UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2012 question paper

for the guidance of teachers

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.

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1 (a) (i) 37 °C ;
body temperature / optimal for enzymes / owtte ;

(ii) 205, 217, 185 ;;

(iii) 202 s ;
(allow 1 mark max in parts **(i)** and **(ii)** if times only given in minutes) [1]

(b) pink <u>due</u> to sodium carbonate ;
fat is digested / broken down ;
<u>fatty</u> acids neutralise the alkali ;
causing phenolphthalein to change colour / neutralise ; [max 2]

(c) to ensure contents / tubes reach the temperature / all tubes the same temp / body
temp ; [1]

(d) EITHER
repeat with boiled / heated / denatured lipase (demonstrates it is an enzyme) ;
no change in pink colour / no reaction / very long time to change colour ;
OR
repeat with different types of fat or named fat (demonstrates it breaks down fats) ;
reaction works as before / owtte ; [max 2]

[Total: 10]

2 (a) 13.7 ; [1]

(b) (i) length (l) = 7.8 ;
external diameter, (d_e) = 2.5 ;
internal diameter, (d_i) = 1.8 ; [3]

(ii) $2.5^2 - 1.8^2$; (allow ecf)
= 3.01 ; [2]

(iii) – (**V**) = 3.14 × 3.01 × 7.8 ÷ 4 = ; (allow ecf)

(between) 18.1 and 18.5 ; [2]

(c) (formula used) density = mass / volume ;
0.74 ; (allow ecf from incorrect values, but **not** from incorrect formula) [2]

[Total: 10]

3 **(a)** 20.**0** ; 47.5 ; 43.5 ; (no tolerance)

    (b) **(i)** axes correct and both labelled with units ;
            points correctly plotted ;
            <u>smooth</u> curve through points ;
            maximum ;   [4]

        (iii) from graph (should be about 34 but accept 32) ;   [1]

        (iii) substitution 25 × 4.2 × ans **(b)(iii)** ;
              correctly worked out if use 34 = 3360 ;   [2]

                                                          [Total: 10]

4 **(a)** **(i)** correct answers in column 3 ;   [1]

time after drinking coffee / min	number of beats in 30 s	number of beats per min
0	36	**72**
5	39	**78**
10	42	**84**
15	45	**90**
20	45	**90**
25	37	**74**
30	36	**72**

        (ii) suitable axes (scale and labels) ;
            plotting correct ;
            decent curve drawn ;   [3]

        (iii) correct estimate from graph (about 17.5) ; (do **not** allow range)   [1]

    (b) **(i)** exercise causes heart rate to increase (therefore not a fair test) ;   [1]

        (ii) volume of coffee ;
            concentration of coffee ;
            (amount of / quantity of coffee – max 1)   [2]

        (iii) take readings more frequently (e.g. every 2 minutes) ;
              would see more clearly the peak in heart rate ;
              more readings between 15 and 20 minutes ;   [max 2]

                                                            [Total: 10]

5 **(a)** **(i)** 9 (cm) ;

(ii) 9 × 30 = 270 ;
× 2 = 540 (m) ;

(iii) allow any sensible idea, e.g. distracted / forgot / not concentrating / didn't hear correct sound owtte ;
(**NOT** just timing / experimental error) [1]

(iv) 1.76(5) ; (allow 1.76 or 1.77) [1]

(v) using <u>their</u> value from above ÷ <u>their</u> distance ;
answer ;
e.g. 540 ÷ 1.765 = 306 [2]

(vi) must comment on their value, e.g. accurate as values are close together / inaccurate as values far apart ; [1]

(b) any two of the following:
longitudinal wave ;
(requires) molecules / particles ;
closer together ; [max 2]

[Total: 10]

6 **(a)** <u>lighted</u> splint ;
pops / small explosion etc ; [2]

(b) **(i)** bubbles / gas / hydrogen floats Mg to surface / owtte ; [1]

(ii) (copper) doesn't react with <u>acid</u> ; [1]

(c) magnesium + copper produces hydrogen faster / steeper graph ;
copper acts as a catalyst / hydrogen given off faster (if say steeper graph) ; [2]

(d) some magnesium / solid remains ; [1]

(e) sketch below others ;
(and) reaches same level ; [2]

(f) connected to a syringe (labelled or graduations shown) ; [1]

[Total: 10]