



COMBINED SCIENCE

0653/61

Paper 6 Alternative to Practical

October/November 2017

MARK SCHEME

Maximum Mark: 60

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.

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Question	Answer	Marks
1(a)	Syringe / burette ;	1
1(b)	3 and 2 ;	1
1(c)	Axes labelled time and s (on y) concentration and % (on x) ; Suitable linear scale using at least half the grid ; all 4 points plotted correctly $\pm$ half small square ; Best fit line ;	4
1(d)	Decreasing <u>concentration</u> increases <u>time</u> ORA ;	1
1(e)(i)	All temps below 100 ; At least 3 below 50 must be above 0 ;	2
1(e)(ii)	two from: Volume of milk Same type of milk pH concentration of enzyme volume of enzyme volume of water	1

Question	Answer	Marks
2(a)(i)	T_1 21.5 ; T_2 34.0 ;	2
2(a)(ii)	(+) 12.5 ;	1
2(a)(iii)	exothermic ;	1
2(b)(i)	alkaline ;	1
2(b)(ii)	limewater / calcium hydroxide / $\text{Ca}(\text{OH})_2$;	1
2(b)(iii)	sodium hydroxide ;	1
2(c)	(H is) calcium (oxide) ; H + water gives limewater for CO_2 test / calcium oxide reacts exothermically with water / F must be calcium hydroxide / F is limewater ;	2
2(d)	chloride / Cl^- ;	1

Question	Answer	Marks
3(a)	1.4 ; 0.32 ;	2
3(b)(i)	to prevent wire getting hot / resistance of wire changing / cell running down ;	1
3(b)(ii)	ammeter shows a reading ;	1
3(c)(i)	W / watt(s) ;	1
3(c)(ii)	0.23 and 0.17; 2 decimal places ;	2
3(d)(i)	a straight line with a positive gradient ; through the origin ;	2
3(d)(ii)	(actual values used to show that (for example)), doubling I does not double P ;	1

Question	Answer	Marks
4(a)	Root hair ;	1
4(b)(i)	Quality drawing using at least half the box ; Nucleus correctly labelled ; Cell wall correctly labelled ;	3
4(b)(ii)	34 ± 1 ;	1
4(b)(iii)	Measurement to nearest mm ;	1
4(b)(iv)	Magnification correctly calculated ;	1
4(c)	Starch present ;	1
4(d)	select <u>anther</u> ; use a microscope to observe ;	2

Question	Answer	Marks
5(a)(i)	6.96 ; 6.85 ;	2
5(a)(ii)	0.49 and 0.49 ; + and – ;	2
5(b)	any two from: stays as blue ; mass changes are the same at the electrodes ; anode dissolves / copper ions from anode go into solution ;	2
5(c)(i)	(iron and copper) because copper dissolves from the anode / positive / plates on the cathode / negative ;	1
5(c)(ii)	copper sulfate (solution) ;	1
5(c)(iii)	smaller pink / orange / copper coloured blue / unchanged ;; all 3 correct = 2 marks; 1 or 2 correct = 1 mark	2

Question	Answer	Marks
6(a)(i)	correct position marked ;	1
6(a)(ii)	0.87 ;	1
6(a)(iii)	data to 2 sf / <u>large</u> variation in raw data ;	1
6(b)(i)	0.76, 0.98, 1.21 correct answers only ;	1
6(b)(ii)	plots correct to half a small square – at least 4 correct ; good best fit line judgement ;	2
6(b)(iii)	indication <u>on graph</u> of how data obtained AND at least half of line used ; correct calculation for triangle method using data from graph ;	2
6(c)(i)	correct answer from candidate's gradient value ;	1
6(c)(ii)	reduces percentage error in the time / reduces the <u>effect</u> of (human) reaction error ;	1



