



COMBINED SCIENCE

0653/61

Paper 6 Alternative to Practical

October/November 2018

MARK SCHEME

Maximum Mark: 60

Published

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This document consists of **9** printed pages.

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GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
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GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

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Question	Answer	Marks
1(a)(i)	smooth continuous outline ; bigger than original ; correct number of spikes ;	3
1(a)(ii)	50 ;	1
1(a)(iii)	(correct placement of AB on drawing and) line and measured to nearest mm ;	1
1(a)(iv)	correct calculation ;	1
1(b)(i)	heat in alcohol / water ; alcohol ; iodine solution ;	3
1(b)(ii)	blue-black;	1

Question	Answer	Marks
2(a)(i)	1°C ;	1
2(a)(ii)	35.5 ;	1
2(a)(iii)	temperature could have been higher between readings / do not know where peak really is ;	1
2(a)(iv)	take more frequent readings / plot a graph and draw best-fit line ;	1
2(b)(i)	use $25 \times 4.2 \times \text{(a)(ii)}$ = value ; correct answer to 2 sf = 3700 ;	2
2(b)(ii)	insulation around cup / lid ; less heat lost to surroundings ;	2
2(c)	add ammonia solution ; blue ppt (soluble in excess) / dark blue solution ; OR sodium hydroxide solution ; blue ppt.(insoluble in excess) ;	max 2

Question	Answer	Marks
3(a)	55 mm ;	1
3(b)	$l_1 = 137$ mm and $e = 82$ mm ;	1
3(c)	0.44 ;	1
3(d)(i)	suitable choice of scales ($\geq$ half the grid used) and starting at 0,0 ; 3 plots correct to half a small square ;	2
3(d)(ii)	good best-fit line judgement ;	1
3(d)(iii)	indication on graph of how data were obtained AND more than half the line used ; correct calculation ;	2
3(d)(iv)	correct calculation of g ;	1
3(e)	view perpendicularly to rule / scale / equivalent; rule close to spring ; use of fiducial marker;	1

Question	Answer	Marks
4(a)(i)	3.4 ; 7.9 ;	2
4(a)(ii)	3.4 ;	1
4(a)(iii)	0.11 ;	1
4(b)	oxygen used up ; carbon dioxide made removed (by soda lime) ;	2
4(c)	prevent air entering / allows bubble to move / to make apparatus airtight ; provide air / oxygen (for maggots) / freeze final bubble position AW ;	2
4(d)	<i>any two from</i> temperature ; number of maggots ; mass of maggots ; (same) maggots ;	max 2

Question	Answer	Marks
5(a)	measuring cylinder / burette / pipette ;	1
5(b)	beaker and liquid and on tripod and heat ; 3 correct labels ;	2
5(c)	black powder in beaker / undissolved solid in beaker / solid in beaker ;	1
5(d)	2 of filter paper / funnel / (evaporating) basin labelled ; copper oxide / residue AND copper sulfate (solution) / filtrate labelled ;	2
5(e)	to form crystals / not to form powder / so doesn't decompose ;	1
5(f)	used excess copper oxide / wash (well) with (ice cold) distilled water ;	1
5(g)	so the crystals don't dissolve / only small amount crystals dissolve ;	1
5(h)	water ;	1

Question	Answer	Marks
6(a)(i)	96.5 ;	1
6(a)(ii)	94.6 ;	1
6(b)(i)	both axes labelled with units ; minimum 5 plots correct ;	2
6(b)(ii)	point at 8% circled ;	1
6(b)(iii)	best-fit line AND not including anomaly ;	1
6(c)	answer from their line in (b)(iii) AND this marked on graph ;	1
6(d)	repeat values and average / repeat to identify anomalies / repeat values to reduce effect of errors / thinner measuring cylinder ;	1
6(e)	difficult to get exactly 100 cm ³ ;	1
6(f)	bubbles take up volume / amount bubbles vary / bubbles change mass / difficult to measure volume ;	1



