



COMBINED SCIENCE

0653/31

Paper 3 Core Theory

October/November 2018

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **10** printed pages.

PUBLISHED**Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks
1(a)	breathing ; digestion ;	2
1(b)(i)	vacuole named ; and label line drawn to vacuole ; OR cell wall named ; and label line drawn to cell wall ;	2
1(b)(ii)	root hair cells ; up stem ; through xylem ; extra detail (e.g. by osmosis) ; Max 3	3
1(c)(i)	phototropism ;	1
1(c)(ii)	leaves have maximum exposure / more sunlight ; for photosynthesis ;	2

Question	Answer	Marks
2(a)(i)	atoms ;	1
2(a)(ii)	molecules ; covalent ;	2
2(a)(iii)	ions ;	1
2(a)(iv)	compounds/molecules ; mixture ;	2

Question	Answer	Marks
2(b)(i)	(left electrode) cathode ; (right electrode) anode ;	2
2(b)(ii)	(solid) copper / Cu ; (gas) chlorine / Cl ₂ ;	2

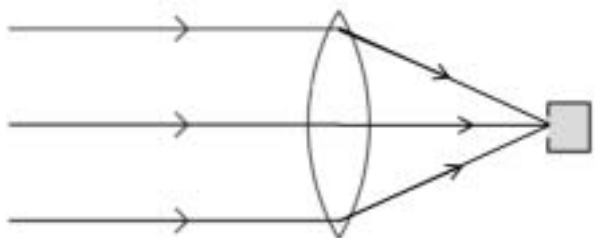
Question	Answer	Marks
3(a)(i)	weight / gravitational (force) ;	1
3(a)(ii)	yes (<i>no mark</i>) constant speed / no acceleration, (so forces must balance) ;	1
3(b)(i)	P on any point on graph line between 0 and 200 s, or between 520 and 650 s ;	1
3(b)(ii)	12 800 (m) ;	1
3(b)(iii)	(average speed =) (total) distance / (total) time ; (12800 / 650) = 19.7 or 20 (m / s) ;	2
3(c)	chemical ; kinetic ;	2
3(d)	the Sun ;	1

Question	Answer	Marks
4(a)	seaweed ; shellfish ; shellfish / crab / starfish / seagull / sealion / octopus	3

Question	Answer	Marks
4(b)	<i>any two of</i> seaweed → shellfish → crab → seagull ; seaweed → shellfish → crab → sea lion ; seaweed → shellfish → crab → octopus → sea lion ; <i>and</i> food chains set out correctly with arrows going in the right direction ;	3
4(c)	(Fewer crabs) so sea lion eats more octopus ; Fewer crabs for octopus / less food for octopus / octopus loses part of its food supply ;	2

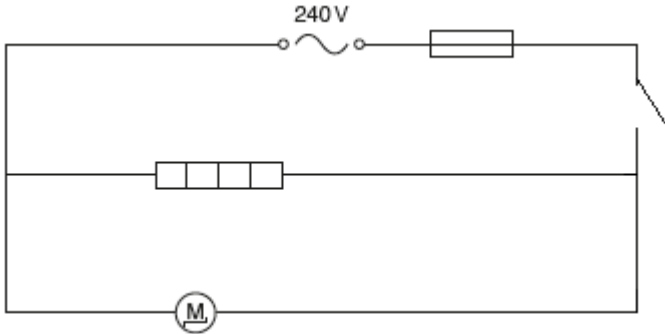
Question	Answer	Marks
5(a)(i)	sulfuric (acid) ;	1
5(a)(ii)	increases ;	1
5(a)(iii)	magnesium oxide / magnesium hydroxide / magnesium carbonate;	1
5(a)(iv)	temperature increases / release of heat (thermal energy) ;	1
5(b)	(method) filter / filtering / filtration ; (explanation) solid (particles) stays on filter paper / cannot pass through filter paper / liquid (particles) can ;	2
5(c)(i)	good and high	1
5(c)(ii)	(most reactive) sodium / Na calcium / Ca (least reactive) magnesium / Mg ;	1

