Length & Time

Mark Scheme 1

Level	IGCSE
Subject	Physics
Exam Board	CIE
Topic	General Physics
Sub-Topic	Length & Time
Paper Type	Alternative to Practical
Booklet	Mark Scheme 1

Time Allowed:	**59 minutes**
Score:	**/49**
Percentage:	**/100**

Question	Answer	Marks
1(a)	 0.44–0.45 Units V and A	**1** **1** **1**
1b)	19(	**1**
1(c)	Perpendicular to scale and at bottom of meniscus	**1**
		Total 5

2 **(a** use of $T^2 = 4\,s^2$ [1]

correct method shown clearly on graph [1]

l = 0.99 (m) cao OR ecf 0.49 if $T^2 = 2\,s^2$ used [1]

(b) reduce (percentage) uncertainty OR reduce (the effect of) error due to starting/stopping [1]

(c) (i) 5 – 10 [1]

(ii) minimum not less than 10 g; maximum not more than 1000 g; maximum must be at least double the minimum [1]

[Total: 6]

3 **(a** any one from:

- reference to how to determine the centre of the bob
- measure to top of bob then add on half diameter measured with blocks and rule or callipers
- measure to top and bottom of bob and average
- reference to perpendicular viewing (reducing parallax)
- rule parallel with/close to string/appropriate use of set-square [1]

(b) (t = 28.4(0) NOT 28:4 [1]

(ii) T = 1.42 (s) allow ecf from **(i)** [1]

(iii) reduce effect of errors in starting/stopping stopwatch [1]

(c) statement to match results (expect no) [1]

justification using results, including idea of difference is beyond limits of experimental uncertainty owtte [1]

(d) minimum of three more values [1]

all values ≥ 20 cm and ≤ 300 cm, and three values are at least 10 cm apart [1]

[Total: 8]

4 **(a) (i)** 4.2 (cm) OR 42 (mm) [1]

(ii) centre of bob touching rule OR how to use fiducial aid, e.g. set-square OR measure to top / bottom of bob and add / subtract radius OR measure to top and bottom of bob and average OR look perpendicularly at scale [1]

(b) (i) 28.2(0) (s) [1]

(ii) 1.41(s) (e.c.f. from **(i)** AND T_C = 1.16(s)) [1]

(iii) (reaction time) inaccuracy – smaller part of total time measured owtte [1]

(c) (i) repeats OR start counting at nought OR use a fiducial mark owtte [1]

(ii) see **(b)(ii)**

(d) correct statement for results [1]
justification must include idea of too different to be within limits of experimental accuracy
(e.c.f. close enough to be within limits of experimental accuracy) [1]

(e) pivot at 1 cm mark owtte OR centre of mass of rule not 50 cm below pivot [1]

[Total: 9]

5 **(a** (human) reaction time [1]

(b) ruler or metre rule [1]
repeat for different diameters around the hole [1]

(c) any two from:
- size / mass / weight / volume / diameter / density of ball
- size of the sand grains / type of sand / nature of the sand
- dampness / depth of sand [2]

[Total: 5]

6 **(a) (i)** l in range 17.1–17.2 (cm)

(ii) x in range 15.5–15.6 (cm) **and** correct calculation of y (e.c.f. incorrect l) [1

(b) use of at least 3 turns [1]

(mark string and) measure distance (between marks) **and** divide by number of turns [1]

(c) (i) any one from:
- stretching of string
- thickness of string
- thickness of mark
- gaps between turns
- winding of turns at an angle [1]

(ii) V = 7.1(0)–7.2(0) $\underline{\text{cm}^3}$ e.c.f. **(a)(ii)** [1]

(iii) V_E = 0.2–0.6 (cm^3) [1
(expect estimate to nearest 0.1 cm^3)

sensible reasoning / working / method which takes account of sharpened shape and length [1]

[Total: 8]

7 **(a** h = 9.5cm d_T = 7.2 cm – 7.3 cm and d_B = 4.5 cm [1]

d_A = 5.85 / 5.9 cm (no mark), V rounds to 260 cm^3 (no ecf) [1]

2 or 3 significant figures and cm^3 [1]

(b) measurement of circumference half way up, or at top and bottom [1]

more than one revolution used for the measurement in at least one position, and divide [1]

(c) **(i)** 225 [1]

(ii) 275 (ecf 500 – candidate's **(c)(i)** [1]

(d) correct line of sight clearly shown at right angles outside measuring cylinder [1]

[Total: 8**]**