
COMBINED SCIENCE**0653/33**

Paper 3 Core Theory

May/June 2017

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.

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Question	Answer	Marks
1(a)	lines drawn from Enzymes to are biological catalysts ; are usually not active at low temperatures ; are protein molecules ;	3
1(b)	large / insoluble / food <u>molecules</u> are broken down ; into small / soluble molecules / so they can be absorbed ;	2
1(c)	glycogen ; starch ;	2
1(d)(i)	Benedict's (test) ; red colour produced ;	2
1(d)(ii)	no reaction ; because enzymes become inactive at high temperatures ;	2
1(e)	chlorophyll ; light ;	2

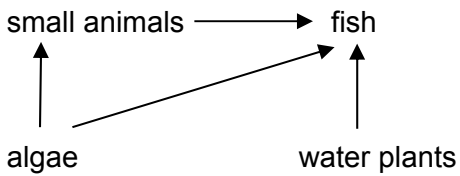
Question	Answer	Marks
2(a)(i)	potassium / K lithium / Li sodium / Na ; ;	2
2(a)(ii)	hydrogen / H ₂ ;	1
2(a)(iii)	turns blue and stays blue / no change ;	1
2(b)(i)	magnesium / Mg ;	1
2(b)(ii)	copper / Cu ;	1
2(b)(iii)	(too) dangerous / (risk of) explosion ;	1
2(c)(i)	resists corrosion / does not rust ;	1
2(c)(ii)	stronger / does not get damaged ;	1

Question	Answer	Marks										
3(a)(i)	<table border="1" data-bbox="846 245 1429 501"> <thead> <tr> <th data-bbox="846 245 1146 296">name of force</th> <th data-bbox="1146 245 1429 296">letter on Fig. 1.1</th> </tr> </thead> <tbody> <tr> <td data-bbox="846 296 1146 347">driving force</td> <td data-bbox="1146 296 1429 347">A</td> </tr> <tr> <td data-bbox="846 347 1146 399">frictional force</td> <td data-bbox="1146 347 1429 399">C</td> </tr> <tr> <td data-bbox="846 399 1146 450">lifting force</td> <td data-bbox="1146 399 1429 450">B</td> </tr> <tr> <td data-bbox="846 450 1146 501">weight</td> <td data-bbox="1146 450 1429 501">D</td> </tr> </tbody> </table> <p data-bbox="539 523 954 555">one mark for each two correct ;;</p>	name of force	letter on Fig. 1.1	driving force	A	frictional force	C	lifting force	B	weight	D	2
name of force	letter on Fig. 1.1											
driving force	A											
frictional force	C											
lifting force	B											
weight	D											
3(a)(ii)	(Force B is 500 000 N) no mark constant height; forces (B and D) are balanced ;	1										
3(a)(iii)	1. A / driving force ; 2. B / lifting force ;	2										
3(b)(i)	$600 \text{ km/h} = 600\,000 / 3600 \text{ m/s} = 167 \text{ m/s}$;	1										
3(b)(ii)	time (= distance / speed) = $2700 / 600 = 4.5 \text{ h}$	1										
3(c)	loss of kinetic energy ; loss of (gravitational) potential energy ;	2										
3(d)	any variation on this shape that goes from the origin to a maximum and returns to speed = 0 ; horizontal section at constant maximum speed ;	2										

Question	Answer	Marks
4(a)(i)	A closes and B opens ;	1
4(a)(ii)	to prevent backflow of blood ;	1
4(b)(i)	any suitable flight or fight situation described ;	1
4(b)(ii)	destroyed by the liver ;	1
4(c)	transport of oxygen / haemoglobin ; transport of blood cells / ions / soluble nutrients / named soluble nutrient / hormones / carbon dioxide ;	2

Question	Answer	Marks
5(a)(i)	Fractional distillation ;	1
5(a)(ii)	no new substance made / involves only changes of state ;	1
5(a)(iii)	cooking / heating allow bottling / bottled gas ;	1
5(b)(i)	methane ;	1
5(b)(ii)	(atoms) five / 5 and (elements) two / 2 ;	1
5(b)(iii)	C atom joined to 4 H atoms by single bonds ; allow correct dot-and-cross diagrams	1
5(c)	coal ;	1

Question	Answer	Marks							
6(a)(i)	conduction ;	1							
6(a)(ii)	insulation (in outer layer of aircraft) / make aircraft out of bad (thermal) conductor / owtte ;	1							
6(b)(i)	(Z – no mark) gas molecules far apart / not touching ;	1							
6(b)(ii)	ice / (frozen) water ; water from fuel combustion freezing / condensing in very cold air ;	2							
6(c)	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">gamma radiation</td> <td style="width: 20px;"></td> <td style="width: 20px;"></td> <td style="padding: 2px;">visible light</td> <td style="width: 20px;"></td> <td style="padding: 2px;">micro-waves ;</td> <td style="padding: 2px;">radio waves ;</td> </tr> </table>	gamma radiation			visible light		micro-waves ;	radio waves ;	2
gamma radiation			visible light		micro-waves ;	radio waves ;			
6(d)	(pitch) low ; (amplitude) (very) high ;	2							

Question	Answer	Marks
7(a)(i)	for <u>respiration</u> ;	1
7(a)(ii)	diffusion ;	1
7(a)(iii)	from the (water) plants ;	1
7(b)(i)	food web completed as shown ;  arrows in the correct direction ;	2
7(b)(ii)	small animals ; water plants / algae ;	2

Question	Answer	Marks
8(a)(i)	filtration ;	1
8(a)(ii)	kill microbes / sterilise (water) ;	1
8(a)(iii)	(damp)-litmus (paper) ; turns white / bleached ;	2
8(b)(i)	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">chlorine</div> <div style="margin: 0 10px;">+</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">hydrogen</div> <div style="margin: 0 10px;">→</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">hydrogen chloride</div> <div style="margin-left: 10px;">;</div> </div> <p>LHS either order</p>	1
8(b)(ii)	covalent ; share (pair of) electrons ;	2
8(b)(iii)	HCl ;	1
8(c)(i)	anode ;	1
8(c)(ii)	copper ;	1
8(c)(iii)	copper chloride solution / aqueous copper chloride ;	1

Question	Answer	Marks
9(a)	correct symbols for ammeter and lamp ; correct symbol for variable resistor ; all shown components connected in series, any order ;	3
9(b)	resistance = V / I ; (total resistance) = $2.4 / 0.6$ (= 4Ω) ; resistance of one lamp = 2Ω ;	3
9(c)	(increase – no mark) (total resistance less) so current increases ;	1