Question	Answer	Marks
6(a)	expansion (on heating) / (thermal) expansion ;	1

Question	Answer	Marks
6(b)(i)	ethanol ; must be a liquid at both these temperatures / only ethanol is liquid at -78°C ;	2
6(b)(ii)	room temperature is below 30°C / melting point of gallium ; gallium would be a solid at room temperature ;	2
6(c)(i)	four / 4 ;	1
6(c)(ii)	(frequency will) increase ; frequency increases as wavelength decreases ORA	2
6(c)(iii)	 all three rays extended to meet at the same point at the detector ;	1

Question	Answer	Marks																							
7(a)	<table><tr><td rowspan="2">characteristic</td><td colspan="3">blood vessel</td></tr><tr><td>artery</td><td>vein</td><td>capillary</td></tr><tr><td>carries blood away from the heart</td><td>✓</td><td></td><td></td></tr><tr><td>contains valves</td><td></td><td>✓</td><td></td></tr><tr><td>walls are one cell thick</td><td></td><td></td><td>✓</td></tr><tr><td>exchange of materials occurs here</td><td></td><td></td><td>✓</td></tr></table>	characteristic	blood vessel			artery	vein	capillary	carries blood away from the heart	✓			contains valves		✓		walls are one cell thick			✓	exchange of materials occurs here			✓	3
characteristic	blood vessel																								
	artery	vein	capillary																						
carries blood away from the heart	✓																								
contains valves		✓																							
walls are one cell thick			✓																						
exchange of materials occurs here			✓																						
7(b)(i)	<i>any two from</i> increases (blood) glucose concentration ; increases heart rate / pulse ; increases rate of respiration ; Max 2	2																							
7(b)(ii)	destroyed by the liver ;	1																							
7(c)(i)	milk / yoghurt / fish / green vegetables ;	1																							
7(c)(ii)	strengthens bones / teeth ;	1																							
7(c)(iii)	tiredness / pale skin / shortness of breath / dizziness ;	1																							

Question	Answer	Marks
8(a)(i)	<u>fractional</u> distillation ;	1
8(a)(ii)	fuel (in diesel engines) ;	1
8(b)	any two gases of: name oxygen ; change decrease ; or name carbon dioxide ; change increase ; or name water (vapour) ; change increase ; 2 nd mark dependent on correct gas named Max 4	4
8(c)	correct arrangement of atoms ; all (single) bonds shown correctly ;	2

Question	Answer	Marks
9(a)(i)	 correct switch symbol in circuit ; motor and heater in parallel ; switch in series with both motor and heater branches;	3

Question	Answer	Marks
9(a)(ii)	fuse ; protection of machine / wiring / components from excess current / overheating ;	2
9(b)(i)	rearrangement to $I = V / R$ or $240 / 24$; (=)10 ; A ;	3
9(b)(ii)	circle round 3.4Ω (no mark) combined resistance of two resistances in parallel is less than either of these resistances ;	1



COMBINED SCIENCE

0653/32

Paper 3 Core Theory

October/November 2018

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **10** printed pages.

PUBLISHED**Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks
1(a)	1 mark for each correct diagram / name / function ; ; ; ;	4
1(b)	diameter of red blood cell = 21 mm ; magnification = $21 / 0.007 = 3000$ (times) ;	2
1(c)	amino acid ; carbon dioxide ; platelets ; All 3 correct = 2 2 or 1 correct = 1	2

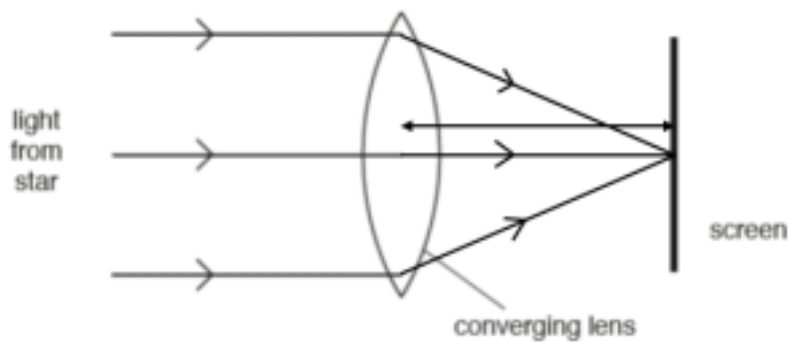
Question	Answer	Marks
1(d)(i)	breaks down ; large / insoluble <u>molecules</u> ; into small / soluble molecules ; that can be absorbed ; Max 3	3
1(d)(ii)	salivary glands / stomach / pancreas / ileum / small intestine ;	1

