Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Mark Schemes

Q1.

(a) smooth line drawn within half grid square of points ✔

minimum between 32.6 and 32.8 cm ✔

2

(b) value of their minimum (cm) ✔

Within a half grid square

1

(c) doubles 0.2 **OR** calculates percentage uncertainty for 0.2 (half range) ✔

Correct answer earns both marks

0.8 (%) ✔

CAO

2

(d) recognises that node-to-node spacing = $\lambda/2$ ✔

recognises the need to divide by 8 ✔

2.36 $\times 10^9$ (Hz) ✔

Condone use of 7 or 9
3 sf required
For example:
$\lambda = \frac{0.509 \times 2}{8}$ *or 0.127(25) m seen; top line earns* $_1$✔ *and bottom line earns* $_2$✔

$f\left(=\frac{3\times10^8\times8}{0.509\times2}\right)$ *= 2.36 ×10^9 (Hz) earns all 3 marks*

$f\left(=\frac{3\times10^8\times7}{0.509\times2}\right)$ *= 2.06 ×10^9 earns 2 marks*

$f\left(=\frac{3\times10^8\times9}{0.509\times2}\right)$ *= 2.65 ×10^9 earns 2 marks*

Allow 2 marks for 4.72 × 10^9 (must be 3 sf)

3

(e) (microwaves are) <u>polarised</u> ✔

Downloaded from www.merit-minds.com

1

[9]

Q2.

(a) correctly deduces extension is 2.6 or 2.7 mm ✔

Should see $AC^2 = 1.50^2 + (6.34 \times 10^{-2})^2$;

(new) AC = 1.50134;

Extension of AC = (1.50134 − 1.50 =) 0.00134 m or 1.34 mm; and then doubles this

Final value must be to at least 2 sf

1

(b) evidence of correct working: ✔

sin θ = $\frac{6.34 \times 10^{-2}}{\text{their new AC}}$ or θ = 2.42° seen

OR

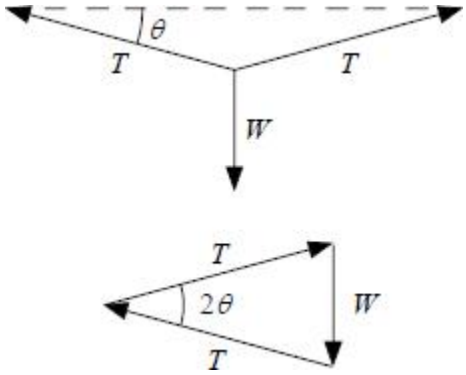
$W = 2T \sin\theta$ seen

OR

suitable vector diagram with θ labelled

tension correctly calculated from $\frac{1.0}{2 \times \text{their } \sin\theta}$ ✓

For ₁✔ acceptable diagrams are shown below



Correct final answer of 11.8 N or 12 N earns both marks

2

(c) ruled best-fit line between first and sixth points;

line must pass above 2nd point

and

must pass below 4th point ₁✔

for ₁✔ withhold mark if line is thick, faint or discontinuous

gradient calculated from $\frac{\Delta(W/y)}{\Delta y^2}$ with $\Delta y^2 \geq 0.004$ ₂✔

(gradient ~ 3850)

for ₂✔ condone read off errors of ± 1 division

Downloaded from www.merit-minds.com

for $_3$✔ note that $1.50^3 = 3.375$ so allow sub of 3.38

for $_4$✔ reject 2 sf 1.2×10^{11}

evidence of using $E = \dfrac{\text{their gradient} \times 1.50^3}{1.11 \times 10^{-7}}$ $_3$✔

for $_3$✔ note that $1.50^3 = 3.375$ so allow sub of 3.38

E in range 1.10×10^{11} to 1.24×10^{11} (Pa) $_4$✔

for $_4$✔ reject 2 sf 1.2×10^{11}

4

(d) kg s^{-2} ✔

no credit for N m^{-1}

correct answer only

1

[8]

Downloaded from www.merit-minds.com