Practice Question Set For A-Level
Subject : Physics
Paper-3 Topic: Section A(Practical Skills Set-2)

Name of the Student:____

Max. Marks : 20 Marks **Time : 20 Minutes**

Mark Schemes

Q1.

(a) 1.43, 1.29

1

(b) Both plotted points to nearest mm ✔

Best line of fit to points ✔

The line should be a straight line with approximately an equal number of points on either side of the line.

2

(c) (i) Large triangle drawn (at least 8 cm × 8 cm) ✔

Correct values read from graph ✔

Gradient value in range (0.618 to 0.652) × 10^{-6} to 2 or 3 sf ✔

Allow the 2nd mark for incorrect numerical values read <u>ignoring</u> incorrect power of 10.

Incorrect power of 10 <u>is</u> penalised in gradient value.

3

(ii) Same figure quoted for gradient but <u>with correct unit</u>

1

(d) (i) Straight line (through origin) ✔

(directly) proportional ✔

2

(ii) Evidence of substituting data from the table / graph into $w = \text{m}D/s + \text{c}$ (from $y = \text{m}x + \text{c}$) ✔

Computation of correct value for c (i.e. value of w when $D/s = 0$) <u>with correct unit</u>.

Should be approximately 0.1 × 10^{-3} m, depending on the exact lobf drawn.

2

(iii) *w*

1

(e) Any reference to **either** width of slits **OR** single slit diffraction ✔

1

[13]

Q2.

(a) $\sin\theta_1 = \frac{XZ}{WX}$ and $\sin\theta_2 = \frac{YZ}{WY}$ or $\frac{\sin\theta_1}{\sin\theta_2} = \frac{(XZ)\div(WX)}{(YZ)\div(WY)}$ 1 ✔

(must see this step either separately or in substitution for $\frac{\sin\theta_1}{\sin\theta_2}$ or 0/2

condone *i* and *r* for *θ* etc.)

$$n = \frac{(XZ)\div(WX)}{(YZ)\div(WY)} = \frac{XZ}{WX}\times\frac{WY}{YZ}$$ 2 ✔

$$\left(= \frac{(XZ)\times(WY)}{(WX)\times(YZ)}\right)$$

2

(b) idea implied that (XZ) × (WY) = *n* × (WX) × (YZ) is of form *y* = *mx* (+ *c*);

plot (XZ) × (WY) against (WX) × (YZ) [$\frac{XZ}{WX}$ against $\frac{YZ}{WY}$ etc] or 0/2 1 ✔

calculate gradient to find *n* (false plot loses both marks) 2 ✔

[must mention XZ, WX, YZ and WY for full credit: bland 'plot sin θ_1 against sin θ_2 and calculate gradient to find *n*'= 1 MAX]

[alternative method is to plot XZ against WX to find G_1 and plot YZ against

WY to find G_2 1 ✔; evaluate $\frac{G_1}{G_2}$ to find *n* 2 ✔]

2

(c) upper limit of (XZ) range [largest value] is suitable 1 ✔

largest XZ value ≈ length of block (114)

[largest WX value ≈ diagonal distance (131) across block / used

(approximately) largest value of XZ [WX] available] 2 ✔

lower limit of (XZ or YZ) range [smallest value] is not suitable 3 ✔

smallest YZ [XZ] values have large percentage uncertainty / are unreliable] 4 ✔ (reject idea these values are too close to zero)

smallest WX value ≈ width of block (65) 5 ✔

[statement that range is suitable plus quantitative comment comparing length of block (114) with 98 (the range of XZ data) or covers more than 85% of available range] 12 ✔✔

equivalent statement regarding WX: compares available range (131 to 65 = 66) with 63 (the range of WX data) 12 ✔✔ = 2 MAX

statement that range is suitable plus simple qualitative comment relating range to the block, e.g. 'a large fraction / part of the available XZ [WX] range is covered' 12✔ = 1 MAX (bland 'range is large / wide' is not enough)]

MAX 3

[7]