



Cambridge IGCSE™

COMBINED SCIENCE**0653/41**

Paper 4 Theory (Extended)

May/June 2020**MARK SCHEME**Maximum Mark: 80

Published

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

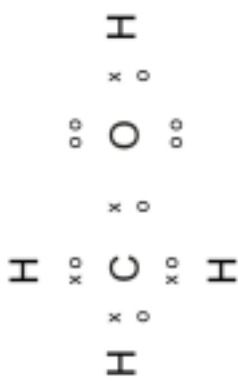
Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

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

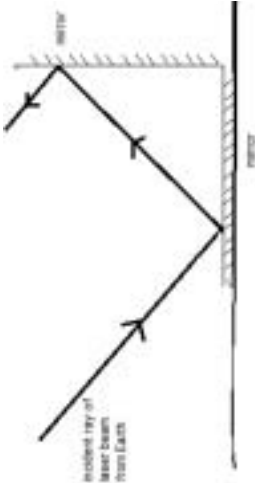
Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & AS Level components, and some Cambridge O Level components.

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

Question	Answer	Marks
1(a)	carbon dioxide produced by cells during respiration ; carbon dioxide, diffuses from blood (plasma) / into alveoli / is excreted at the lungs ;	2
1(b)	<i>any two from:</i> large surface area ; thin surface ; good blood supply ; well ventilated ;	max 2
1(c)(i)	goblet cell ;	1
1(c)(ii)	(cilia) (beat to) remove mucus ; (mucus) traps pathogens and particles ;	2
1(c)(iii)	stimulates mucus production / bronchitis / lung cancer / destroys or paralyses cilia / collects in alveoli / coats gas exchange surface ;	1

Question	Answer	Marks
2(a)	contains oxygen / is not just carbon and hydrogen ;	1
2(b)(i)	 correct electrons around carbon atom ; correct electrons around oxygen atom ;	2
2(b)(ii)	all atoms are non-metallic elements ;	1

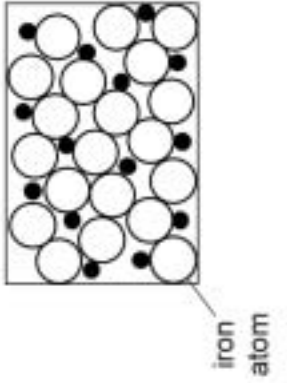
Question	Answer	Marks
2(c)	$(2\text{CH}_3\text{OH}) + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 4\text{H}_2\text{O}$ correct formulae ; correctly balanced ;	2
2(d)(i)	reactants on left and products on right ;	1
2(d)(ii)	activation energy ;	1
2(e)	(carbon dioxide is a greenhouse gas) so enhanced greenhouse effect / global warming / climate change / example of an effect of climate change ;	1

Question	Answer	Marks
3(a)(i)	(weight = $5000 \times 1.6 =$) 8000 (N) ;	1
3(a)(ii)	(work done =) force $\times$ distance = $15\,000 \times 500$; = 7 500 000 (J) ;	2
3(a)(iii)	(gravitational PE gained =) weight $\times$ height = 8000×500 ; = 4 000 000 (J) ;	2
3(a)(iv)	difference (7 500 000 J – 4 000 000 J = 3 500 000 J) = kinetic energy of the spacecraft ;	1
3(b)(i)	 reflections at first and second mirrors ; angles of reflection roughly 45° for both reflections, and emergent ray parallel to incident ray ;	2

Question	Answer	Marks
3(b)(ii)	distance travelled in $2.56 \text{ s} = 3.00 \times 10^5 \times 2.56 (= 7.68 \times 10^5 \text{ km for there and back again})$; (distance from the Earth to the Moon $(= \frac{1}{2} \times 7.68 \times 10^5) = 3.84 \times 10^5 \text{ km} / 384\,000 \text{ km}$;	2

Question	Answer	Marks
4(a)	<u>phototropism</u> ;	1
4(b)(i)	arrow drawn coming from the left towards the top of the shoot ;	1
4(b)(ii)	increases light intensity on shoot ; for photosynthesis ;	2
4(b)(iii)	cells C are, longer / elongated, in Fig. 4.2 ;	1
4(b)(iv)	more auxin present, in cells on the dark side / in cells C , in Fig. 4.2 ; auxin stimulates cell elongation ;	2
4(c)	<i>ticks placed in boxes next to:</i> increases the blood glucose concentration ; increases the pulse rate ;	2