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Question	Answer	Marks
1(a)	quality of drawing ; larger than original ; root and stem correctly labelled ;	3
1(b)(i)	14 ± 1 ;	1
1(b)(ii)	correct measurement (in mm) ;	1
1(b)(iii)	magnification correctly calculated and rounded correctly ;	1
1(c)(i)	(placed in a suitable container with) water ; kept in a warm place ;	2
1(c)(ii)	protein ; starch ;	2

Question	Answer	Marks
2(a)(i)	Different coloured ppts. ; same coloured ppts. as NaOH or ammonia ;	2
2(a)(ii)	(add H to) iron(II) sulfate (solution) ;	1
2(a)(iii)	add aqueous sodium hydroxide (and heat) ; (in gas) red litmus turns blue / pungent smell ;	2
2(b)(i)	add (dil) HCl or (dil) nitric acid ; bubbles / effervescence ;	2

Question	Answer	Marks
2(b)(ii)	test-tube / flask connected to test-tube / beaker with delivery tube ; limewater in correct place labelled ;	2
2(b)(iii)	(limewater goes) milky / white ppt. ;	1

Question	Answer	Marks
3(a)(i)	89. <u>0</u> ;	1
3(a)(ii)	92.5 ;	1
3(b)(i)	s / second / sec and °C ;	1
3(b)(ii)	30, 60, 90, 120, 150, 180 ;	1
3(c)	to allow maximum temperature of hot water to be recorded / let thermometer get to temperature of water / beakers owtte ;	1
3(d)	rate of temperature drop greater at start / wtte ;	1
3(e)	use of table results (e.g. 89 to 80 and 92.5 to 76) ; reference to temperature changes <u>in the same time / same time specified</u> ;	2
3(f)	Any two from: room temperature / initial water temperature / same volumes of water / keep thermometer the same depth ;;	2

Question	Answer	Marks
4(a)(i)	1.5 and 4.9 ;	1
4(a)(ii)	3.4 3.2 3.0 all 3 correct is 2 marks ;; 1 or 2 correct is 1 mark	2
4(a)(iii)	Low 0.16 and High 0.32	1
4(a)(iv)	Increase in temperature increases rate / ORA ;	1
4(b)	Any two from: Identify anomalies / more reliable / average is more accurate ;;	2
4(c)(i)	transpiration ;	1
4(c)(ii)	Water stored or produced or used by plant ;	1
4(d)	(reduced) because surface area reduced / fewer stomata / less evaporation of water / less transpiration AW ;	1

Question	Answer	Marks
5(a)(i)	sulfuric ;	1
5(a)(ii)	added solid does not dissolve / no more bubbles ;	1
5(a)(iii)	(blue) litmus ; does not go red ;	2
5(b)(i)	funnel with filter paper drawn ; (excess) copper carbonate and filtrate / copper sulfate labelled ;	2

Question	Answer	Marks
5(b)(ii)	insoluble (in water) ;	1
5(c)	to avoid dehydration / to avoid decomposition ;	1
5(d)(i)	sodium hydroxide is soluble ;	1
5(d)(ii)	use an indicator for neutralisation ;	1

Question	Answer	Marks
6(a)	66.2 ;;	2
6(b)	6.2 and 9.0 ;	1
6(c)(i)	suitable choice of scales ($\geq$ half the grid used) ; plots correct to half a small square, at least 4 correct ; good best fit line judgement ;	3
6(c)(ii)	indication <u>on graph</u> of how data obtained AND at least half of line used ; correct calculation for triangle method using data from graph ;	2
6(c)(iii)	correct answer using candidate's gradient ;	1
6(d)	rule will not balance / balance point is off the scale of the rule ;	1



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Cambridge International General Certificate of Secondary Education

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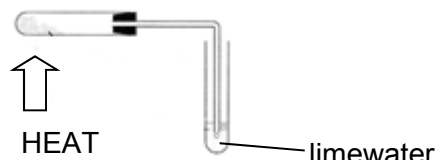
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Question	Answer	Marks
1(a)(i)	Axes correctly labelled: surface area and cm² and distance / d and cm ; Suitable linear scale using at least half the grid ; All 4 points plotted correctly $\pm$ half small square ; Best fit straight line through origin ;	4
1(a)(ii)	More enzyme, faster reaction ORA ;	1
1(a)(iii)	Correct reading from graph ; Lines on graph to show working ;	2
1(b)	Any two from temperature ; pH ; pieces from same potato ; concentration of peroxide ;	2
1(c)	Glowing splint and relights ;	1

