

GCSE

**Science: Double Award
(Modular)**

**End of Module Tests
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: Double Award (Modular)

Living Organisms and the Processes of Life

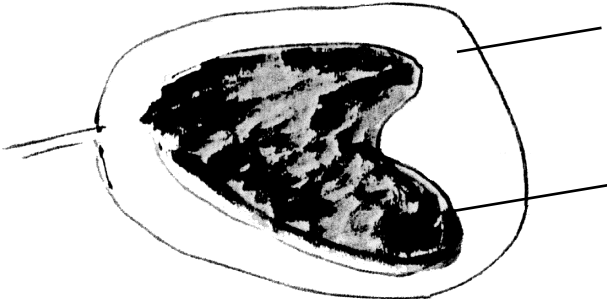
End of Module Test

Foundation Tier

[GDA01]

WEDNESDAY 24 FEBRUARY, MORNING

**MARK
SCHEME**

- 1 (a) Chloroplasts/chlorophyll – not shape (not vacuole not cell wall) [1]
- (b) (i) Cilia [1]
- (ii) Respiratory tract/oviduct/trachea/bronchi [1]
- (c) Chromosomes/genes [1]
- 2 (a) A – eyepiece lens [2]
B – Stage
- (b) $\times 10 \times 10 / \times 100$ [1]
- 3 (a) Any **three** from:
Boil leaf in water;
Boil in alcohol; **needs boil**
To remove chlorophyll/colour;
Soften leaf/dip in warm water;
Place on white tile;
Add Iodine solution
Stages not correct order –1 [3]
- (b)
- 
- Brown/yellow/orange or red
with one of these other colours
[not red on its own]
- Blue/Black or black
not purple
not blue on its own
- [2]
- 4 (a)
$$\begin{array}{r} 9 \text{ units} \\ + 2.5 \text{ units} \\ \hline 11.5 \text{ units} \end{array} \left. \vphantom{\begin{array}{r} 9 \\ + 2.5 \\ \hline 11.5 \end{array}} \right\} \begin{array}{l} [1] \\ [1] \end{array} \quad [2]$$
- (b) Will become obese/overweight/liver damage/brain damage/liver disease [1]
- 5 (a) DCPIP [1]
- (b) A [1]
- (c) Prevents scurvy/healthy gums [1]

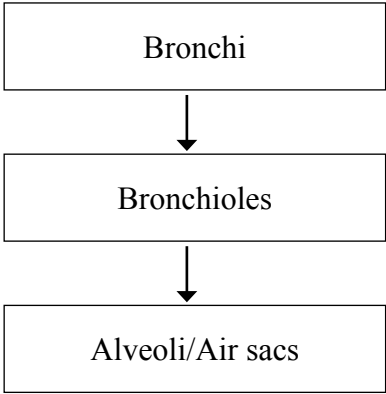
4

3

5

3

3

- 6 (a)  [3]
- (b) Any **two** from:
 Large surface area/lots alveoli;
 Good blood supply;
 Thin walls/one cell thick/permeable;
 Moist; [2] 5
- 7 (a) Antibodies;
 made by mother/coming from mother [2]
- (b) Placenta/umbilical cord [1]
- (c) Fast acting/protection without exposure to the disease [1] 4
- 8 (a) A – Aorta
 B – Pulmonary vein
 C – Left atrium [3]
- (b) Left side of heart shaded [1]
- (c) Muscle D pumps blood round the body/or E only has to pump to lungs [1] 5
- 9 (a) A – iris;
 Controls amount of light that enters the eye/protects eye [2]
- (b) Bending of rays at cornea/or lens;
 Focus onto retina [2] 4

