



Number	Details	marks																														
PART 1																																
No.1 R ₁	R1-Recording mass, m, of the metre rule Range m=(70 – 140)g	01																														
R ₂	R2-Recording balance point G of the rule to 1dp Range G=(49.5 – 51.5) cm	01																														
R ₃	R3-Recording position P of the knife edge to 1dp Range P=(46.5-48.5)cm. (36.0 – 46.0) cm	01																														
	R4-Recording distance GP to 1dp. (140 – 130 –)	0 1/2																														
R₄	Recording distance PA to 1dp. (360 – 460)	0 1/2																														
Subtotal for R		05.04																														
	C1-Calculating R to 2sf. without unit	0 1/2																														
	-Calculating m ₁ (unit-g) value - 1/2 unit - 1/2	01																														
Subtotal		1 1/2																														
PART 2																																
R ₅	R5-Recording distance x to 1dp.	0 1/2																														
	-Recording distance y to 1dp.	0 1/2																														
Subtotal		01																														
Table of results																																
<table><tr><th>d(cm)</th><th>x(cm)</th><th>y(cm)</th><th>(y - d) (cm)</th><th>(x - y)(cm)</th></tr><tr><td>15.0</td><td>54.5</td><td>45.0</td><td>1dp</td><td>1dp</td></tr><tr><td>20.0</td><td>54.2</td><td>45.7</td><td></td><td></td></tr><tr><td>25.0</td><td>53.1</td><td>46.9</td><td></td><td></td></tr><tr><td>30.0</td><td>52.3</td><td>47.2</td><td></td><td></td></tr><tr><td>35.0</td><td>52.0</td><td>48.0</td><td></td><td></td></tr></table>		d(cm)	x(cm)	y(cm)	(y - d) (cm)	(x - y)(cm)	15.0	54.5	45.0	1dp	1dp	20.0	54.2	45.7			25.0	53.1	46.9			30.0	52.3	47.2			35.0	52.0	48.0			x + y = 100.0 ± 0.2
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T ₁	T1 Design of table with at least 5 columns with all d values.	0 1/2																														
T ₂	T2-label of other columns. (1/2 mark each pair)	01																														
T ₃	T3-Recording 4 more values of x increasing to 1 dp (01 mark @)	04.05																														
	-Recording 5 more values of y increasing to 1dp (01 mark @)	04.05																														
	- Recording 5 calculated values of (y - d) to 1dp (1/2 mark each)	2 1/2																														
	- Recording 5 calculated values of (x - y) 1 dp. (1/2 mark each)	2 1/2																														
Total for Table		16 1/2																														
	G1-Tittle - A graph of (x - y) against (y - d)	0 1/2																														
	G2-Label of axes (1/2 mark each)	01																														
	G3-suitable and convenient scales starting values indicated.(1/2 mark each)	01																														
G ₄	G4-plotting 5 points correctly (1/2 mark each)	02 1/2																														
G ₅	G5-line of best fit	0 1/2																														
G ₆	G6-method of slope	0 1/2																														
Subtotal for G		06mks																														
	C2-Calculation of slope, s, substitution and arithmetic.	01																														
C ₃	C3-calculation of m ₂ , m ₂ and substitution and arithmetic. value of m ₀ - 1/2	01																														
Sub-total		02mks																														
TOTAL FOR ONE		=30mks																														