Question	Answer	Marks						
2(a)(i)	 apparatus ; H or limewater label and 'HEAT' ;	2						
2(a)(ii)	to prevent suckback / to stop cold liquid hitting hot solid / to prevent glassware cracking ;	1						
2(a)(iii)	carbon dioxide (gas) ;	1						
2(a)(iv)	H is a carbonate ;	1						
2(a)(v)	zinc carbonate / ZnCO_3 ;	1						
2(b)(i)	white ;	1						
2(b)(ii)	(white) ppt ;	1						
2(c)(i)	<table border="1"><thead><tr><th>(test / reagent)</th><th>(observation)</th></tr></thead><tbody><tr><td>barium nitrate solution</td><td>no reaction</td></tr><tr><td>silver nitrate solution</td><td>yellow ppt.</td></tr></tbody></table> ;	(test / reagent)	(observation)	barium nitrate solution	no reaction	silver nitrate solution	yellow ppt.	1
(test / reagent)	(observation)							
barium nitrate solution	no reaction							
silver nitrate solution	yellow ppt.							
2(c)(ii)	iodide / I^- / not sulfate / not SO_4^{2-} / not chloride / not Cl^- / not bromide / not Br^- ;	1						

Question	Answer	Marks
3(a)(i)	59.8 (cm) ;	1
3(a)(ii)	29.8 (cm) ;	1
3(a)(iii)	1. <u>0</u> and 1.7 ;	1
3(a)(iv)	2.0 and 2.7 ;	1
3(b)(i)	plots correct to half a small square, at least 4 correct ; good best fit line judgement ;	2
3(b)(ii)	indication <u>on graph</u> of how data obtained AND at least half of line used ; correct calculation for triangle method using data from graph ;	2
3(b)(iii)	$(15.0 \pm 1.0) \text{ } 2 / 3 \text{ s.f. only ;}$	1
3(c)	any one from move screen slowly to / fro until sharpest focus obtained ; object / lens / screen perpendicular to bench ; object and lens same height above the bench ; carry out experiment away from other bright light sources / darkened room ;	1

Question	Answer	Marks
4(a)	(Placed in a suitable dish with) water ; (Kept in a) warm (place) / suitable temperature ;	2
4(b)	shorter shoot in A ; taller shoot in C ;	2
4(c)	Heat ; Benedicts solution ; Yellow / green / orange / red ;	3
4(d)	Lighting from one side ; Control – even light / in the dark ; More than one seedling (in each condition) ;	3

Question	Answer	Marks
5(a)(i)	alkali / hydroxide ion / OH^- ;	1
5(a)(ii)	green and ppt. ;	1
5(a)(iii)	aqueous Fe^{3+} / dissolve / react with acid ; add (excess) sodium hydroxide solution / ammonia solution ; red-brown and ppt. ;	3
5(b)(i)	oil on top label ; boiled water label ;	2
5(b)(ii)	all nails made of iron / steel ;	1
5(c)	need to show that water alone does not cause rusting as in L ; need to show that air alone does not cause rusting as in J ;	2

Question	Answer	Marks
6(a)(i)	4.2 ; 13.0 ;	2
6(a)(ii)	1,4,6,8 ; all use brick / same block ; all have different surfaces / all surfaces ;	3
6(a)(iii)	sand carpet wood glass ;	1
6(b)	difficult to judge the first pull / accuracy / minimise errors / lessens effects of anomalies AVP ;	1
6(c)	would be difficult to stop / slip / slide etc. ;	1
6(d)	sand / gravel / very rough tarmac ; high resistance to movement / would slow / stop car quickest / big(gest) resisting force / large(st) friction ;	2