Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Mark Schemes

Q1.

(a) the normal

1

(b) v

1

(c) any **one** from:

- light has moved from glass to air / from air to glass
  accept light has changed medium
- speed of light has changed
  beware of contradictions for this marking point eg light has moved from glass to air and slowed down gets zero
- angle of incidence is less than the critical angle
  ***or** (angle) i < (angle) c **or** (angle) y is less than the critical angle*
- change in density (of medium)
  eg glass is more (optically) dense than air

1

(d) (i) ratio of v to y does not give the same answer (in every case)

or value of v doubles value of y does not double

1

or increments for v are the same but increments for y are not the same
*allow for **1** mark a calculation but no conclusion*
eg 30 → 60 19 → 35 (38)

1

(ii) as (angle) v increases, angle y increases
accept as the angle of incidence increases, the angle of refraction increases
***or** there is a (strong) positive(non-linear) relationship between the variables*
***or** ratio of sines is constant*
*do **not** accept angle y is not directly proportional to angle v*

1

(iii) no evidence outside this range
OWTTE

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or when angle y is greater than the critical angle total internal reflection occurs

1

[7]

Q2.

(a) (mechanical) vibration(s)

not *just 'particles knocking into each other'*
not reference to 'sound particles'

1

(b) K

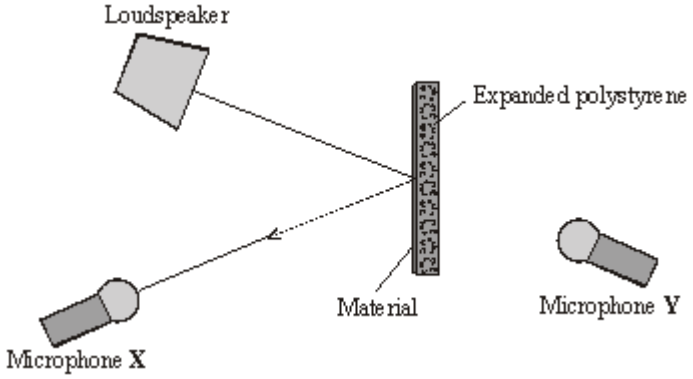
1

(c) (i) reflected by the material from loudspeaker to microphone X

1

shown by straight lines with angle of incidence = angle of reflection (by eye) **and** at least one arrow in the correct direction

*do **not** credit if the direction is contradicted by any incorrect arrow / may be shown by waves / wavefronts in the direction of straight lines*
ignore any sound to Y or which 'misses' the material
example



1

(ii) any **one** from:

- so (the student) can compare results
- so only one (independent) variable
- to get reliable / accurate results
- because (the expanded) polystyrene absorbs some of the sound

*do **not** credit just 'so it's a fair test'*

1

(iii) **[A]** wood

1

[B] either 0.25 **or** 1/4 **or** 25 % **or** 15/60 **or** 1: 3

*do **not** credit 1 : 4*

1

(d) practical suggestion

1

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appropriate reason / explanation

example *line / panel the walls with wood / plasterboard / increase the thickness of the plaster (on the walls) (1)*
(this) will absorb / reflect (back) (most / some of) the sound (1)

credit legal suggestions for attempting to limit the noise made by the neighbours
example *ask the neighbours to make less noise (1)*
by limiting the time(s) music played (1)

do ***not*** *credit reference to 'sound particles' for second mark*

1

[9]

Q3.

(i) X-rays or gamma rays

for 1 mark

1

(ii) passes through flesh;
stopped by bone/absorbed

for 1 mark each

2

[3]

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