



Cambridge IGCSE™

COMBINED SCIENCE

0653/42

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 **11** printed pages.

Question	Answer	Marks
1(a)	<i>any two of the following correctly labelled:</i> chloroplast ; (large) vacuole ; cell wall ;	2
1(b)	(presence of) <u>cilia</u> ; move mucus ;	2
1(c)(i)	an organism that gets its energy by feeding on other organisms ;	1
1(c)(ii)	(tertiary consumers) foxes and frogs and owls ; (explanation) organisms are at the fourth trophic level ;	2
1(c)(iii)	(grass) → insects → spiders → frogs → foxes ;	1
1(c)(iv)	transfer of energy ;	1
1(d)	light (energy is transferred into) chemical (energy) ; chlorophyll ;	2

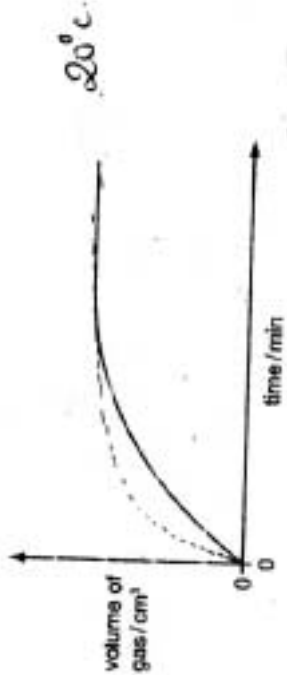
Question	Answer	Marks
2(a)(i)	A refinery gas B (gasoline) C (naphtha) D diesel oil E bitumen ; <i>all three correct for one mark</i>	1
2(a)(ii)	<i>any two from:</i> all gases ; similar boiling points ; small molecules ;	2
2(a)(iii)	feedstock for making chemicals ;	1

Question	Answer	Marks
2(b)(i)	family of compounds with, the same general formula ; similar chemical properties ;	2
2(b)(ii)	$C_6H_{12} + 8O_2 \rightarrow 5CO_2 + 6H_2O$ formula ; balancing ;	2

Question	Answer	Marks
3(a)(i)	(volume = $80 \times 2.0 \times 2.0 =$) 320 (m ³) ;	1
3(a)(ii)	mass (of sea water) = volume $\times$ density ; = 320×1030 (= 329 600 or 3.30×10^5 kg) ; weight (of sea water) = mass $\times$ gravitational field strength = 3.30×10^5 kg $\times$ 10 N / kg = 3 300 000 / 3.30×10^6 (N) ;	3
3(a)(iii)	pressure = force / area = 3 300 000 / 4 or 3 296 000 / 4 ; = 825 000 or 824 000 ; N/m ² or Pa ;	3
3(b)	straight line graph through origin ;	1

Question	Answer	Marks
4(a)(i)	(72 – 45 =) 27 (mm) ;	1
4(a)(ii)	the environment for stalk Y had a lower humidity than stalk X ; transpiration rate increases at lower humidity ; due to increased water vapour gradient ;	3
4(b)	xylem ;	1
4(c)(i)	needed to make amino acids ;	1

Question	Answer	Marks
4(c)(ii)	poor growth ;	1

Question	Answer	Marks
5(a)(i)	reactants on left and products on right ;	1
5(a)(ii)	activation energy correctly identified ;	1
5(b)(i)	 steeper ; finish at same volume ;	2
5(b)(ii)	particles move faster / have more kinetic energy / move more ; particles collide more frequently / more energetically ;	2
5(c)	carbon dioxide is a greenhouse gas ; (which contributes to) enhanced greenhouse effect / global warming / climate change ;	2
5(d)	magnesium / magnesium oxide / magnesium hydroxide ;	1

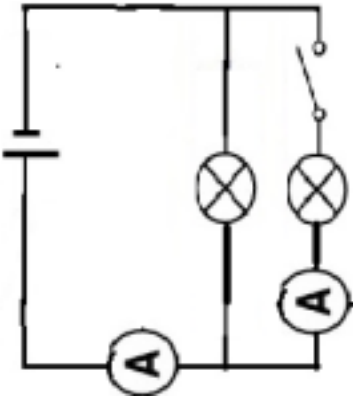
Question	Answer	Marks
6(a)(i)	<i>any two from:</i> increasing vibrations ; passed from atom to atom by collisions ; reference to role of free electrons ;	2

Question	Answer	Marks
6(a)(ii)	loss of (thermal) energy along the rod by, radiation / convection ;	1
6(b)(i)	infra-red ;	1
6(b)(ii)	rate of cooling increased ; shiny silvery – poor radiator / dull black – better radiator ;	2
6(c)(i)	$3 \times 10^8 \text{ m/s}$;	1
6(c)(ii)	time = $6 \times 10^7 \text{ km} \times 1000 \text{ (to convert to m)} / 3 \times 10^8$; = 200 (s) ;	2

Question	Answer	Marks
7(a)(i)	septum labelled ;	1
7(a)(ii)	<i>any four from:</i> (deoxygenated) blood enters (right) atrium from, vein A / vena cava) ; (right) atrium contracts and valve X opens ; blood flows into (right) ventricle ; (right) ventricle contracts and valve X closes ; blood flows into, B / pulmonary artery ; valve X prevents backflow of blood ;	4
7(b)(i)	less, oxygen / glucose supplied to heart muscle ; and any one from: reduces respiration in heart muscle ; reduces, ability / efficiency of contraction of heart muscle ;	2

Question	Answer	Marks
7(b)(ii)	<i>any two from:</i> - poor diet ; - stress ; - smoking ; - genetic predisposition ; (increasing risk with) age ; - sex / males more likely to get CHD ; - AVP, e.g. lack of exercise / overweight ;	2

Question	Answer	Marks
8(a)	forms coloured compounds ; has high melting point ; has high density ;	2
8(b)(i)	(charge) 2+ ; (explanation) 2+ to balance 2– on oxide ion ;	2
8(b)(ii)	carbon, above zinc in reactivity series / more reactive than zinc ;	1
8(c)(i)	energy needed, for work to be done against attractive forces / to break interatomic ‘bonds’ / for particles to break free, from solid state ;	1
8(c)(ii)	ions must be mobile ;	1
8(c)(iii)	(anode) chlorine ; (cathode) sodium ;	2

Question	Answer	Marks
9(a)	 correct circuit symbols for lamp and ammeter ; two lamps in parallel, ammeters in correct parts of circuit ; switch in lower branch / in series with ammeter 3 ;	3
9(b)	(ammeter 2 – no mark) total resistance in circuit 2 lower than in circuit 1 ; ammeter 2 in main circuit ;	2
9(c)(i)	0.7 V ;	1

Question	Answer	Marks
9(c)(ii)	$E = IVt = 2 \times 1.4 \times 300$; = 840 (J) ;	2
9(d)	combined resistance = $R_1 R_2 / (R_1 + R_2) = 0.49 / 1.4$; = 0.35 (Ω) ;	2