			AVAILABLE MARKS
10 (a)	So that it can be absorbed/so can get into bloodstream	[1]	
(b)	A	[1]	
(c)	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Protein → Amino acids </div>	Both needed	
	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Starch → Glucose/(not carbohydrate) Sugar/ Maltose </div>	Both needed	[2]
11 (a)	All points correct = 2 3 – 4 points correct = 1 Line = 1	[3]	
(b)	As light increases, it takes less time for discs to rise/quicker group; More oxygen; more photosynthesis.	[3]	6
12 (a)	Osmosis	[1]	
(b)	Maintain concentration gradient/or create one/ or describe more H ₂ O outside than inside root cells; To allow water intake /prevent water loss; For photosynthesis/described turgor/solvent.	[3]	4
Total			50



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Using Materials and Understanding Reactions

End of Module Test

Foundation Tier

[GDB01]

WEDNESDAY 24 FEBRUARY 2010, MORNING

**MARK
SCHEME**

1 (a) Idea that symbols are internationally understood / Idea that symbols are eye-catching / Idea of helpful to people who can't read (2 × [1])
Do **not** accept idea of warning as it is used in the stem [2]

(b) (i) C [1]

(ii) D [1]

(c)  [1]

5

2 (a) Transparent [1]

(b) Idea that it retains its shape when heated [1]

(c) Copper / aluminium or other suitable [1]

(d)

Physical property of metal	Meaning
lustrous	shiny
malleable	Can be beaten into shape
ductile	Idea that it can be drawn into wires

[2]


5

3 (a) (i) B [1]

(ii) D [1]

(iii) A [1]

3

			AVAILABLE MARKS	
4	(a) (i)	Any two from: Stirring / shaking Use more water Crush the copper sulphate ($2 \times [1]$) Do not accept idea of heat as it is suggested in the stem	[2]	4
		(ii) Idea that solution has dissolved maximum amount of solute	[1]	
	(b)	Solubility decreases	[1]	
5	(a) (i)	state symbol	[1]	3
		(ii) steam	[1]	
	(b)	Idea that zinc has gained oxygen	[1]	
6	(a)	The number of protons is equal to the atomic number	[1]	4
	(b)	A compound	[1]	
	(c)	Number of protons and electrons are equal	[1]	
7	(a)	Idea that gases are compressible	[1]	3
		(b)		
	(c)	21.4g	[1]	
8	(a) (i)	4	[1]	3
		(ii) 3	[1]	
	(b)	Na_2CO_3	[1]	
9	B.	Neutralisation	[1]	4
	C.	Electrolysis	[1]	
	D.	Reduction	[1]	
	E.	Oxidation	[1]	

- 10 (a) Hard water is water which will not (easily) form a lather **with soap** [1]
- (b) B [1]
- (c) Leaves scale (on kettles)/wastes soap/forms scum **with soap**/
clogs up (hot) water pipes/qualified economic reason or any suitable
disadvantage [1]

- 11 (a) potassium sulphate [1]
hydrochloric acid [1]
sodium hydroxide **or** sodium oxide
or sodium carbonate **or** sodium hydrogencarbonate [1] [3]
- (b) Water [1]

12

Name of particle	Charge	Relative mass	Position of particle in the atom
Proton	+1	1	nucleus
Electron	-1	Almost zero *	outside the nucleus
Neutron	0	1	in the nucleus

[1] each

* Accept 0

or answers in $\frac{1}{1800} - \frac{1}{2000}$ range [4]

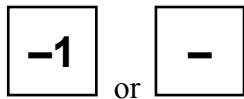
13 (a) Isotopes are atoms of the same element/have same atomic number [1]
Which have a different number of neutrons/have a different mass number [1]

[2]

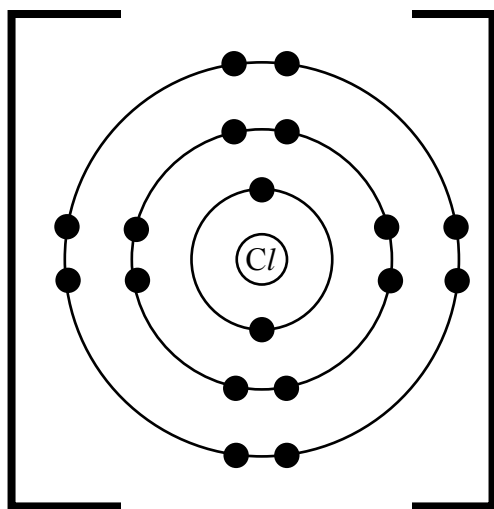
(b) Covalent

[1]