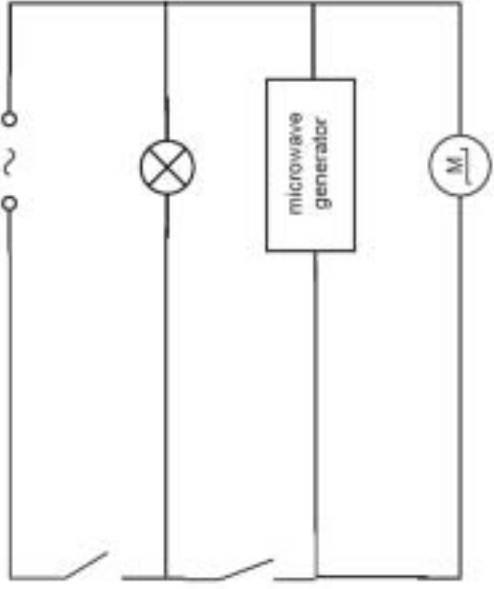
Question	Answer	Marks
5(a)	forms coloured compounds / has high melting point / has high density / catalyst ;	1
5(b)(i)	(to provide) energy ; (energy) needed, for work to be done against attractive forces / to break interatomic 'bonds' / for particles to break free from solid state ;	2

Question	Answer	Marks
5(b)(ii)	 two different atoms and semi-regular / most touching ;	1
5(c)(i)	iron oxide is reduced / iron oxide loses oxygen ; carbon monoxide is oxidised / carbon monoxide gains oxygen ;	2
5(c)(ii)	Fe_2O_3 ;	1
5(c)(iii)	magnesium is too reactive ; above carbon in reactivity series ;	2

Question	Answer	Marks
6(a)	X drawn anywhere on curve between 0 s and 3 s ;	1
6(b)(i)	(molecules) closer in solid / further apart in liquid ; the idea that the regular arrangement of molecules in solid means that molecules more efficiently packed / owtte ; or in liquid, random arrangement so molecules less efficiently packed / owtte ;	2
6(b)(ii)	slower in solid / faster in liquid ; in solid less (thermal / kinetic) energy / in liquid more (thermal / kinetic) energy ;	2
6(c)	(poor conductor – no mark) good conductors of electricity require free electrons ;	1

Question	Answer	Marks
7(a)	(first line) starch ; (second line) lipase and glycerol ; (third line) amino acids ;	3
7(b)	kills bacteria ; gives an acid pH for enzymes ;	2
7(c)(i)	77 (°C) ;	1
7(c)(ii)	no activity / reaction rate is reduced ; enzyme denatures / loss of 3D shape ; substrate no longer fits active site ;	3
7(c)(iii)	(enzyme) A and (reason) high / optimum, activity at body temperature ;	1

Question	Answer	Marks
8(a)(i)	(hydrogen ion) gains ; one electron ;	2
8(a)(ii)	(test) lighted splint ; (result) goes pop ;	2
8(a)(iii)	oxygen ;	1
8(b)	<i>any two from:</i> particles, move faster / have more kinetic energy / move more ; particles, collide more frequently / more energetically ; more of the collisions provide the activation energy ;	max 2
8(c)	magnesium oxide / magnesium carbonate / magnesium hydroxide ;	1

Question	Answer	Marks
9(a)	electrical (energy) ; (→) thermal (energy) ;	2
9(b)	$v = f\lambda$ so $\lambda = v/f = 3 \times 10^8 / 2.45 \times 10^9$; wavelength = 0.12 / 0.122 (m) ;	2
9(c)(i)	 a.c. mains symbol ; microwave generator in parallel with lamp and motor ; second switch in a position where it operates motor and microwave generator only ;	3
9(c)(ii)	(current = 0.1 + 2.5 + 0.2 =) 2.8 (A) ;	1
9(c)(iii)	Power = $V \times I = 230 \times 2.5$; = 575 ; watts / W ;	3