Reflection

Mark scheme

1. (a) B 1

(b) G 1

(c) D 1

(d) A 1

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2. (a) Reflection correct 4
Normal incidence correct in and out
Correct refraction in
Parallel ray out *each for 1 mark*

(b) (i) Each ray correctly refracted in 7
1 + 1 = 2

(ii) Wavefronts perp sides; Wavefronts closer
(Cannot score wavefront marks if refracted rays clearly wrong)

(iii) Speed reduces; Starting at B; Then D
each for 1 mark

(c) TIR correct *gets 2 marks* 2
Else rough reflection *gets 1 mark*

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3. (a) (i) compare (the health of) mobile phone users with non-mobile phone users 1
must be an implied comparison between users and non-users
any idea of doing an experiment negates the mark

(ii) increase the sample size 1
accept use more people
accept have a large sample size
repeat the research / test is neutral

(iii) ethical 1

(b) (i) so the phones can be compared (fairly) 1
*a fair test is insufficient; accept different tests (may) give different results; do **not** accept to make the results reliable, unless qualified eg all variables are controlled; do **not** accept bias unless qualified*

(ii) yes all are below the legal limit / 2 (W/kg) 1

or no and any **one** from:
- even absorbing a small amount of energy may be harmful
  accept microwaves for energy
  accept emits energy absorbed by head / other parts of body
- no proof that small amounts of energy are not harmful
  accept because the SAR value is not 0 (W/kg)

(c) any **one** from:
- to get an independent opinion
- company scientists may be biased 1
  accept company scientists may manipulate results

[6]