(c) (i)



[1]



[1]

(ii) chloride

[1]

Total

6

51



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Science: Double Award (Modular)

Forces and Energy
End of Module Test

Foundation Tier

[GDC01]

THURSDAY 25 FEBRUARY, MORNING

**MARK
SCHEME**

GCSE SCIENCE: DOUBLE AWARD (MODULAR) 2010

Forces and Energy

End of Module Test

Foundation Tier

Mark Scheme

1	<p>(a) (i) never runs out or can be replaced in a lifetime or limitless supply</p>	[1]	
	<p>(ii) Two from: e.g. wind, solar, tidal, biomass, hydroelectric, geothermal</p>	[2]	
	<p>(b) Two from: e.g. coal, oil, gas, natural gas, lignite, turf/peat</p>	[2]	5
2	<p>chemical → heat or thermal</p>	[2]	
	<p>electrical → sound</p>	[2]	4
3	<p>(a) A – weight/gravity/gravitational B – friction</p>	[1] [1]	
	<p>(b) Equal</p>	[1]	
	<p>(c) Heat</p>	[1]	4
4	<p>(i) 25kg → 250N</p>	[1]	
	<p>(650 + 250) = 900 (N)</p>	[1]	
	<p>(ii) Weight</p>	[1]	3

			AVAILABLE MARKS
5	(i) Moment = $F \times d$	[1]	
	= 4×12	[1]	
	= 48 (N cm)	[1]	
(ii) Moment = 150 (N cm)	[1]	5	
(iii) Clockwise (consistent with above)	[1]		
6	(a) 40(s)		[1]
	(b) Av. sp. = $\frac{\text{(total) dist}}{\text{(total) time}}$	[1]	4
	= $\frac{50}{40}$ ecf from (a)	[1]	
	= 1.25 (m/s)	[1]	
7	$P = \frac{F}{A}$	[1]	3
	= $\frac{630}{3}$	[1]	
	= 210 (N/cm ²)	[1]	
8	Eff = $\frac{\text{(Useful) energy}}{\text{(Total) energy in}}$	[1]	3
	= $\frac{600}{2500}$	[1]	
	= 0.24 or 24%	[1]	
9	G	[1]	4
	G	[1]	
	G I	[1]	
	I	[1]	

			AVAILABLE MARKS
10 (a)	No		
	Line does not go through origin	[1]	
(b)	4 (cm)	[1]	
(c)	Total $l = 10$ (cm) or line on graph	[1]	
	Unknown load = 5 N ecf from (b)	[1]	4
11 (a) (i)	D	[1]	
	(ii) Friction/centripetal	[1]	
(b)	Momentum = mass \times speed or $p = mv$	[1]	
	= 1500×20	[1]	
	= 30 000 (kg m/s)	[1]	5
12 (a)	$W = F \times d$	[1]	
	= $700 \times (20 \times 0.15)$ or 700×3	[1]	
	= 2100 (J)	[1]	
(b)	$P = \frac{W.D.}{Time}$	[1]	
	= $\frac{2100}{5}$ (e.c.f.)	[1]	
	= 420 (W)	[1]	6
		Total	50



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Living Organisms and the Processes of Life

End of Module Test

Higher Tier

[GDA02]

