

# Length & Time

## Mark Scheme 4

<b>Level</b>	IGCSE
<b>Subject</b>	Physics
<b>Exam Board</b>	CIE
<b>Topic</b>	General Physics
<b>Sub-Topic</b>	Length & Time
<b>Paper Type</b>	Alternative to Practical
<b>Booklet</b>	Mark Scheme 4

**Time Allowed:** 48 minutes

**Score:** /40

**Percentage:** /100

- 1 (a) 0.7 N [1]  
6 cm<sup>3</sup> [1]  
1.4 s [1]  
4.0 N/cm<sup>2</sup> [1]

(b) (i) minimum current/turn down power supply/increase resistance [1]  
switch off between readings/carry out without delay [1]

(ii) variable resistor/rheostat [1]

**[Total: 7]**

2 (a) (i) 1 m–2.5 m [1]

(ii) 10 cm–1 m but  $h$  must be less than  $l/2$  [1]

(b) any three from:

- making marks/lines on track for start and finish
- repeats/find average time
- constant starting positions
- not pushing car
- time from same point on car
- use light gates/data logger/automatic timer for timing
- method for avoiding parallax error when judging finishing point/stand level with finish

[max 3]

**[Total: 5]**

- 3 (a) (i)  $h = 2.5$ ,  $w = 2.7$ , and  $d = 2.7$  [1]
- (ii)  $V_A = 18.225 \text{ (cm}^3\text{)}$  to 2 or more sig. figs. ecf (i) [1]
- (iii) density =  $3.22 \text{ g/cm}^3$  to 2 or 3 sig. figs. ecf (ii) [1]  
unit needed, penalise additional sig. figs.
- (b) diagram showing blocks and rule correctly used – blocks touching the sphere, and rule spanning gap and touching blocks [1]
- (c)  $V_1 = 66 \text{ (cm}^3\text{)}$  [1]
- (ii) line of sight at right angles to measuring cylinder [1]
- (d)  $V_B = 18 \text{ (cm}^3\text{)}$  ecf from candidate's  $V_1$  [1]
- (e) any two from:  
measuring cylinder not sensitive owtte  
some clay left on fingers  
cube not perfectly shaped/difficult to measure owtte  
air bubbles clinging to modelling clay/within the modelling clay  
volume of string  
difficult to judge the bottom of the meniscus/bubble on meniscus [2]  
ignore parallax  
do not credit poor experimental practice e.g. spills or splashes

[Total: 9]

- 4 (a) 100, 200, 300, 400, 500 [1]
- (b) Graph:  
Axes labelled (label and unit) [1]  
Scales suitable [1]  
All plots correct to nearest  $\frac{1}{2}$  small square [1]  
Continuous, straight, well-judged best fit line [1]  
Thin line, neat plots [1]
- (c)  $F$  correct from graph scale to  $\frac{1}{2}$  small square – must see unit of N [1]  
Clear how obtained [1]
- (d) Weight/mass/force of rule owtte [1]

[Total: 9]

- 5 (a) (i)  $h = 3.6, w = 3.4, d = 3.2$  (cm) c.a.o. [1]
- (ii)  $V = 39$  OR  $39.2$  OR  $39.17$  OR  $39.168$  AND  $\text{cm}^3$  ecf (i) [1]  
 $\rho = 2.6$  OR  $2.63$  OR  $2.64$ , ignore significant figures and unit, ecf [1]
- (b)  $V_1 = 50$  ( $\text{cm}^3$ ) [1]
- (ii)  $V_2 = 64$  ( $\text{cm}^3$ ) [1]
- (iii) bottom of meniscus, direct vision [1]
- (iv)  $V_s = 14$  ( $\text{cm}^3$ ) ecf (i)(ii)
- (v)  $\rho = 2.46$ , 2 or 3 significant figures AND  $\text{g/cm}^3$  ecf (iv) [1]
- (c) (i) two from:  
difficulty of making perfect cuboid shape o.w.t.t.e.  
measuring cylinder readings only to nearest  $\text{cm}^3$  o.w.t.t.e.  
smaller mass so greater inaccuracy  
volume of thread not taken into account  
air bubbles in clay / uneven density distribution / clay may absorb water / some  
clay may stick to the knife [2]
- (ii) either method but with sensible matching reason [1]

[Total: 10]