorophyll	[1]
8	(a) Respiration	[1]
	(b) To show/prove that there is no carbon dioxide present	[1]
	(c) Cloudy/milky/white	[1]
9	(a) White blood cells/white	[1]
	(b) Stage 2: Ingestion/engulfing/eating (swallows)/surrounds; Stage 3: Digestion/broken down/destroys/dissolves	[2]
	(c) Active immunity/production of antibodies	[1]
		4

		AVAILABLE MARKS				
10 (a)	<table border="1" style="margin: auto;"> <tr><td style="text-align: center;">✓</td></tr> <tr><td style="text-align: center;">X</td></tr> <tr><td style="text-align: center;">X</td></tr> <tr><td style="text-align: center;">✓</td></tr> </table>	✓	X	X	✓	[3]
✓						
X						
X						
✓						
	4 correct – [3] marks 3 correct – [2] marks 2 correct – [1] marks					
(b)	Spontaneous generation	[1] 4				
11	Any four from: Description: Cylinder increases in size/length/expands/turgid/firmer/heavier Explanation: High concentration of water outside cylinder ; So water moves in; by osmosis; across a selectively permeable membrane 1 mark for description wherever it occurs within the answer.	[4] 4				
12 (a)	Any four from: Take initial temperature of water; Set food alight/at start; Hold burning food at a set distance from base of tube; Stir water; Take final temperature/work out difference (change in temp); Replace water (with fresh water); repeat for second food sample/or same volume of water; Do repeats (to improve reliability) Completely burn food	[4]				
(b)	Bacon has more energy/larger increase in temperature bacon burns longer	[1] 5				
Total		50				



Rewarding Learning

General Certificate of Secondary Education

2009–2010

Science: Double Award (Modular)

Using Materials and Understanding Reactions

End of Module Test

Foundation Tier

[GDB01]

THURSDAY 20 MAY 2010, MORNING

**MARK
SCHEME**

1 (a) Candidates should indicate this hazard symbol, corrosive.



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[1]

(b) Idea that symbols are internationally understood/idea that symbols are eye-catching/idea of helping those who can't read
Do **not** accept idea of warning as it is used in the stem

[2]

3

2 Any 4 of:

Conductor of heat	[1]	ductile	[1]
Conductor of electricity	[1]	high melting point	[1]
idea of malleable i.e. can be shaped	[1]	rigid	[1]
durable/unreactive/long-lasting	[1]	flexible	[1]

or other correct

Any order

Accept light **not** cheap **not** strong

[4]

4

3 (a) pink

[1]

(b) water

[1]

(c) insoluble

[1]

3

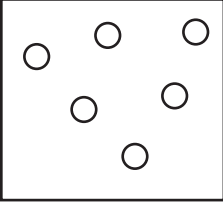
4 (a) (K) Po P [1]

(b) SO_3^- (SO_4^{2-}) S^{2-} [1]

