



COMBINED SCIENCE

0653/61

Paper 6 Alternative to Practical

May/June 2019

MARK SCHEME

Maximum Mark: 40

Published

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GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

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- 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:

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GENERIC MARKING PRINCIPLE 4:

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Question	Answer	Marks
1(a)(i)	fills more than 50% of space ; Continuous, smooth line around outside of apple shape and two pips in the core ;	2
1(a)(ii)	photograph 54–58 (mm) ;	1
1(a)(iii)	correct calculation for magnification (drawing over photograph) ;	1
1(b)	Benedicts ; heat (with Benedicts) ; (independent) orange / (brick) red / yellow / green ;	3

Question	Answer	Marks
2	1 apparatus lamp / sunlight / light source ; apparatus for collecting gas ; stop-clock / timer ; 2 method and variables change brightness of light / change distance (from lamp) ; same amount of time (at each brightness) ; repeat experiment at each brightness ; control length elodea / control volume of water ; control temperature / carbon dioxide / pH ; stated safety precaution linked to apparatus ; 3 measurements measure distance / intensity of light ; measure volume of gas / count bubbles ; 4 processing results and make conclusion calculate rate as volume / number of bubbles per unit time ; idea of looking for relationship between rate / volume / number of bubbles and intensity / brightness / distance ; graph of rate / volume / number of bubbles against intensity / brightness / distance ;	7

Question	Answer	Marks
3(a)	33.5 ; 55.0 ;	2
3(b)(i)	linear scale more than half grid ; at least 6 points correctly plotted $\pm \frac{1}{2}$ a small square ;	2
3(b)(ii)	2 straight lines drawn with ruler, through all points and meet in a cross ;	1
3(b)(iii)	maximum T from their graph ;	1
3(c)	same as (b)(iii) ;	1
3(d)(i)	43.5 ;	1
3(d)(ii)	lines labelled magnesium and zinc ; 2 straight lines drawn with ruler, through all points and meet in a cross and temperature ;	2
3(e)	magnesium is more reactive (than zinc) ;	1
3(f)(i)	burette / pipette ;	1
3(f)(ii)	<i>any 1 from</i> lid AND reduces heat loss ; insulate cup AND reduce heat loss ;	max 1

Question	Answer	Marks
4(a)(i)	78.0 (cm ³) ;	1
4(a)(ii)	read perpendicular to the scale ;	1
4(a)(iii)	86.69 (g) ;	1
4(a)(iv)	1.11(1) g / cm ³ ; 2 or 3 sig. figs and must be correctly rounded ;	2
4(b)(i)	15.83 (g) ;	1
4(b)(ii)	24 / 23.7 / 23.66 ;	1
4(b)(iii)	0.67 g / cm ³ ;	1
4(b)(iv)	5.6 cm ;	1
4(b)(v)	1.4 g / cm ³ ;	1
4(c)	(expect no) answer values too far apart OWTTE	1
4(d)(i)	test-tube is curved at the bottom	1
4(d)(ii)	<i>mark as a pair</i> volume too high and density too low ;	1



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Question	Answer	Marks
1(a)(i)	as a control / to compare (with enzyme) ;	1
1(a)(ii)	temperature / mass/amount of apple / pH / volume/amount added / surface area of pieces/size of pieces ;;	2
1(b)(i)	<i>any three from:</i> funnel ; filter / filtration paper in funnel with 'V' at bottom ; collection of juice ; at least any two labels;	max 3
1(b)(ii)	24.0 and 18.5 ;	1

Question	Answer	Marks
2	1 apparatus potometer / balance / shoot in water ; stop-clock ; suitable container / bell jar / bag / box (to contain moist air) ; 2 method plant in different levels of moisture ; same amount of time ; repeat experiment at each level of moisture ; safety linked to apparatus / hygiene / procedure ; 3 control of variables control size / type of plant / number / surface area / size of leaves ; control wind / temperature / (sun)light ; control amount of water given to plant ; 4 measurements, processing and use of results (dependent variable is) movement of water / bubble / meniscus in potometer / weight loss of leaves / weigh plant or leaves before and after ; measure humidity ; calculate rate of water loss / transpiration / mass lost per unit time ; graph of mass lost against humidity ; compare e.g. mass / water lost in dry and humid / compare mass at different humidities ;	7