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Question	Answer	Marks
1(a)	Benedict's (solution) ;	1
1(b)	A contains protein <u>and</u> starch ; B contains reducing sugar ; C contains starch ;	3
1(c)	wear goggles because of hot water / chemicals / named substance / (named) solutions/splashes ;	1
1(d)	ethanol / alcohol ; water <u>and</u> white emulsion ;	2
1(e)(i)	<i>any two from</i> volume of Benedict's ; mass / volume of food ; concentration of food ; time in water bath / left for same time ; temperature of water bath ;	max 2
1(e)(ii)	yellow / green indicates less (concentrated) OR orange / red indicates more (concentrated) ;	1

Question	Answer	Marks
2(a)(i)	2 test-tubes connected by delivery tube ; limewater and metal carbonate in correct places ;	2
2(a)(ii)	to avoid suck-back ;	1
2(a)(iii)	01:05 ;	1
2(b)(i)	carbon dioxide / CO ₂ ;	1
2(b)(ii)	(fastest) copper carbonate zinc carbonate (slowest) magnesium carbonate ;	1
2(b)(iii)	the more reactive the metal the slower the rate of thermal decomposition ;	1
2(c)	measure volume of gas / height of foam / foam to top of test-tube ; in a certain time ; suitable diagram showing what replaces limewater test-tube ;	3

Question	Answer	Marks
3(a)(i)	A and W ;	1
3(a)(ii)	0.15 (V) ;	1
3(a)(iii)	0.03 (W) ;	1
3(b)	so that wire does not become hot / resistance of wire might change / cell or battery may run down ;	1
3(c)(i)	axes labelled with units ; suitable choice of scales $\geq$ half the grid used ; plots correct to half a small square ;	3
3(c)(ii)	good best-fit line judgement ;	1
3(d)	(directly) proportional ; straight line through the origin ;	2

Question	Answer	Marks
4(a)	red blood cell labelled R and white blood cell labelled W ;	1
4(b)(i)	clear and continuous single outline ; nucleus lobes ; larger than original ;	3
4(b)(ii)	Correct magnification (width of cell in drawing in mm / 35) ;	1
4(c)(i)	203 ;	1
4(c)(ii)	rest before taking pulse (minimum 1 minute) ; pulse taken on suitable location on body ; count beats / pulse ; specified time ; rate = beats divided by time / multiply correctly to give beats / min (e.g. beats in 10 seconds × 6 to give bpm) ; takes it several times until similar / repeat to check ;	max 4

Question	Answer	Marks
5(a)(i)	below the level of the pencil line ;	1
5(a)(ii)	so will not run in the ethanol / will not interfere with inks / will not move / will not mix ;	1
5(a)(iii)	fire risk / flammable ethanol / stop (solvent) evaporating ;	1
5(b)(i)	3 ;	1
5(b)(ii)	red and blue and 1 other colour ; spots line up with each other / same R_f value ;	2
5(c)(i)	black ink dissolves in ethanol / does not dissolve in water ;	1
5(c)(ii)	inks spread out (more) / easier to tell the difference between the spots / errors in measurement are less ;	1
5(d)	dissolve colour from sweet into ethanol / water ; run chromatogram of sweet and red ink / black ink ;	2

Question	Answer	Marks
6(a)	measure the height of one stair <u>and</u> multiply by the number of stairs ;	1
6(b)(i)	student gets more tired / fatigued ;	1
6(b)(ii)	$(2.07 + 2.13 + 2.25 + 2.37) / 4$; 2.21 (s) ;	2
6(c)(i)	460 (N) ;	1
6(c)(ii)	to obtain a steady reading ;	1
6(c)(iii)	to avoid parallax error ;	1
6(d)(i)	1288 (J) ;	1
6(d)(ii)	583 (W) ;	1
6(e)	second student's power is less because same work done in more time ;	1