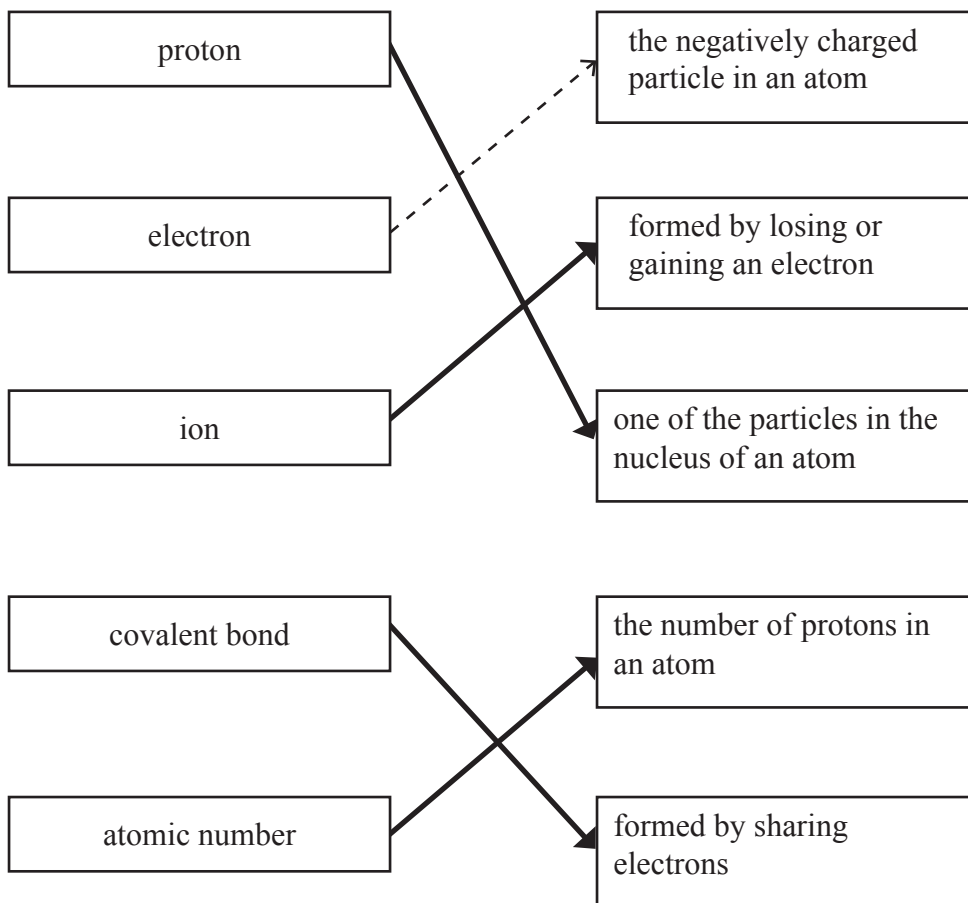
(c) calcium (copper) carbon [1]

(d) (elements) compounds solids [1]

4

		AVAILABLE MARKS
5	(a) Step 2	[1]
	(b)  Diagram should clearly show a gas. i.e. far apart and random	[1]
	(c) Sublimation	[1]
	(d) A compound is a substance which contains two or more elements/ types of atoms [1] which are (chemically) combined/joined [1]	[2]
6	Candidates should place ticks against the following answers. More than one tick in each section is awarded zero for that section.	
	(a) soap	[1]
	(b) to fur up	[1]
	(c) washing soda	[1]
	(d) May prevent kidney failure	[1]
		5
		4

7



[4]

AVAILABLE MARKS

4

8 (a) protons 13 [1]
neutrons 14 [1]
electrons 13 [1]

[3]

(b) 2, 8, 3 apply cm

[1]

4

9 (a) hydrogen oxide (water) neutral [1]
carbon dioxide acidic [1]
magnesium oxide basic [1]

[3]

(b) alkalis
Accept alkaline

[1]

4

10 (a) 4

[1]

(b) 8

[1]

(c) +1/1+ allow + **not** positive

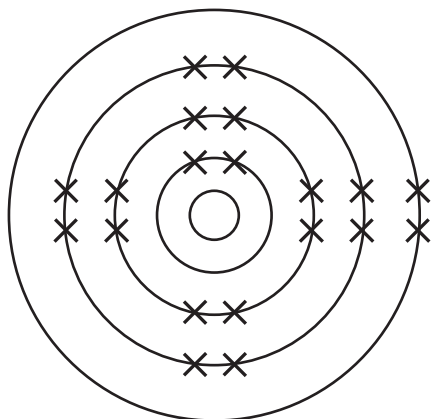
[1]

(d) $(\text{NH}_4)_2 \text{CO}_3$

[1]

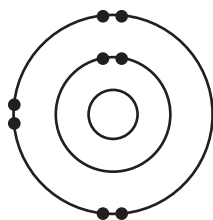
4

11 (a)



[1]

(b)



[1]

(c) Idea of electron transfer from calcium to oxygen [1] two [1] electrons transferred [2]
Second mark follows from first
Idea of sharing gains **no** credit

