Thermal Properties and Temperature
Mark Scheme 3

Level	IGCSE
Subject	Physics
Exam Board	CIE
Topic	Thermal Physics
Sub-Topic	Thermal Properties and Temperature
Paper Type	Alternative to Practical
Booklet	Mark Scheme 3

Time Allowed: **62 minutes**

Score: **/51**

Percentage: **/100**

1 **(a** 24 (°C) [1]

(b) units all correct (symbols or words) [1]
times   1, 2, 3, 4, 5, 6 (allow seconds if compatible with heading) [1]

(c) thermometer near bottom/no significant difference
<u>and</u> justification matching statement (words or figures) with mention/implication of
temperature <u>change</u> [1]
in <u>same time</u> [1]

(d) appropriate precaution:
e.g. stir before reading / keep thermometer at same dep [1]
<u>matching</u> explanation:
e.g. ensure temperature is the same throughout / temperature different at different depths [1]

(e) appropriate precautions relating to comparison
any two of:
same size/thickness/surface area of beaker
same volume of water
same initial temperature (of water)
same room temperature / appropriate environmental condition [2]

[Total: 9]

2 **(a** 87 (^{o}C) [1]

   (b)   s, ^{o}C, ^{o}C [1]

      (ii)(iii)   **B** <u>and</u> greater temperature difference
            OR numbers quoted, *must see* 21 and 8 or 24 and 5 [1]

     (iv) **A** 23(^{o}C) and **B** 40(^{o}C) [

     (v) 20 – 26 (^{o}C) [1]

   (c) EITHER viewing thermometer at right angles
      OR reference to being ready on time [1]

   (d) any two from:
      room temperature
      water / starting temperature
      distance of thermometer bulb from water surface
      relevant reference to draughts / fans / air conditioning [2]

                                            [Total: 8]

3   **(a** neat, clear table with column headings and correct units [1]
      results arranged in order [1]

   (b) **(i)** 40° [1]

     (ii) plot a line graph [1]
         reading will clearly not lie on line [1]
         allow suggestion of appropriate mathematical treatment

                                            [Total: 5]

4   **(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]

5   **(a**   23 °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]

6   **(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]

7   **(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_N = 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]