

**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]**

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- 3 (a) (i) 1.5 cm ( $\pm 0.1$  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):  $6.1 \pm 0.1$  ; (*must have 1dp*)  
(*d* = 25 cm):  $3.8 \pm 0.1$  ; (*must have 1dp*) [2]
- (c) (i) points correctly plotted  $\pm \frac{1}{2}$  small square (*allow 1 error*) (ecf) ;  
smooth curve drawn ; [2]
- (ii) H<sub>30</sub> **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]**

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- 5 (a) (i) 80 (cm<sup>3</sup>);  
125 (cm<sup>3</sup>); [2]
- (ii) both points plotted correctly  $\pm \frac{1}{2}$  square ;  
smooth curve drawn ;  
beginning at the origin  $\pm \frac{1}{2}$  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<sub>2</sub> 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<sup>3</sup>)  
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]**