(d) Ionic (bond)/electrostatic force/electrostatic attraction [1]

5

12 (a) nitrogen [1]

(b) decreases [1]

(c) in the fridge [1]

3

13 (a) pure copper [1]

(b) copper sulphate [1]

(c) at the cathode [1]

3

Total

50



Rewarding Learning

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

Science: Double Award (Modular)

Forces and Energy
End of Module Test
Foundation Tier

[GDC01]

THURSDAY 20 MAY 2010, AFTERNOON

**MARK
SCHEME**

			AVAILABLE MARKS
1	<ul style="list-style-type: none"> • Electrical → Heat • Chemical → Heat/Light • Electrical → Sound [1] each	[6]	6
2	(a) (i) Oil Gas Turf/peat Any 2 for [1] each	[2]	
	(ii) Sun	[1]	
	(b) Carbon dioxide or CO ₂	[1]	4
3	Momentum = Mass × Speed [1] = 60 × 15 [1] = 900 [1] kg m/s [1]	[4]	4
4	(a) Air resistance/drag/friction	[1]	
	(b) 1800 (N)	[1]	
	(c) Velocity/speed is reduced or decelerates	[1]	3
5	Pressure = Force/Area [1] = 500 ÷ 2.5 [1] = 200 [1] (N/cm ²)	[3]	3
6	(a) Tension/centripetal	[1]	
	(b) A	[1]	
	(c) B	[1]	3
7	(a) (i) good conductor	[1]	
	(ii) poor conductor/insulator	[1]	
	(b) (i) hot [1] cold [1]	[2]	
	(ii) convection	[1]	5

			AVAILABLE MARKS
8	<p>(a) 2.5 N [1] 200 g [1] or 0.2 kg</p> <p>(b) They all hit the ground at the same instant</p>	<p>[2]</p> <p>[1]</p>	<p>3</p>
9	<p>Efficiency = $\frac{\text{Useful output energy}}{\text{Input energy}}$ [1] $= \frac{20}{25}$ [2] showing energy output = 20 J award [1] $= 0.8$ or 80% [1]</p>	<p>[4]</p>	<p>4</p>
10	<p>(i) Stationary [1] or stopped [1] Constant speed [1] or steady speed</p> <p>(ii) (Average) speed = $\frac{\text{(Total) distance}}{\text{(Total) time}}$ [1] $= \frac{50}{25}$ [1] $= 2$ (m/s) [1]</p>	<p>[2]</p> <p>[3]</p>	<p>5</p>
11	<p>(i) 2 N \equiv 4 cm [1] 1 N \equiv 2 cm [1]</p> <p>(ii) $\left. \begin{matrix} 3 \times 2 = 6 \\ 15 - 6 = 9 \end{matrix} \right\}$ or $\left\{ \begin{matrix} 5 \times 2 = 10 \\ 19 - 10 = 9 \end{matrix} \right.$ [1] Answer = 9 (cm) allow ecf from (i) if ext \leq 3 cm</p>	<p>[2]</p> <p>[2]</p>	<p>4</p>
12	<p>(a) Power = Work done \div time [1] or equivalent $= 9400\ 000 \div 5$ [1] $= 1880\ 000$ [1] (W)</p> <p>(b) Work done = Force \times distance [1] $= 11\ 750 \times 200$ [1] $= 2\ 350\ 000$ [1] (J)</p>	<p>[3]</p> <p>[3]</p>	<p>6</p>
Total			50



Rewarding Learning

General Certificate of Secondary Education

2009 – 2010

Science: Double Award (Modular)

Living Organisms and the Processes of Life

End of Module Test

Higher Tier

[GDA02]