Question	Answer	Marks
2(a)(i)	(process A) filtration / filtering / filter ; (process B) evaporation ;	2
2(a)(ii)	decreases ;	1
2(a)(iii)	increases ;	1
2(a)(iv)	exothermic ;	1
2(b)(i)	(copper carbonate) + sulfuric acid → copper sulfate + carbon dioxide + water sulfuric acid LHS AND copper sulfate RHS ; carbon dioxide AND water RHS ;	2
2(b)(ii)	(test) (add) aqueous sodium hydroxide OR aqueous ammonia ; (observations) (light) blue precipitate OR blue ppt (then deep blue solution) ;	2
2(b)(iii)	high density / high melting point / (element or compound) act as catalysts ;	1

Question	Answer	Marks
3(a)(i)	Z	1
3(a)(ii)	2000 N ; constant speed / no acceleration, (so forces must balance) ;	2
3(b)(i)	C on any point on graph line between 0 and 20 s, or between 50 and 60 s ;	1
3(b)(ii)	(average) speed = (total) distance / (total) time ; = 200 / 60 = 3.3(3) (m / s) ;	2
3(c)(i)	chemical ; kinetic ;	2
3(c)(ii)	the Sun ;	1
3(c)(iii)	converted / transformed into thermal energy ;	1

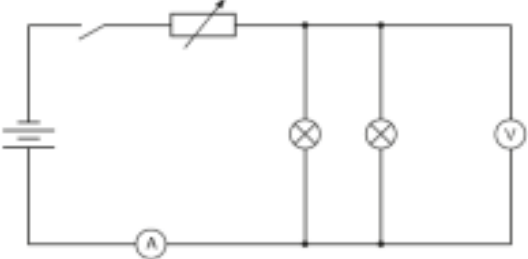
Question	Answer	Marks
4(a)	no reaction ; the increased temperature / boiling has removed enzyme activity ;	2
4(b)(i)	the water / river is polluted ; contains bacteria / viruses / microbes / pathogens ; that cause disease ; Max 2	2
4(b)(ii)	animals / fish will die / move away ; due to suffocation / less oxygen for respiration ;	2

Question	Answer	Marks																			
5(a)(i)	petroleum ;	1																			
5(a)(ii)	methane ;	1																			
5(b)(i)	unreactive / (only) burn / combust ;	1																			
5(b)(ii)	C – C single bond ; All else correct ;	2																			
5(c)(i)	number of protons (in an atom / nucleus) ;	1																			
5(c)(ii)	<table border="1"><thead><tr><th rowspan="2">particle</th><th colspan="3">property</th></tr><tr><th>position in atom</th><th>relative charge</th><th>relative mass</th></tr></thead><tbody><tr><td>electron</td><td>surrounding nucleus</td><td>(-1)</td><td>negligible</td></tr><tr><td>neutron</td><td>(nucleus)</td><td>0</td><td>1</td></tr><tr><td>proton</td><td>nucleus</td><td>+1</td><td>(1)</td></tr></tbody></table> 2 or 3 correct entries = 1 mark 4 or 5 correct entries = 2 marks All correct = 3 marks	particle	property			position in atom	relative charge	relative mass	electron	surrounding nucleus	(-1)	negligible	neutron	(nucleus)	0	1	proton	nucleus	+1	(1)	3
particle	property																				
	position in atom	relative charge	relative mass																		
electron	surrounding nucleus	(-1)	negligible																		
neutron	(nucleus)	0	1																		
proton	nucleus	+1	(1)																		