D1	Trace PQRS seen with normal BE drawn at 2.0cm from P. - Drawing line AB at angle $\alpha = 10^\circ$ to the normal.	01 0 1/2																																				
D2	Pin holes seen and line BC joined - Length x seen and line BC joined.	0 1/2 0 1/2																																				
Sub-total for D		04 2 1/2																																				
R1	R1 - Recording angle θ to 1dp	01																																				
R2	R2-Recording length x when $x = 20$, to 1dp; $x = 1.5$ cm.	01																																				
Sub-total for R		02																																				
Table of results																																						
<table><tr><th>$\alpha(^{\circ})$</th><th>$\sin \alpha$</th><th>$\theta(^{\circ})$</th><th>$\cos \theta$</th><th>$x(\text{cm})$</th><th>$x \cos \theta(\text{cm})$</th></tr><tr><td>20</td><td>0.342</td><td>4-13 16</td><td>0.974</td><td>1.5</td><td>1.5</td></tr><tr><td>30</td><td>0.500</td><td>17-20 23</td><td>0.940</td><td>2.3</td><td>2.2</td></tr><tr><td>40</td><td>0.643</td><td>24-26 29</td><td>0.899</td><td>3.2</td><td>2.9</td></tr><tr><td>50</td><td>0.766</td><td>28-31 34</td><td>0.857</td><td>3.1</td><td>3.3</td></tr><tr><td>60</td><td>0.866</td><td>33-34 40</td><td>0.829</td><td>4.4</td><td>3.7</td></tr></table>			$\alpha(^{\circ})$	$\sin \alpha$	$\theta(^{\circ})$	$\cos \theta$	$x(\text{cm})$	$x \cos \theta(\text{cm})$	20	0.342	4-13 16	0.974	1.5	1.5	30	0.500	17-20 23	0.940	2.3	2.2	40	0.643	24-26 29	0.899	3.2	2.9	50	0.766	28-31 34	0.857	3.1	3.3	60	0.866	33-34 40	0.829	4.4	3.7
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T1	T1-Design of table with at least 5 columns and α column labeled.	0 1/2																																				
T2	T2-labelling of other 4 columns (each = 1/2 mark)	02																																				
T3	T3-Recording 4 more values of θ increasing to no decimal place - Recording 6 values of $\sin \alpha$ increasing to 3 dp 1/2 mark each - Recording 6 more values of $x \cos \theta$ to 2sfs = 1/2 mark each (any 2 - 1/2) - Recording of 4 more values of x increasing to 1 dp	2 1/2 3 2 1/2 3 1 1/2 04 06 15 1/2 19																																				
Subtotal for Table																																						
G1	G1-Title of graph-A graph of $\sin \alpha$ against $x \cos \theta$	0 1/2																																				
G2	- G2-label of axes. 1/2 mark each	01																																				
G3	- G3-Suitable and convenient scale (vertical from zero)	01																																				
G4	G4-Correctly plotted 5 points 1/2 mark each	2 1/2																																				
G5	G5-line of best fit	0 1/2																																				
G6	G6-method of slope (Large enough right angled triangle)	0 1/2																																				
Subtotal for G		06																																				
C1	C1 Calculation of slope-substitution, arithmetic and accuracy	01 1/2																																				
I2	I2-Intercept c with unit	0 1/2																																				
C2	C2 Calculations of n-substitution and arithmetic	0 1/2																																				
Accuracy 14-16		2 1/2																																				
Subtotal																																						
TOTAL FOR NUMBER 2		30																																				

No 3 R1

R1-Recording the value of V to 2 d.p.

Table of results

$d(m)$	$V(V)$	$\frac{1}{V}(V^{-1})$	$\frac{1}{d}(m^{-1})$
0.10	0.2 0.50	2.00 1 d.p.	5.0 1 d.p.
0.15	0.3 0.75	1.33 2 d.p.	3.3 1 d.p.
0.20	0.4 0.80	1.25 d.p.	2.5
0.30	0.33 0.85	1.18	2.0
0.40	0.25 0.90	1.11	1.7
0.70	0.90	1.11	1.4

T1-Design of a table with at least four columns and values of d entered

0½

T2-Labeling of other columns each each=1mk

03

T3-Record ~~6~~ more values of V @ = 1mk ~~1½~~ 2mk

06 9

- Recording calculated values of $\frac{1}{V}$ to 1 decimal places each = ½mk

03

- Recording calculated values of $\frac{1}{d}$ to 2 significant figures each = ½mk

03

Subtotal

18½

Details

Scores

C1

Calculating the slope substitution ¼ value/Unit ½

2

I

Reading the intercept value ½ unit ½

1

C2

Calculating R substitution ½ .Arithmetic(value/unit ½)

2

05

G1-Tittle of a graph

A graph of $\frac{1}{V}$ against $\frac{1}{d}$

01½

G2 -labeling the axes @ ½mk $\frac{1}{d}$ must start from zero

01

G3-Suitable and convenient scale

01

-G4 plotting six points correctly @ = 1mk ½mk

06 03½

G5-Best straight line through at least 3 correctly plotted points (the best line must touch the $\frac{1}{V}$ axis)

0½

G6-Method of slope (Big triangle to enclose all plotted points).

0½

Sub-total for G

10 6½

TOTAL FOR NUMBER 3

30mks