



CO-ORDINATED SCIENCES

0654/32

Paper 3 Theory (Core)

May/June 2017

MARK SCHEME

Maximum Mark: 120

Published

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

Question	Answer	Marks
1(a)(i)	B – stomach ; G – large intestine ;	2
1(a)(ii)	D ; F ;	2
1(b)	taking substances into the body ; through the mouth ;	2
1(c)	<pre> graph LR protease --> fats protease --> proteins lipase --> fats amylase --> starch fats --> fatty_acids["fatty acids and glycerol"] proteins --> glucose proteins --> amino_acids starch --> amino_acids </pre> <p style="text-align: right;">⋮</p>	3

Question	Answer	Marks
2(a)(i)	nucleus ;	1
2(a)(ii)	proton ; neutron ;	2
2(a)(iii)	atomic number / proton number / number of protons in one atom ;	1
2(a)(iv)	N / nitrogen ;	1
2(b)(i)	H ₂ O ₂ ;	1
2(b)(ii)	(anhydrous) cobalt chloride (paper) ; (blue to) pink ; or (anhydrous) copper(II) sulfate ; (white to) blue ;	2
2(c)	kills harmful microorganisms / sterilises the water ; make it safe to drink / avoid (waterborne) diseases / owtte ;	2

Question	Answer	Marks
3(a)(i)	iron ;	1
3(a)(ii)	copper ; (allow aluminium)	1
3(a)(iii)	uranium ;	1
3(a)(iv)	lead ;	1
3(b)	<u>temperature</u> at which (all of) a liquid turns to gas ;	1
3(c)(i)	gases take up all the space available ; gas particles free to move / constantly moving and hitting the lid ;	2
3(c)(ii)	force / weight ; area ;	2

Question	Answer	Marks
4(a)(i)	sweating ; vasodilation / more blood flows (close) to the surface of the skin ; hair lies flat ;	max 2
4(a)(ii)	vasoconstriction / more blood flows (close) to internal organs / away from skin ; hair stands on end ; reduction in sweating ;	max 2
4(b)(i)	speed up reactions ;	1
4(b)(ii)	pH / substrate concentration ;	1
4(c)	carbon, hydrogen, oxygen, nitrogen ;	1

Question	Answer	Marks								
5(a)(i)	parts of the flower labelled ;;;	3								
5(a)(ii)	<table border="1"> <thead> <tr> <th><i>part of flower</i></th> <th><i>function</i></th> </tr> </thead> <tbody> <tr> <td><i>ovary</i></td> <td>produces, ovules / female sex cells / female gametes</td> </tr> <tr> <td><i>petal</i></td> <td>attract insects</td> </tr> <tr> <td><i>sepal</i></td> <td>protects flower (bud)</td> </tr> </tbody> </table> ;;;	<i>part of flower</i>	<i>function</i>	<i>ovary</i>	produces, ovules / female sex cells / female gametes	<i>petal</i>	attract insects	<i>sepal</i>	protects flower (bud)	3
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5(b)	anther ; stigma ;	2								
5(c)	bees / wasps / flies / insects ;	1								

Question	Answer	Marks
6(a)	hydrocarbon and methane ;	1
6(b)	reference to release / build-up of carbon dioxide / carbon monoxide ; reference to dangers of poisoning / suffocation / death ;	2
6(c)(i)	(catalytic) cracking ;	1
6(c)(ii)	ethene molecules join together / form (long) chains ;	1
6(c)(iii)	no reaction ; no colour change / stays orange ;	1
6(d)(i)	iron ;	1
6(d)(ii)	air / oxygen ; water ;	2
6(d)(iii)	any reasonable source of damage / cause of paint removal ;	1