Question	Answer	Marks
6(a)(i)	able to flow / takes up the shape of container / any appropriate property ;	1
6(a)(ii)	(liquid) irregular / random arrangement ; molecules can move around one another ; molecules further apart ; (solid) regular / lattice arrangement ; molecules vibrate around fixed positions ; molecules tightly packed / closer together ; Max 2	2
6(b)	thermometer ;	1
6(c)	ticks in first, second and fourth boxes ; cross in 3rd box ;	2
6(d)(i)	conduction and convection require a medium	1
6(d)(ii)	gamma in left-hand end box ;	1
6(d)(iii)	 all three rays refracted to meet the screen at the same point ;	1
6(d)(iv)	focal length correctly indicated as on above diagram ;	1

Question	Answer	Marks
7(a)(i)	A no mark presence of root hairs ; xylem / phloem / vascular tissue (stele) found in the central area ;	2
7(a)(ii)	one area of xylem correctly shaded in B ;	1
7(b)	mesophyll cells ; higher ; diffuses ; stomata ;	4
7(c)	carbon dioxide ; sugar / glucose + oxygen ;	2

Question	Answer	Marks
8(a)	(prediction) no reaction AND (explanation) lead bromide is solid / needs to be molten / liquid ;	1
8(b)	(name) chlorine ; (effect) bleaches / (turns) white / decolourises ;	2
8(c)	(oxidised) carbon ; (reduced) copper oxide ;	2
8(d)(i)	water (vapour) / noble gas / named noble gas ;	1
8(d)(ii)	oxygen / O ₂ AND water (vapour) / H ₂ O ;	1

Question	Answer	Marks
9(a)	<u>variable</u> resistor ;	1
9(b)(i)	$R = V / I = 3.0 / 0.40$; $= 7.5 (\Omega)$;	2
9(b)(ii)	Brightness changes / resistance decreases ;	1
9(c)(i)	 lamp in parallel ;	1
9(c)(ii)	higher (current) reading ; combined resistance of two resistances in parallel is less than either of the two resistances ;	2



COMBINED SCIENCE

0653/33

Paper 3 Core Theory

October/November 2018

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **10** printed pages.

PUBLISHED**Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks
1(a)	Line drawn from: <i>absorbs mineral ions</i> to any part of the root ; <i>makes carbohydrate</i> to any leaf ; <i>transports water to the leaves</i> to any part of the stem ; <i>absorbs carbon dioxide</i> to any leaf ;	4
1(b)	large petals ; or anther / stigma inside the flower ;	1
1(c)	Spiky / irregular surface ; sticks well to insects' bodies / stigma ;	2
1(d)(i)	for <u>respiration</u> ; and one of to release energy ; for growth ; building up large molecules ; cell division ; Max 2	2
1(d)(ii)	warmth / water ;	1

Question	Answer	Marks
2(a)	atomic / proton ; noble ; transition ;	3
2(b)(i)	covalent ;	1
2(b)(ii)	(electrons are) shared ;	1
2(c)	(electrons are) lost / gained / lost and gained ;	1

Question	Answer	Marks
2(d)(i)	filter / filtering / filtration ;	1
2(d)(ii)	evaporation ;	1
2(d)(iii)	physical and no new substance(s) is / are made ;	1

Question	Answer	Marks
3(a)	Y ;	1
3(b)(i)	C at any point on graph line between 5 and 10 s, or between 25 and 30 s ;	1
3(b)(ii)	(average) speed = (total) distance / (total) time or 20 / 30 ; = 0.67 (m / s) ;	2
3(c)(i)	chemical ; chemical ; kinetic ;	3
3(c)(ii)	converted / transformed into thermal energy;	1

Question	Answer	Marks
4(a)(i)	A oesophagus ; B pancreas ;	2
4(a)(ii)	ileum ;	1
4(a)(iii)	stores bile ;	1
4(b)	amylase from mouth cavity doesn't work ; in the acidic environment of the stomach ;	2

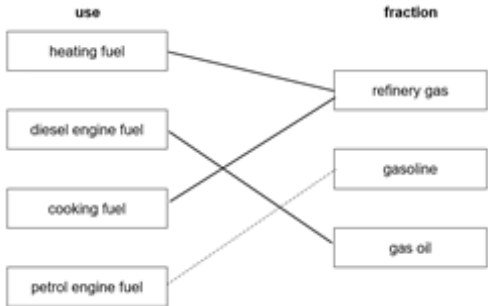
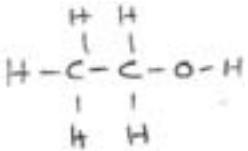
Question	Answer	Marks
4(c)	any two of ions / named ion, e.g. chloride ; carbon dioxide ; hormones ; any other soluble nutrient, e.g. amino acids ; Max 2	2
4(d)	in red (blood) cells ; by haemoglobin ;	2

