

Light

Mark Scheme 6

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| Level | IGCSE |
| Subject | Physics |
| Exam Board | CIE |
| Topic | Properties of Waves. Including Light and Sound |
| Sub-Topic | Light |
| Paper Type | Alternative to Practical |
| Booklet | Mark Scheme 6 |

Time Allowed: 63 minutes

Score: /52

Percentage: /100

- 1 (a) Trace:
Normal at 90° in correct position [1]
Angle of incidence = $30^\circ (\pm 2^\circ)$ [1]
- (b) P_1P_2 distance ≥ 5.0 cm [1]
 P_3P_4 line and line **GE** correctly and neatly drawn [1]
- (c) $r = 18$ or 19 or 20 [1]
- (ii) i/r value correct [1]
- (d) (i) i/r value 1.54 and both i/r values with no unit and to 2 or 3 significant figures [1]
- (ii) Idea of within (or beyond) limits of experimental accuracy [1]

[Total: 8]

- 2 Line 10 cm (± 0.1) (accept horizontal or vertical line) [1]
Normal correctly drawn [1]
Angle of incidence at 30° ($\pm 2^\circ$) [1]
Pins at least 5 cm apart [1]

Any one from:

Thickness of lines (answer must refer to pencil lines, not light rays)

Difficulty in reading protractor to better than 2°

Thickness of pins

[1]

[Total: 5]

- 3 (a) Table: uv values 894, 990, 1090, 1155, 1194. Accept 3 or 4 significant figures. [1]
 cm^2 and cm [1]

(b) Graph:

Axes correctly labelled and scales suitable [1]

($100 \text{ cm}^2 = 2 \text{ cm}$ on y -axis and $5 \text{ cm} = 2 \text{ cm}$ on x -axis)

All plots correct to $\frac{1}{2}$ small square [1]

Good line judgement [1]

Thin, continuous line (penalise 'blobs') [1]

(c) (i) Triangle method used and shown [1]

Using at least half of line [1]

(ii) $f = 14 - 16$ (accept numbers rounding to 14/16) [1]

2 or 3 significant figures and unit [1]

[Total: 10]

- 4 (a) (i) and (ii) $u = 7.0$ cm and $v = 5.2$ cm (or equivalent in mm) [1]
 (iii) $u = 0.350$ and $v = 0.260$ in table (ecf) to 3 sf [1]
- (b) Correct $\frac{1}{u}$ (2.86(ecf)) and $\frac{1}{v}$ (1.67, 2.55, 3.85 (ecf), 4.50, 5.10) [1]
- (c) Axes labelled (including units) and appropriate scales [1]
 Plots correct to $\frac{1}{2}$ small square [1]
 Well judged straight line [1]
 Thin line and small plots [1]
- (d) (i) and (ii) p and q values there and matching graph [1]
- (e) (i and (ii) f within range 0.145 to 0.155 [1]
 2 or 3 significant figures and appropriate unit [1]

[Total: 10]

5. (a) Normal in centre at 90° to **MR** [1]
 CD drawn correctly [1]
 Both neat and thin [1]
- (b) (**CN** drawn correctly [1]
- (ii) $i = 23^\circ \pm 1^\circ$ (ecf allowed) [1]
- (c) (Line through P_3 and P_4 correct [1]
 $r = 21^\circ \pm 1^\circ$ [1]
- (d) Any two:
 Thickness of lines
 Thickness of mirror
 Protractor can only be read to $\pm 1^\circ$ OR protractors are not that precise (owtte)
 Thickness of pins [2]

[Total: 9]

- 6 (a) $i = 30^\circ (\pm 1^\circ)$ - no penalty for missing or incorrect unit [1]
- (b) $a = 12$ to 13mm / 1.2 to 1.3cm [1]
 $b = 36\text{mm}$ / 3.6cm [1]
Lines HF and P_4P_3H drawn neatly and correctly [1]
 n correctly calculated [1]
 n 2 or 3 significant figures, no unit [1]
- (c) At least 5 cm [1]
Greater accuracy owtte [1]
- (d) Pin: pins not vertical/not straight
OR pins too close
OR thickness of lines/size of holes [1]
Ray Box: thickness of ray [1]

[Total: 10]