Question	Answer	Marks
7(a)(i)	no of waves / second ;	1
7(a)(ii)	piano ; highest frequency ;	2
7(a)(iii)	20 000 Hz and 20 Hz ;	1
7(b)	density = mass / volume ; = 1200 / 160 = 7.5 ; g / cm ³ ;	3
7(c)(i)	(named) electromagnetic wave / water waves ;	1
7(c)(ii)	transverse waves oscillate at right angles to direction of wave / energy transfer or longitudinal waves oscillate parallel to direction of wave / energy transfer ;	1
7(d)(i)	speed = distance / time ; = 150 / 0.5 = 300 (m / s) ;	2
7(d)(ii)	vibration of air molecules produced ;	1
7(e)(i)	angle of incidence correctly labelled ;	1
7(e)(ii)	40° ; angle of incidence = angle of reflection ;	2

Question	Answer	Marks															
8(a)	reference to release of carbon dioxide / carbon dioxide turns limewater milky ; carbon (more reactive than copper) so can remove/take oxygen from copper oxide / owtte ; carbon (less reactive than magnesium) so cannot remove / take oxygen from magnesium oxide / owtte ;	3															
8(b)(i)	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">solid reacts and dissolves</th> <th style="text-align: center;">gas given off</th> </tr> </thead> <tbody> <tr> <td>copper</td> <td style="text-align: center;">x</td> <td style="text-align: center;">x ;</td> </tr> <tr> <td>copper oxide</td> <td style="text-align: center;">✓</td> <td style="text-align: center;">x ;</td> </tr> <tr> <td>(magnesium</td> <td style="text-align: center;">✓</td> <td style="text-align: center;">✓)</td> </tr> <tr> <td>magnesium oxide</td> <td style="text-align: center;">✓</td> <td style="text-align: center;">x ;</td> </tr> </tbody> </table>		solid reacts and dissolves	gas given off	copper	x	x ;	copper oxide	✓	x ;	(magnesium	✓	✓)	magnesium oxide	✓	x ;	3
	solid reacts and dissolves	gas given off															
copper	x	x ;															
copper oxide	✓	x ;															
(magnesium	✓	✓)															
magnesium oxide	✓	x ;															
8(b)(ii)	magnesium chloride + hydrogen ;;	2															
8(b)(iii)	increases ; acidity decreases / acid is used up / acid concentration decreases ;	2															

Question	Answer	Marks
9(a)	252 km / h ;	1
9(b)(i)	diagonal line from 0, 70 ; to 60, 0 ;	2
9(b)(ii)	gravitational (potential) energy ;	1
9(b)(iii)	kinetic energy ;	1
9(b)(iv)	chemical energy ;	1

Question	Answer	Marks
10(a)	watt ;	1
10(b)(i)	melts ; when too much current passes through ;	2
10(b)(ii)	must be higher than 3A / not 3A fuse or else it will blow with normal current ; not 13A fuse as too much current could pass through / damage TV / be a fire risk ;	2
10(c)(i)	gamma to medical tracers microwaves to mobile phone communication X rays to airport security scanners ;;	2
10(c)(ii)	infra-red ;	1
10(d)	formula or $8 + 8$; $= 16 (\Omega)$;	2

Question	Answer	Marks
11(a)(i)	(heart rate) increases then decreases ; additional detail ;	2
11(a)(ii)	5 (minutes) ;	1
11(a)(iii)	5 (minutes) ;	1
11(b)(i)	glucose ;	1
11(b)(ii)	red blood cell ;	1
11(b)(iii)	<i>Accept any two from the following:</i> white blood cell platelets plasma AVP ;;	max 2

Question	Answer	Marks
12(a)(i)	electrolyte ;	1
12(a)(ii)	cathode ;	1
12(b)(i)	reference to formation of copper / a copper layer ;	1
12(b)(ii)	chlorine ; (damp) litmus / (Universal) indicator paper ; bleached ;	3
12(c)(i)	negative ; non-metals form anions / bromine atoms gain (an) electron ;	2
12(c)(ii)	the idea that there is only an electron difference ; electrons have no/negligible mass ;	2

Question	Answer	Marks
13(a)(i)	Sarah ;	1
13(a)(ii)	Jack / Amina / Zayn ;	1
13(a)(iii)	Mei / Ben ;	1
13(b)	(two or more) alternative forms of a gene ;	1
13(c)	parental gametes B, b, b, b ; offspring genotypes Bb, Bb, bb, bb ; phenotypic ratio 1 brown : 1 blue ;	3