THURSDAY 20 MAY 2010, MORNING

**MARK
SCHEME**

			AVAILABLE MARKS					
1	(a)	Trachea/windpipe/cartilage/ring of cartilage	[1]	5				
	(b)	Arrow points down (from diaphragm)	[1]					
	(c)	Tar	[1]					
	(d)	Any two from: binds to red blood cells/haemoglobin; irreversible; displaces oxygen/less oxygen carried/greater affinity	[2]					
2	(a)	<table border="1" style="margin-left: 20px;"> <tr><td style="text-align: center;">✓</td></tr> <tr><td style="text-align: center;">X</td></tr> <tr><td style="text-align: center;">X</td></tr> <tr><td style="text-align: center;">✓</td></tr> </table>	✓	X	X	✓	[3]	4
✓								
X								
X								
✓								
	(b)	Spontaneous generation	[1]					
3	(a)	White blood cells/white	[1]	4				
	(b)	Stage 2: Ingestion/engulfing/eating/surrounds; Stage 3: Digestion/broken down/destroys/dissolves	[2]					
	(c)	Active immunity/production of antibodies	[1]					
4	(a)	Any four from: Ensure that food is completely burned; Take initial temperature of water; Set food alight/use Bunsen to burn food at start; Hold burning food at a set distance from base of tube; Stir water; Take final temperature (work out difference (change in temp)); Replace water (with fresh water) and repeat for second food sample; Do repeats to improve reliability If put food in water → can get 3 marks for 3 correct statements	[4]	5				
	(b)	Bacon has more energy/larger increase in temperature Bacon burns longer	[1]					

		AVAILABLE MARKS
5	<p>Any four from: Mark all together irrespective of where they occur i.e. mark as complete paragraph for 4 marks</p> <p>Description: Cylinder increases in size/length/expands/turgid/firmer/heavier</p> <p>Explanation: High concentration of water outside cylinder; So water moves in; by osmosis; across a selectively permeable membrane</p>	[4] 4
6	<p>(a) Hepatic portal vein Not hpv</p> <p>(b) Any two from: Under influence of insulin; Converts glucose → glycogen; Converts glucose → fat; increased respiration; increased uptake into cells/glucose.</p>	[1] 3
7	<p>(a) Sensory neurone enters through dorsal root and starts on foot</p> <p>(b) Muscle</p> <p>(c) Association neurone labelled</p>	[1] 3
8	<p>(a) Any two from: Urea/salt(s)/water</p> <p>(b) No concentration gradient/same level of useful substances in dialysis solution as in the blood</p>	[2] 3
9	<p>(a) (i) Boil solution</p> <p>(ii) Thin layer of oil on top of solution/add oil</p> <p>(b) Any two from: To heat up the water bath/vary the temperature; count number of bubbles; in a set time how quickly limewater goes cloudy → 1 mark</p>	[1] 4

			AVAILABLE MARKS
10 (a)	Any two from: Concentration of potassium ions in the solutions/Same volume of solution; Length of time left in solutions; Temperature pH Same light	[2]	
(b)	Any two from: With increased oxygen; there is increased respiration/energy; to move potassium ions against a concentration gradient/ low to high conc.	[2]	
(c)	Seedlings have taken up as much K ⁺ as they can/or need/some other factor limits uptake, e.g. amount of potassium remaining/no K ⁺ left/ O ₂ is no longer limiting	[1]	5
11	Any three from: Wider/dilated bronchioles/bigger bronchioli; Allows increased air/oxygen to the lungs; So more oxygen diffuses across alveoli/into the blood; So more respiration/energy For muscle concentration	[3]	3
12 (a)	Fatty acids	[1]	
(b)	Any three from: Optimum temp for lipase is 35°; at lower temperature, less collisions between enzyme and substrate; at higher temperature (50°C), lipase is denatured	[3]	4
13 (a)	Carbon dioxide	[1]	
(b)	Enzymes; are denatured	[2]	3
Total			50



Rewarding Learning

General Certificate of Secondary Education

2009–2010

Science: Double Award (Modular)

