

Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Mark Schemes

Q1.

- (a) (i) microwaves 1
- (ii) can pass through the ionosphere
accept travels in a straight line
accept atmosphere for ionosphere
*do **not** accept air for ionosphere* 1
- (b) higher the frequency, further the wave travels
 (into the atmosphere before reflection) 1
- (c) 15 000
allow 1 mark for correct transformation and substitution

$$\frac{300\,000\,000}{20}$$
ie
an answer of 15 000 000 only gains 1 mark
allow both marks for an answer of 15 MHz (unit must be changed)
an answer of 15 gains no credit 2

[5]**Q2.**

- (a) (i) shorter than 1
- (ii) increase slightly 1
- (b) (i) go up in the same ratio
or (directly) proportional **or** as speed (of the tennis ball) increases so does the
 (difference in) frequency
accept as one goes up, so does the other
accept positive correlation 1
- (ii) 20 (m/s)
allow 1 mark for showing correct method on graph
(ie horizontal or vertical line anywhere on graph)
if indicated by a cross, must be \pm half square of correct value)

(iii) frequency and speed are both continuous variables

1

[6]

Q3.

(a) (i) compare (the health of) mobile phone users with non-mobile phone users

*must be an implied comparison between users and non-users
any idea of doing an experiment negates the mark*

1

(ii) increase the sample size

*accept use more people
accept have a large sample size
repeat the research / test is neutral*

1

(iii) ethical

1

(b) (i) so the phones can be compared (fairly)

*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*

1

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

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)

1

(c) any **one** from:

- to get an independent opinion
- company scientists may be biased
accept company scientists may manipulate results

1

[6]