Simple Kinetic Molecular Model of Mater
Mark Scheme 4

Level	IGCSE
Subject	Physics
Exam Board	CIE
Topic	Thermal Physics
Sub-Topic	Simple Kinetic Molecular Model of Matter
Paper Type	Alternative to Practical
Booklet	Mark Scheme 4

Time Allowed: 56 minutes

Score: /46

Percentage: /100

1 **(a** θ_R = 22(°C)   [1]

   (b) Table:
   mm, °C   [1]
   Correct *d* values 100, 80, 60, 40, 20, 10   [1]

   (c) Temperature difference = 3(°C), higher   [1]

   (d) Draughts   [1]
   Room temperature/humidity   [1]

   (e) One from:
   Relevant avoidance of parallax explained, in using rule or thermometer
   Waiting time between readings
   Wait for steady thermometer reading
   Allow lamp to cool/warm up
   Repeats and average   [1]

                                                                                                   [Total: 7]

2 **(a** 23 $\underline{°C}$ need unit for the mark [1]

(b) Axes correctly labelled with quantity and unit [1]
Suitable scales [1]
All plots correct to ½ small square [1]
Good line judgement [1]
Thin, continuous line [1]

(c) Two from:
Room temperature/humidity/sun through window/air conditioning
Draughts
Initial water temperature [2]

[Total: 8]

3 **(a** θ_R = 24(°C) [1]

(b) **(i)** Table:
s, °C, °C [1]

(ii) About the same [1]
Justified with reference to numbers in table [1]

(c) Any two from:
Volumes of water
Room temperature/draughts
Same beaker
Initial water temperature [2]

[Total: 6]

4   **(a** θ_R = 23   [1]
          °C   [1]

     (b) **(i)** θ_A = 63 and **(ii)** θ_H = 14 (unit not required) ecf θ_R from **2(a)**   [1]

     (c) θ_B = 36 and **(ii)** θ_W = 15 (unit not required) ecf θ_R from **2(a)**   [1]

     (d) Ratios calculated 4.5 and 2.4 ecf **2(b)** and **2(c)**   [1]
          Expect NO <u>and</u> ratios too different/not close enough (owtte), matching statement ecf wrong
          values from **2(b)** and **2(c)**   [1]

     (e) Any two from:
          Room temperature/draughts/humidity/air conditioning (i.e. environmental factor)
          Initial (water) temperature (cold or hot)
          Amount of stirring
          Time interval
          Mass/volume/amount of water/water level
          Size/surface area/material of beaker   [2]

                                                    [Total: 8]

5   **(a** θ_r 26   [1]

     (b) **(i)** s and °C   in both tables   [1]

          (ii) at least 300s and given to nearest 10s or in mins   [1]

     (c) Table 2.2 (heating) justified by two temperature differences compared,
          must see 14 and 44/56 OR 74 to 60 and 25 to 69/81   [1]

     (d) any two from:
          same starting temperature
          constant room temperature/avoid draughts/same place
          same time intervals
          same thermometer (wtte)
          same mass/amount/volume of water
          same beaker
          lid always used   [2]

                                                    [Total: 6]

6 **(a** t in s, θ in $^{\circ}$C seen in BOTH
(symbols or words (sec allowed but NOT degrees/centigrade) [1]

(b) 19 ($^{\circ}$C) [1]

(c) rate of heating greater (wtte) (can be included as part of justification) [1]
comparison given of changes in temperature <u>with correct numbers</u> [1]

(d) any two from:
same (starting) temperature (wtte)
constant room temperature/draughts (wtte)/environment/place
carry out in same time intervals/duration/allow 'time' alone
same thermometer (wtte)

NOT volume of water/location of thermometer/beaker/'temperature' <u>alone</u>
if > 2 responses, -1 for each <u>additional</u> incorrect (ignore 'neutrals') [2]

[Total: 6]

7 **(a** 91 ($^{\circ}$C) [1]

(b) t in s, both θ in $^{\circ}$C [1]

(c) statement B and justified by reference to readings [1]

(d) any two from:
same starting temperature/temperature of hot water
constant room temperature/keep away from draughts/out of direct sunlight
same time intervals [2]

[Total: 5]