Using Materials and Understanding Reactions

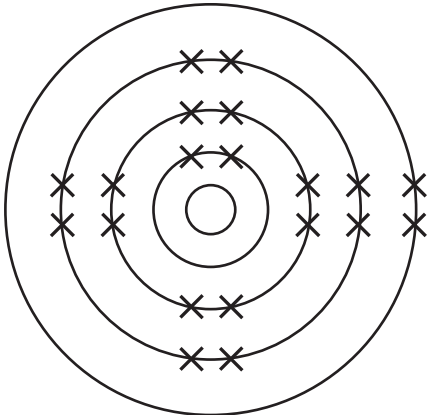
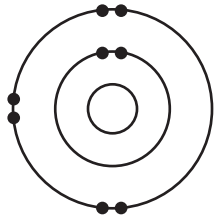
End of Module Test

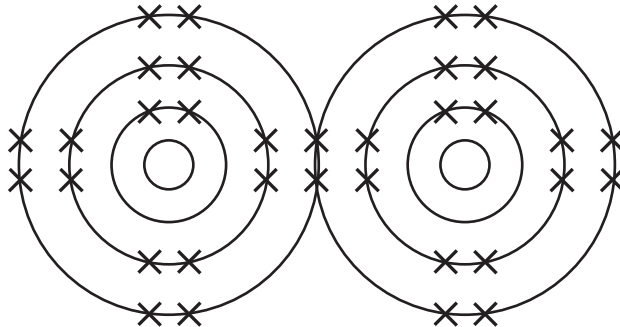
Higher Tier

[GDB02]

THURSDAY 20 MAY 2010, MORNING

**MARK
SCHEME**

					AVAILABLE MARKS	
1	(a)	protons 13 [1] neutrons 14 [1] electrons 13 [1]			[3]	4
	(b)	2, 8, 3	Apply cm		[1]	
2	(a)	hydrogen oxide (water)	neutral	[1]	[3]	4
		carbon dioxide	acidic	[1]		
		magnesium oxide	basic	[1]		
	(b)	alkalis			[1]	
		Accept alkaline				
3	(a)	4			[1]	4
	(b)	8			[1]	
	(c)	+1/1+	Allow +	not positive	[1]	
	(d)	$(\text{NH}_4)_2\text{CO}_3$			[1]	
4	(a)					[1]
	(b)					[1]
	(c)	Idea of electron transfer from calcium to oxygen [1]	two [1] electrons transferred		[2]	
		Second mark follows from first Idea of sharing gains no credit				
	(d)	Ionic (bond)/electrostatic force/electrostatic attraction			[1]	5

			AVAILABLE MARKS
5	(a) Nitrogen	[1]	3
	(b) Decreases	[1]	
	(c) In the fridge	[1]	
6	(a) pure copper	[1]	3
	(b) copper sulphate	[1]	
	(c) at the cathode	[1]	
7	(a) 	correct sharing [1] correct total number of electrons [1] [2] second mark dependent on first	4
	(b) weaker than	[1]	
	(c) Any correct covalent formula	[1]	
8	$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$ $\frac{1800 \times 40}{300} = \frac{3600 \times V_2}{400}$ $V_2 = \frac{1800 \times 40 \times 400}{300 \times 3600}$ $V_2 = 26.67 \text{ (or } 26.7) \text{ cm}^3$	[1] for method $\frac{PV}{T} = 240$ gets first method mark [1] for computation correct numerical answer gains [3] units gain [1]	[4] 4
up to 2 method marks available for incorrect answer			