WEDNESDAY FEBRUARY 2010, MORNING

**MARK
SCHEME**

			AVAILABLE MARKS	
1	(a)	A – Aorta B – Pulmonary vein C – Left atrium	[3]	5
	(b)	Left side heart shaded	[1]	
	(c)	Muscle D pumps blood round the body/converse E only has to pump to lungs	[1]	
2	(a)	A – iris; Controls amount of light that enters the eye/protects eye	[2]	4
	(b)	Bending of rays at cornea/or lens; Focus onto retina	[2]	
3	(a)	So that it can be absorbed/so that it can get into bloodstream	[1]	4
	(b)	A	[1]	
	(c)	<div style="border: 1px solid black; padding: 5px; display: inline-block; margin-bottom: 5px;"> Protein → Amino acids </div> Both needed		
		<div style="border: 1px solid black; padding: 5px; display: inline-block; margin-bottom: 5px;"> Starch → Glucose/(not carbohydrate) Sugar/ Maltose </div> Both needed	[2]	
4	(a)	All points correct = 2 3/4 points correct = 1 Line = 1	[3]	6
	(b)	As light increases, it takes less time for discs to rise/quicker; More oxygen; more photosynthesis	[3]	
5	(a)	Osmosis	[1]	4
	(b)	Maintain concentration gradient/or create one/ To allow water intake /prevent water loss; For photosynthesis/or described turgor/solvent	[3]	

			AVAILABLE MARKS	
6	(a) (i)	B is heavier/or A is lighter Move the sliding weight towards B/or further away from pivot towards B add extra weight to slide B	[1]	5
	(ii)	A; A loses more water/more transpiration/uses more water (A); larger leaves/larger surface area/more stomata	[2]	
	(b)	Less carbon dioxide; diffuses into the leaf for photosynthesis ;	[2]	
7	(a)	HPV starts and ends in capillaries	[1]	3
	(b)	Glucose is converted to glycogen; under the influence of insulin; glucose converted to fat/ increased uptake of glucose/increased rate of respiration; (Any two)	[2]	
8	(a)	Less muscle/large lumen; Less pressure (any two)	[2]	3
	(b)	Thin wall/one cell thick so easier for diffusion	[1]	
9	(a)	Any three in correct sequence: hepatic vein/vena cava/aorta/renal artery; to the kidney; converted to urine; in ureter; to bladder; urethra to outside	[3]	3
10	(a)	Boil the solution (not heat)	[1]	4
	(b)	carbon dioxide; is produced in aerobic and anaerobic respiration/in both	[2]	
	(c)	Less produced in an aerobic or more in aerobic. Aerobic is more efficient.	[1]	

			AVAILABLE MARKS
<p>11 Any four from:</p> <p>Plenty of oxygen; for respiration/energy; for active uptake; of minerals/named mineral; against a concentration gradient 1 mark minerals:</p>	<p>plenty of oxygen; or better germination; more plants; photosynthesis; better root development; more mineral uptake</p>	<p>} 4 } 2</p>	<p>[4]</p> <p style="margin-top: 100px;">4</p>
<p>12 (a) Any two from:</p> <p>Both processes controlled by enzymes; Less collisions between molecules; Molecules have less energy/less kinetic energy</p>			<p>[2]</p>
<p>(b) More growth → optimum temp for growth; Bigger difference between rate of photosynthesis and respiration</p>			<p>[2]</p>
<p>(c) To obtain extra reflected light/more humid/less sandy free draining soil ground wet/soils not waterlogged/less frost/More H₂O:</p>			<p>[1]</p> <p style="margin-top: 10px;">5</p>
Total			50



Rewarding Learning

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Using Materials and Understanding Reactions

End of Module Test

Higher Tier

[GDB02]

WEDNESDAY 24 FEBRUARY 2010, MORNING

**MARK
SCHEME**

- 1 (a) (i) 4 [1]
 (ii) 3 [1]
 (b) Na_2CO_3 [1]
- 2 B. Neutralisation [1]
 C. Electrolysis [1]
 D. Reduction [1]
 E. Oxidation [1]
- 3 (a) Hard water is water which will not (easily) form a lather **with soap** [1]
 (b) B [1]
 (c) Leaves scale (on kettles)/wastes soap/forms scum **with soap**/
 clogs up (hot) water pipes/qualified economic reason or any suitable
 disadvantage [1]
- 4 (a) potassium sulphate [1]
 hydrochloric acid [1]
 sodium hydroxide **or** sodium oxide
or sodium carbonate **or** sodium hydrogencarbonate [1] [3]
 (b) Water [1]

