CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 series

0654 CO-ORDINATED SCIENCES

0654/63 Paper 6 (Alternative to Practical), maximum raw mark 60

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.

Cambridge will not enter into discussions about these mark schemes.

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1 **(a)** <u>minutes</u> ; [1]

(b) axes labelled with units; temperature / °C **and** time / mins ;
correct plots for set **A** ± half square ;
correct plots for set **B** ± half square *(allow 1 incorrect per set)* ;
two best-fit curves ; [4]

(c) large test-tubes cooled more slowly / retained heat ;
prevents penguins getting too cold / helps body temperature to be maintained ; [2]

(d) **(i)** water cooler at start in last tube poured / can't read both thermometers at the same time / only measures temperature in one tube in **A** ; [max 1]

(ii) do each set separately / have two people reading the thermometers / read all three tubes and average ; [max 1]

(e) repeat the experiment ; [1]

[Total 10]

2 **(a)** **(i)** 43 ;
32.5 ;
29.5 ; [3]

(ii) 23, 12.5, 8.<u>0</u> *(all required for mark)* ; [1]

(b) **(i)** the temperature changes get less as volume of **X** increases ; [1]

(ii) **X** reacts with copper sulfate / some copper sulfate is removed from the solution ;
less copper sulfate to <u>react</u> with zinc / less heat produced ; [2]

(c) sodium hydroxide / potassium hydroxide / sodium carbonate / potassium carbonate ; [1]

(d) plastic absorbs less heat (than glass) / more accurate temperature change / reduces heat losses / better insulation ; [max 1]

(e) to keep the volume constant for a fair comparison of the temperature rise / owtte ;
solution **X** is the only variable ;
fair test ; [max 1]

[Total: 10]

3	**(a)**	**(i)**	1.5 cm (± 0.1 cm) ;	[1]
		(ii)	light rays cannot bend (so part of the screen is not lit) / the object blocks the light ;	[1]
	(b)		*(d = 15 cm):* 6.1 ± 0.1 ; *(must have 1dp)* *(d = 25 cm):* 3.8 ± 0.1 ; *(must have 1dp)*	[2]
	(c)	**(i)**	points correctly plotted ± ½ small square *(allow 1 error)* (ecf) ; smooth curve drawn ;	[2]
		(ii)	H_{30} **or** suitable line marked on the graph ; equation used correctly ;	[2]
	(d)	**(i)**	*h* correctly read from candidate's extrapolation at *d* = 10 cm ;	[1]
		(ii)	shadow will not fit on screen / will become blurred ;	[1]
				[Total: 10]
4	**(a)**		control ;	[1]
	(b)	**(i)&(ii)**	4.3 (cm) for **A** ; 2.9 (cm) for **B** ; 0.1 (cm) for **A and** 3.1 (cm) for **B** ;	[3]
	(c)	**(i)**	may have cooled / warmed slightly ;	[1]
		(ii)	(use a) water-bath ;	[1]
	(d)		organisms use up oxygen (in flask) ; in respiration ; carbon dioxide produced absorbed (by soda lime) ;	[3]
	(e)		oil drop travels further (to left) / faster / AW ;	[1]
				[Total 10]

5 **(a)** **(i)** 80 (cm^3) ;
125 (cm^3) ; [2]

(ii) both points plotted correctly ± ½ square ;
smooth curve drawn ;
beginning at the origin ± ½ or 1 square ; [3]

(b) hydrogen does not dissolve in water / does not react with water ; [1]

(c) the reaction slows ;
as reactant used up / gets less concentrated ;
less (frequent) collisions ;
and stops (when level) / no more H_2 produced ; [max 3]

(d) zinc is less reactive / zinc pieces have lower surface area / pieces of zinc are larger / ORA ; [max 1]

[Total: 10]

6 **(a)** 74, 78 (cm^3)
36, 54 (°C) ;;
all 4 correct 2 marks, 3 or 2 correct 1 mark [max 2]

(b) **(i)** so that the syringe / gas are at the same temperature as the water / owtte ; [1]

(ii) add ice to water / put in freezer ; [1]

(c) molecules move faster / have more energy / gas has more (kinetic) energy ;
molecules get further apart ;
molecules hit syringe with more force / harder ; [max 2]

(d) gas **G** turns to a liquid / condenses ; [1]

(e) water level too low / all of gas not in water;
temperature of water not gas ;
vertical syringe gravity acting on barrel compresses gas ;
no stirring / thermometer too high ;
gap between seal and syringe ; [max 2]

(f) **C** marked on barrel – above the level of the beaker ; [1]

[Total: 10]