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1(a)(i)	smooth continuous outline; larger than original drawing ; anther and filament clearly visible ; stigma and style clearly visible ;	4
1(a)(ii)	petal correctly labelled ; stigma correctly labelled ; anther correctly labelled ;	3
1(b)(i)	ethanol ; water and white emulsion ;	2
1(b)(ii)	opaque so masks observation ;	1

Question	Answer	Marks
2(a)(i)	filter funnel, paper and test-tube drawn ; at least two of funnel, paper and test-tube labelled ; positions of residue and filtrate correctly labelled ;	3
2(a)(ii)	so no impurities introduced / so no other ions introduced ;	1
2(b)	Cu^{2+} / copper(II) / copper ion ;	1
2(c)(i)	no ppt. / no reaction / remains colourless / no change ; blue / stays blue / no change AND (red goes) blue ;	2
2(c)(ii)	ammonia solution gives off ammonia gas (under all circumstances) ;	1
2(c)(iii)	(nitric) not CO_3^{2-} / not carbonate ; (barium nitrate) SO_4^{2-} / sulfate ;	2

Question	Answer	Marks
3(a)(i)	60.5 °C ;	1
3(a)(ii)	to give the thermometer time to react / to record the highest temperature reached ;	1
3(a)(iii)	<i>any two from</i> read perpendicular to scale ; stir (before reading) ; place clock close to test tube ; keep thermometer at same level ; keep the thermometer in the water ;	max 2
3(b)(i)	s and °C and °C ;	1
3(b)(ii)	33.5 (°C), 22.5(°C) ;	1
3(c)	Faster rate of cooling / more cooling / loses more heat / loses more temperature in cold surroundings ; bigger temperature drop in the same time / reference to data with time ;	2
3(d)	improvement: use measuring cylinder to measure water poured into test-tube / mark the test-tube ; reason: to compare equal volumes / amounts of water each time / amount of water affect cooling ; improvement: same volume of water ; reason; same surface area / different rates of cooling of different volumes / amount of water affect cooling ;	2

Question	Answer	Marks
4(a)(i)	2 1 3 2 ;	1
4(a)(ii)	1 ;	1
4(b)	axes labelled ; linear vertical axis <u>and</u> using more than half the grid ; bars correct height $\pm$ half a square ; same width bars ;	4
4(c)(i)	damp and dark ;	1
4(c)(ii)	all placed in the centre / two in each section / randomly ;	1
4(c)(iii)	<i>any two from</i> leave longer than 15 minutes ; use more woodlice ; repeat more times ;	max 2

Question	Answer	Marks
5(a)(i)	anhydrous / white copper sulfate ; turns blue ;	2
5(a)(ii)	to condense any water vapour ;	1
5(b)(i)	delivery tube under level of limewater in the bottle ;	1
5(b)(ii)	white ppt. / milky ;	1
5(c)	do not agree (no mark) cannot be sure of complete combustion / burns in air not oxygen / incomplete combustion ; other gases may have been produced / CO / gas goes to pump ; carbon may be produced ; there are only two tests ;	max 2
5(d)	water condenses in limewater and never reaches U-tube / water condensing in U-tube could have come from limewater ;	1
5(e)	to show that little or no water comes from the air / to show that little or no carbon dioxide comes from the air / to show that the carbon dioxide and water come from the burning ;	1
5(f)	soot / carbon ;	1

Question	Answer	Marks
6(a)	60 ;	1
6(b)	8.2 ;	1
6(c)(i)	both axes labelled with units ; linear scale covering $\geq 1/2$ paper ; minimum 4 plots correct, $\pm 1/2$ square ;	3
6(c)(ii)	straight line of best-fit ;	1
6(d)	correct value from their graph AND shown on graph ;	1
6(e)(i)	(increases) less %age error on a larger distance ;	1
6(e)(ii)	wider tank ;	1
6(f)	too little change / d small / d small range ;	1