5

Name of particle	Charge	Relative mass	Position of particle in the atom
Proton	+1	1	nucleus
Electron	-1	Almost zero	outside the nucleus
Neutron	0	1	in the nucleus

[1] each [4]

3

4

3

4

4

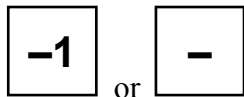
6 (a) Isotopes are atoms of the same element/have same atomic number [1]
Which have a different number of neutrons/have a different mass number [1]

[2]

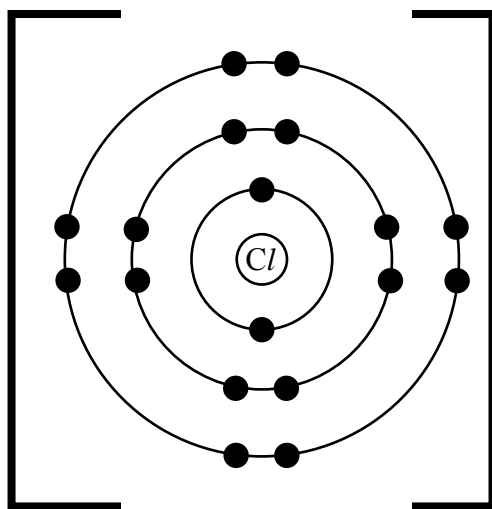
(b) Covalent

[1]

(c) (i)



[1]



[1]

(ii) chloride

[1]

6

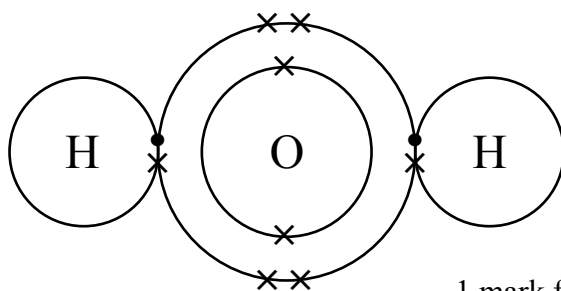
7 (a) Two electrons on nitrogen outer shell

[1]

(b) low melting pt / low boiling point
gas (at room temp.) / low density

[1]

(c)



1 mark for sharing
1 for correct total electrons
2nd mark dependent on first

[2]

4

		AVAILABLE MARKS
8	<p>(a) Bone combines the properties of two or more materials [1] to make a better material / more useful material [1] Any two</p> <p>(b) Property [1] reason [1] Smooth – easy movement Unreactive – does not affect body fluids / or other Durable – it will last a long time Rigid/hard – correct idea Not Density answer or other correct</p>	<p>[2]</p> <p>[2]</p> <p>4</p>
9	<p>(a) Weak bonds between layers [1] allowing it to slide/slip [1]</p> <p>(b) Delocalised electrons (between the layers) [1] carry charge/current [1]</p> <p>(c) All the bonds are strong no layer structure [1]</p> <p>Diamond does not have delocalised electrons / free mobile electrons [1]</p>	<p>[2]</p> <p>[2]</p> <p>[2]</p> <p>6</p>
10	$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \quad [1]$ <p>or</p> $\frac{66 \times 7000}{280} = \frac{V_2 \times 9000}{300}$ $V_2 = \frac{66 \times 7000 \times 300}{280 \times 9000} \quad [1] \quad V_2 = 55 \text{ [3] cm}^3 \text{ [1]}$	<p>Up to two method marks Correct numerical answer gains [3] Units needed for [4]</p> <p>[4]</p> <p>4</p>
11	<p>(a) $\text{CaCO}_3 + \text{H}_2\text{O} + \text{CO}_2 \rightarrow \text{Ca}(\text{HCO}_3)_2$ LHS [1] RHS [1] (or H_2CO_3)</p> <p>(b) (i) Ca^{2+} Mg^{2+} both needed for mark correct names are OK</p> <p>(ii) Na^+ or H^+</p>	<p>[2]</p> <p>[1]</p> <p>[1]</p> <p>4</p>