			AVAILABLE MARKS	
9	(a)	hydrated [1] iron(III) oxide [1]	[2]	
	(b)	(i) idea of being coated/covered with zinc	[1]	
		(ii) clear idea that zinc is more reactive than iron [1] idea that (if bucket gets scratched) zinc reacts and iron does not/ or idea that zinc reacts first [1] apply cm not idea that zinc reacts faster not just zinc reacts	[2]	5
10	(a)	C	[1]	
	(b)	E [1] the second answer depends on first it conducts when liquid but not when solid [1] (both needed)	[2]	
	(c)	D [1] the second answer depends on first it has a high melting point and does not conduct electricity [1] (both needed)	[2]	5
11	(a)	any correct e.g. good for teeth and bones/tastes nice/may help prevent heart disease/used to make beer/for tanning leather not good for you, not contains Ca (or Ca ²⁺) not answers about lathering	[1]	
	(b)	calcium ions /Ca ²⁺ react/combine [1] with carbonate ions /CO ₃ ²⁻ /to form calcium carbonate/CaCO ₃ an insoluble substance/a precipitate [1] not idea of exchange	[3]	4
12	(a)	graphite allow carbon	[1]	
	(b)	oxygen	[1]	
	(c)	sulphate/SO ₄ ²⁻	[1]	
	(d)	2H ⁺ + 2e ⁻ → H ₂ [1] [1]	[2]	5
	or	H ⁺ + e ⁻ → H H + H → H ₂		
			Total	50



Rewarding Learning

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

Science: Double Award (Modular)

Forces and Energy
End of Module Test
Higher Tier

[GDC02]

THURSDAY 20 MAY 2010, AFTERNOON

**MARK
SCHEME**

			AVAILABLE MARKS
1	(a) (i) good conductor	[1]	5
	(ii) poor conductor/good insulator	[1]	
(b)	(i) hot [1] cold [1]	[2]	
	(ii) convection	[1]	
2	(a) 2.5 N [1] 200 g [1] or 0.2 kg	[2]	3
	(b) They all hit the ground at the same instant	[1]	
3	(a) Efficiency = $\frac{\text{Useful output energy}}{\text{Input energy}}$ [1]		4
	= $\frac{20}{25}$ [2] showing energy output = 20J award [1]		
	= 0.8 or 80% [1]	[4]	
4	(i) Stationary [1] or stopped [1] Constant speed [1] or steady speed	[2]	5
	(ii) (Average) speed = $\frac{\text{(Total) distance}}{\text{(Total) time}}$ [1]		
	= $\frac{50}{25}$ [1] = 2 (m/s) [1]	[3]	
5	(i) 2 N \equiv 4 cm [1] 1 N \equiv 2 cm [1]	[2]	4
	(ii) $\left. \begin{array}{l} 3 \times 2 = 6 \\ 15 - 6 = 9 \end{array} \right\}$ or $\left\{ \begin{array}{l} 5 \times 2 = 10 [1] \\ 19 - 10 = 9 [1] \end{array} \right.$ Answer = 9 (cm)		
	allow ecf from (i) if ext \leq 3 cm	[2]	
6	(a) Power = Work done \div time [1] or equivalent = 9400 000 \div 5 [1] = 1 880 000 [1] (W) [1]	[3]	6
	(b) Work done = Force \times distance [1] = 11 750 \times 200 [1] = 2 350 000 [1] (J)	[3]	

			AVAILABLE MARKS
7	(i) Hydroelectric or HEP	[1]	
	(ii) Nuclear	[1]	
	(iii) Nuclear	[1]	
	(iv) e.g. wind, solar, tidal, waves, biomass, geothermal	[1]	4
8	Momentum = mass × velocity [1] or $p = mv$ = 0.5×4 [1] = 2 (kg m/s) [1]	[3]	3
9	(a) Direction changes	[1]	
	(b) Speed = $\frac{\text{distance}}{\text{time}}$ (or equivalent) [1] $4 = \frac{300}{t}$ [1] or $t = \frac{300}{4}$ $t = 75$ (s) [1]	[3]	4
10	CWM = ACWM [1] or $F_1 \times d_1 = F_2 \times d_2$ $4 \times 36 = 6 \times x$ [1] $x = 24$ (cm) [1] $y = 26$ (cm) [1]	[4]	4
11	(a) Line is not straight or does not pass through origin	[1]	
	(b) $F = ma$ [1] Choose point from graph e.g. $F = 5 \times 1$ [1] = 5 (N) [1]	[3]	4
12	k.e. = $\frac{1}{2} mv^2$ [1] $v^2 = \frac{2 \times 960\,000}{1200}$ [2] $v = 40$ (m/s) [1]	[4]	4
Total			50