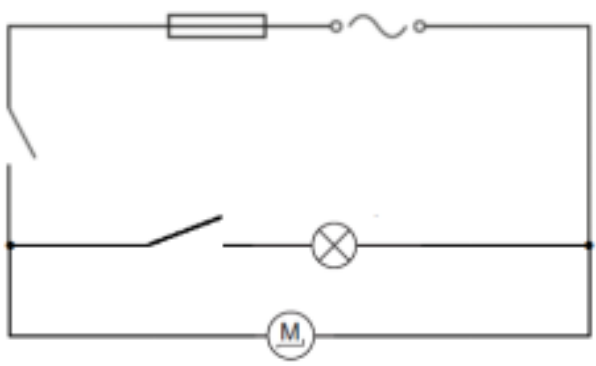
Question	Answer	Marks
5(a)(i)	time taken ; volume of gas ;	2
5(a)(ii)	(highest) calcium / Ca magnesium / Mg zinc / Zn (lowest) iron / Fe	1
5(a)(iii)	(magnesium) + hydrochloric acid → hydrogen + magnesium chloride magnesium chloride identified anywhere ; all species correct and in correct places ;	2
5(a)(iv)	(test) lighted splint ; (result) burns with a (squeaky) 'pop' ;	2
5(b)	(substance) carbon and (explanation) gains oxygen / O ;	1

Question	Answer	Marks
6(a)(i)	density / volume / cannot be compressed ;	1
6(a)(ii)	(liquid) molecules close together ; molecules can move around / slide over one another ; (gas) molecules far apart ; Molecules free to move apart ; Max 2	2
6(b)	example of use of gas expansion on heating (e.g. hot air balloon, convection heater) ;	1
6(c)(i)	evaporation ;	1
6(c)(ii)	conduction ; convection ;	2
6(d)(i)	refraction ;	1
6(d)(ii)	ray from thermometer bulb to meet ray to eye at water surface ;	1

Question	Answer	Marks
7(a)	rate is reduced (no mark) haze / smoke particles reduce light / block stomata ;	1
7(b)	(reason) lack of tree roots in soil ; (explanation) roots stabilise the soil ; or (reason) trees and plants not present to protect soil / bare soil is exposed ; (explanation) wind and rain can easily reach soil to erode it ;	2
7(c)	<i>any two of</i> lose their habitats / move to new areas ; lose food supplies ; may be suffocated / burned by the burning process ; Max 2	2
7(d)	carbon dioxide is a greenhouse gas ; contributes to global warming ; any valid consequence of global warming ; Max 2	2

Question	Answer	Marks
8(a)(i)	coal (and) natural gas ; (either order)	1

Question	Answer	Marks
8(a)(ii)	 three correct lines = 2 marks one or two correct lines = 1 mark ;	2
8(a)(iii)	exothermic ;	1
8(b)(i)	ethene ;	1
8(b)(ii)	 C-C bond correct and C-H bonds correct ; O-H correctly bonded to C ;	2
8(c)(i)	atoms of more than one element joined together ;	1
8(c)(ii)	different chemical substances not joined together / can be separated by (suitable named) separation technique;	1

Question	Answer	Marks
9(a)(i)	 correct symbol for lamp ; parallel circuit with motor in one branch, lamp in other branch ; switch in series with lamp only ; complete workable circuit ;	4
9(a)(ii)	lamp can be switched off while motor remains on / if one component fails, the other will still work ;	1
9(a)(iii)	mains supply / (a.c.) power supply ;	1
9(a)(iv)	protection of components / circuit / wiring from excess current / overheating ;	1
9(b)	$R (= V / I) / 240 / 1.25 ;$ $= 192 ;$ $\Omega / \text{ohm} ;$	3