Question	Answer	Marks
3(a)	10 ; 34 ;	2
3(b)(i)	axes labelled with units ; linear scale more than half grid ; at least 5 points plotted correctly to within half a small square ;	3
3(b)(ii)	10 circled and too little / impure sodium sulfate ;	1
3(b)(iii)	(straight) line not including the anomalous point ;	1
3(b)(iv)	as volume / amount increases (height of)ppt increases OR / (directly) proportional ;	1
3(b)(v)	value from graph(to nearest half square) and indication on graph ;	1
3(b)(vi)	increases and stops / no further increase / stays at 36 / the same ; reagent(s) (all)used up / reaction finished / sodium sulphate now in excess ;	2
3(c)	<i>any 2 from:</i> volumes with burette / syringe and difficult to judge / read OR with mc ; ruler without dead space and difficult to get actual length due to the dead space (so had to pick up tube and not level etc.) ; leave to settle longer and some ppt was still suspended / solution above ppt not colourless / clear OR shake / magnetic stirrer to avoid loss of solid on withdrawn glass rod ; repeat and reduces errors / spots anomalies ; AVP ;	max 2

Question	Answer	Marks
4(a)(i)	place empty measuring cylinder on balance AND tare / zero ; fill to 100 ml and find new mass ; or find mass of empty and filled measuring cylinder ; subtract ;	2
4(a)(ii)	14.5 (°C) ;;	2
4(a)(iii)	21.51 (g) ;	1
4(b)(i)	ensures all water at same temperature OWTTE ORA ;	1
4(b)(ii)	otherwise you will be measuring both water / melted ice and ice / presence of water / melted ice makes mass / it inaccurate OWTTE ;	1
4(c)(i)	7.5 (°C) ;	1
4(c)(ii)	correct calculation ; $(100.05 \times 4.2 \times 7.5)$ 3200 (J) answer to 2 sig figs ;	2
4(d)(i)	11.56 (g) $(21.51 - 9.95)$;	1
4(d)(ii)	3860 (J) (11.56×334) ;	1
4(e)	(energy has come from) the glass / (surrounding) air	1



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Question	Answer	Marks
1(a)(i)	arrow(s) down / into and up / out of limewater or test-tube B ;	1
1(a)(ii)	milky / cloudy / white precipitate ;	1
1(a)(iii)	hydrogencarbonate ;	1
1(a)(iv)	sterilise mouth piece / avoid sucking up limewater / don't inhale/breathe in / breathe into the tube gently ;	1
1(b)(i)	relights glowing splint ;	1
1(b)(ii)	20–15 / = 5 ; ÷ 20 × 100 = 25(%) ;	2

Question	Answer	Marks
2(a)	measure pulse per unit time / description of taking pulse / heart rate monitor / smart watch or named brand ;	1
2(b)	At least one from each: apparatus stop watch ; method and variables method of exercise ; fixed timed intervals to measure heart rate after exercise ; repeats (the same procedure) (to find an average) ; (controlled variable) same person / control intensity of exercise e.g. same duration / same distance to run ; safety, eg running shoes so don't slip / awareness of asthma or injury ; measurements and processing and use of results pulse rate taken (at rest) before (and after exercise) ; pulse rate taken in 10s and multiplied by 6 / AW ; measure time between <u>end of exercise</u> and to return to normal pulse rate ; graph of time v pulse rate – read off when back to resting ;	6

Question	Answer	Marks
3(a)(i)	beaker / container of water ; delivery tube leads gas to upturned measuring cylinder in water with labels ;	2
3(a)(ii)	use a (gas) syringe ;	1
3(a)(iii)	86. <u>5</u> ; 93. <u>0</u> ;	2
3(b)(i)	axes labelled with units ; linear scale more than half grid ; at least 4 points plotted correctly to within half a small square ;	3
3(b)(ii)	continuous curve through points ;	1
3(c)	finishes / stops / no more CO ₂ made / CO ₂ stays the same and one or both reagents have run out ;	1
3(d)	line steeper (to the left) ; line continues or ends higher ;	2
3(e)	calcium sulfate coats the marble chips / stop acid reaching marble chips ;	1

Question	Answer	Marks
4(a)(i)	rubber ;	1
4(a)(ii)	rubber ;	1
4(a)(iii)	lead copper aluminium ;	1
4(a)(iv)	as density increases speed of sound decreases / the higher the density the slower the sound / ORA ;	1
4(b)(i)	58.91 – 42.65 / idea of subtracting mass of empty measuring cylinder ; 16.26 (g) ;	2
4(b)(ii)	make sure that the measuring cylinder is dry before measuring its mass / measure the mass (of the cylinder) before putting the water in ;	1
4(b)(iii)	16.5 ;	1
4(b)(iv)	0.985 / 0.99 (g / cm ³) ;;	2
4(b)(v)	((b)(iv) ÷ 1000 =) 0.000985 (kg / cm ³)	1
4(b)(vi)	((b)(v) × 1000 000 =) 985 (kg / m ³)	1
4(c)	yes (they are within limits of experimental accuracy) because values are close together OWTTE	1