Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Mark Schemes

Q1.

(a) Group 1

ignore figures
reason only scores if group correct

Reason: Loudest sound needed for person to notice it.

allow louder sound
allow exposed to loud noise for longest / longer

1

(b) any **three** from:

ignore Group 1 has the worst hearing
ignore figures unqualified

- the *longer* the exposure (to loud sounds) the greater the hearing loss
- no exposure / *Group 3* has the best hearing

  allow better
- hearing worsens (significantly) for frequencies above 1000Hz (or converse).

  ignore hearing is worse at high frequencies
- the first 10 years exposure has more of an effect than the next 10 years

  allow 10 years exposure to loud noise has no effect on hearing at 500 Hz

3

[4]

Q2.

0.000294 or 2.94×10^{-4} (m)

*a correct answer given to an incorrect number of significant figures gains **2** marks*
eg 2.939×10^{-4} *(m)* ***or*** 2.93×10^{-4} *(m)*
or *0.0002939 (m)* ***or*** *0.000293 (m)*
or 2.9×10^{-4} *(m)* ***or*** *0.00029 (m)*
or 3×10^{-4} *(m)* ***or*** *0.0003 (m)*
*allow **1** mark for correct substitution*
$1540 = 5\ 2400\ 000 \times \lambda$
or $1540 = 5.24 \times 10^{6} \times \lambda$
provided no subsequent step
or *allow **1** mark for correct substitution and rearrangement*

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$$\lambda = \frac{1540}{5\,240\,000}$$

or

$$\lambda = \frac{1540}{5.24 \times 10^6}$$

provided no subsequent step

an answer of 2.94 gains one mark only

an answer given to an incorrect number of s.f. and including a rounding error gains one mark only

eg 2.938 × 10^{-4} (m)

3

[3]

Q3.

(a) radiation

ignore infra red, IR, or heat

1

(b) (i) 105 000 000

(E = mcθ)

accept answers in standard form eg. 1.05 × 10^8

*E = 5000 × 4200 × 5 gains **1** mark*

Unit mark is independent, but must match value given for full marks

if no other marks gained 1 mark for any correct unit of energy

2

J / joules

not lower case j

allow Joules

allow units in words eg kilojules

*allow 105 000 kJ or 105 MJ for **3** marks. These figures must have units.*

allow units written as words Eg. kilojoules

not KJ, kj, mJ, Mj

1

(ii) 6600(s) / 6560(s) / 6563(s) / 6562.5(s)

(E = Pt)

allow ecf from (b)(ii)

allow answers in minutes and hours provided correct and unit changed on answer line

eg. 109 / 110 minutes or 1.8 hours

*if correct answer given with incorrect unit, maximum mark of **2** eg 6600 minutes*

*105 000 000 = 16 000 × t gains **1** mark*

*t = 105 000 000 / 16 000 gains **2** marks*

*t = 105 000 000 / 16 gains **1** mark*

or

6 562 500(s) gains 2 marks

3

(iii) energy gained from surroundings / air

allow heat

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ignore air is warmer or pool is colder

1

[8]

Q4.

(a) X = wavelength

1

Y = frequency

1

wavelength in metres / m and frequency in hertz / Hz

*both units correct for **1** mark (independent of first two marking points)*
correct units must match correctly named quantities
allow Hertz
allow multiples of the units eg kHz, km (or in words)

1

(b) (i) galaxy A is stationary (relative to Earth / us)

1

galaxy B is moving towards (Earth / us)

allow 1 mark for identifying galaxies B and C are moving in opposite directions

1

galaxy C is moving away from (Earth / us)

*allow **1** mark if say <u>all</u> moving away / towards **or** stationary*

1

(ii) galaxy C is fast<u>er</u> (than galaxy B)

allow converse statement
*do **not** accept galaxy C <u>expanding</u> faster*

1

(iii) sample is too small

accept three is too few
allow not enough evidence
ignore inaccurate, invalid, anomalous

1

compared to the size of the population

accept there are a very <u>large</u> number of galaxies in the Universe
*allow A, B and C are moving differently (from each other) for **1** mark*

1

[9]

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