



**Cambridge Assessment International Education**  
Cambridge International General Certificate of Secondary Education

---

**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) ; <b>Max 3</b>	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 <sub>2</sub> ;	2

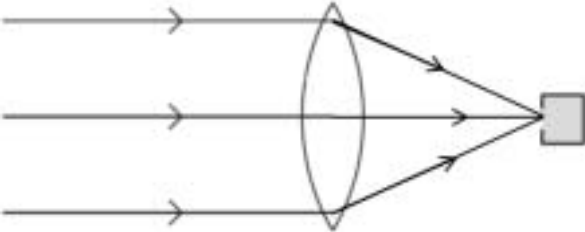
Question	Answer	Marks
3(a)(i)	weight / gravitational (force) ;	1
3(a)(ii)	yes ( <i>no mark</i> ) constant speed / no acceleration, (so forces must balance) ;	1
3(b)(i)	P on any point on graph line between 0 and 200 s, or between 520 and 650 s ;	1
3(b)(ii)	12 800 (m) ;	1
3(b)(iii)	(average speed = ) (total) distance / (total) time ; (12800 / 650) = 19.7 <b>or</b> 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)	<p><i>any two of</i>            seaweed → shellfish → crab → seagull ;            seaweed → shellfish → crab → sea lion ;            seaweed → shellfish → crab → octopus → sea lion ;</p> <p><i>and</i>            food chains set out correctly with arrows going in the right direction ;</p>	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)	<p>(method) filter / filtering / filtration ;            (explanation) solid (particles) stays on filter paper / cannot pass through filter paper / liquid (particles) can ;</p>	2
5(c)(i)	good <b>and</b> high	1
5(c)(ii)	<p>(most reactive) sodium / Na            calcium / Ca            (least reactive) magnesium / Mg ;</p>	1

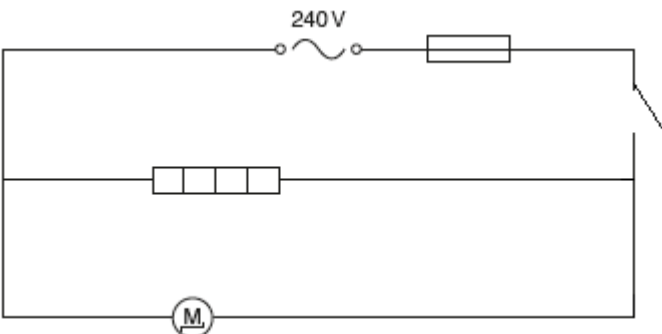
Question	Answer	Marks
6(a)	expansion (on heating) / (thermal) expansion ;	1

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

Question	Answer	Marks																							
7(a)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">characteristic</th> <th colspan="3">blood vessel</th> </tr> <tr> <th>artery</th> <th>vein</th> <th>capillary</th> </tr> </thead> <tbody> <tr> <td>carries blood away from the heart</td> <td style="text-align: center;">✓</td> <td></td> <td></td> </tr> <tr> <td>contains valves</td> <td></td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>walls are one cell thick</td> <td></td> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td>exchange of materials occurs here</td> <td></td> <td></td> <td style="text-align: center;">✓</td> </tr> </tbody> </table> <p style="text-align: center;">...</p>	characteristic	blood vessel			artery	vein	capillary	carries blood away from the heart	✓			contains valves		✓		walls are one cell thick			✓	exchange of materials occurs here			✓	<b>3</b>
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)	<p><i>any two from</i>            increases (blood) glucose concentration ;            increases heart rate / pulse ;            increases rate of respiration ;  <b>Max 2</b></p>	<b>2</b>																							
7(b)(ii)	destroyed by the liver ;	<b>1</b>																							
7(c)(i)	milk / yoghurt / fish / green vegetables ;	<b>1</b>																							
7(c)(ii)	strengthens bones / teeth ;	<b>1</b>																							
7(c)(iii)	tiredness / pale skin / shortness of breath / dizziness ;	<b>1</b>																							



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

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

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