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

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1 **(a)** minutes ; [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, 8.0 *(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 react 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]