Light

Mark Scheme 7

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 7

Time Allowed: **57 minutes**

Score: **/47**

Percentage: **/100**

1 **(a) (i)** normal at 90°, at centre of **MR** and crossing **MR** [1]

(ii) **AB** is a continuous line from **B**, 8 cm long [1]
AB is at 40° to normal [1]

(b) continuous, thin line that reaches normal and at least touches P_2 and P_3 dots [1]

(ii) $r = 40 - 43(^{\circ})$ (no ecf) [1]

(c) any two from:
thickness of lines
thickness of protractor o.w.t.t.e. / accuracy of reading protractor
thickness of pins / pin holes [2]
accept thickness of mirror / glass in front of mirror

(d) ticks in boxes 1, 3, 5 (1 mark each)
(if more than 3 ticks, –1 for each tick in a wrong box to minimum of 0) [3]

[Total: 10]

2 **(a** trace:
normal at 90° in correct position [1]
C at 3.0 cm to left of **L** [1]

(b) (i) & (ii) all lines neatly drawn in correct position [1]

(iii) table:
cm, °, ° [1]
i value in range 16–18 AND r value in range17–19 [1]

(c) any two from:
thickness of lines
thickness of pin holes/pins
allow thickness of mirror o.w.t.t.e. e.g. 'two lines seen' [2]

(d) any one from:
ensure pins vertical / view bases of pins / increase pin separation
draw thin lines / use sharp pencil
view protractor / rule perpendicularly o.w.t.t.e.
mirror 90° to paper [1]

[Total: 8]

3 **(a) (i)** pins P_3 and P_4 at least 5 cm apart [1]

(ii) normal correct position and at 90° [1]

(b) (i) **AB** drawn neatly and $r = 20° \pm 2°$ [1]

(ii) $i = 32° \pm 2°$ and unit shown at least once and no contradiction [1]

(c) view bases of pins / keep line of sight low / view close to table [1]

[Total: 5]

4 (a any one from:
use of darkened room
how to avoid parallax when taking readings
moving lens back and forth to obtain clearest image
mark at centre of lens holder
place / secure ruler on the bench
lens, object, screen perpendicular to the bench [1]

(b) correct graph:
axes labelled and scales [1]
all plots correct to nearest ½ small square [1]
well-judged best-fit line [1]
thin line and small plots, ≤ ½ small square [1]

(c) both intercepts correct to ½ small square [1]
both between 6.4 and 7.0 [1]

[Total: 7]

5 **(a) (i)** pins at least 5 cm apart [1]

(ii) $i = 30$ [1]

(iii) $r_1 = 31$ [1]

(b) & **(ii)** both lines correct area [1]

(iii)–(v) r_2 correct to $\pm 1^{\circ}$ with unit [1]
difference = 1 or –1 (c.a.o.) [1]

(c) statement matches result (expect YES) (ecf NO) [1]
justification matches statement and by reference to result
(expect within limits of experimental accuracy, wtte) (too different, wtte) [1]

[Total: 8]

6 **(a)** normal labelled (allow N N' on end or N, N' alone) [1]

(b) P_1P_2 distance at least 3 cm [1]

(c) line to H drawn neatly and correctly [1]
θ correct to ±1° 60 [1]
(θ – 2i) correct 0 (ecf) (ignore sign) [1]
unit ° at least once in **(c)** and not contradicted [1]

(d) 2° (ignore unit and sign) [1]

(e) statement matches results (ecf)
expect YES if 0 and 2,
NO only if 'too different' or wtte in justification [1]
justification matches statement and by reference to results
(allow almost/nearly the same or within expt accuracy) [1]

[Total: 9]