12 (a) Any **two** of:
Conduct electricity
high melting point
inert (2 × [1])

[2]

(b) $\text{Li}^+ + \text{e}^- \rightarrow \text{Li}$
[1] [1]

[2]

Total

AVAILABLE
MARKS

4

50



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Forces and Energy
End of Module Test

Higher Tier

[GDC02]

THURSDAY 25 FEBRUARY, MORNING

**MARK
SCHEME**

GCSE SCIENCE: DOUBLE AWARD (MODULAR) 2010

Forces and Energy

End of Module Test

Higher Tier

Mark Scheme

1	$P = \frac{F}{A}$	[1]	
	$= \frac{630}{3}$	[1]	
	$= 210 \text{ (N/cm}^2\text{)}$	[1]	3
2	$\text{Eff} = \frac{\text{(Useful) energy}}{\text{(Total) energy in}}$	[1]	
	$= \frac{600}{2500}$	[1]	
	$= 0.24 \text{ or } 24\%$	[1]	3
3	G	[1]	
	G	[1]	
	G I	[1]	
	I	[1]	4
4	(a) No		
	Line does not go through origin	[1]	
	(b) 4 (cm)	[1]	
	(c) Total $l = 10$ (cm) or line on graph	[1]	
	Unknown load = 5 N ecf from (b)	[1]	4

			AVAILABLE MARKS
5	(a) (i) D	[1]	5
	(ii) Friction/centripetal	[1]	
	(b) Momentum = mass × speed	[1]	
	= 1500 × 20	[1]	
	= 30 000 (kg m/s)	[1]	
6	(a) W = F × d	[1]	6
	= 700 × (20 × 0.15)	[1]	
	= 2100 (J)	[1]	
	(b) $P = \frac{W.D.}{Time}$	[1]	
	= $\frac{2100}{5}$ (e.c.f.)	[1]	
	= 420 (W)	[1]	
7	(a) Coal, oil (regardless of order)	[1]	3
	(b) (i) HEP	[1]	
	(ii) Non renewables Earth's oil & gas source will have (virtually) run out or policy decision or reduce global warming or reduce pollution or nonrenewables are being used too much 1/1	[1]	
8	(a) A – arrow (vert.) downwards		4
	B – arrow (horizontally) left	[2]	
	(b) Black is a better [1] absorber [1] of heat Shiny is a better reflector [2] Black is a poorer reflector [2]	[2]	

			AVAILABLE MARKS	
9 (a)	Accel = Gradient or $a = \frac{v-u}{t}$	[1]		
	$= \frac{6}{10}$ or equivalent	[1]		
	$= 0.6 \text{ (m/s}^2\text{)}$	[1]		
(b)	Constant velocity or steady velocity or steady speed	[1]	4	
10 (a)	Arrow vertically downwards at c. of g. (labelled with W.)	[1]		
	(b) ACM = CM or $\sqrt{M} = M\downarrow$	[1]		
	$W \times 35 = 8 \times 85$	[1]		
	$W = 19.4 \text{ (N)}$	[1]		4
11	$F = ma$ or $RF = ma$	[1]		
$3600 - 3000 = 300a$	} either LHS gets 1/1 RHS gets 1/1	[1]		
$600 = 300a$		[1]		
	$a = 2 \text{ (m/s}^2\text{)}$	[1]		4
12 (a)	$KE = \frac{1}{2} mv^2$	[1]		
	$= \frac{1}{2} \times 550 \times (20)^2$	[1]		
	$= 110,000 \text{ (J)}$	[1]		
	(b) Work done = Force \times distance or equivalent	[1]		
	$88\,000 = F \times 22$	[1]		
	$F = 4000 \text{ (N)}$	[1]	6	
Total			50	

