

Mark schemes

1

(a) they vibrate

do not accept 'they move'

1

(b) (i) any **one** from

- sound cannot travel through a vacuum
- there is no air **or** atmosphere on the Moon

accept 'there is a vacuum'

1

(ii) the sound can travel from **one** helmet to the other without passing through a vacuum

*accept 'there is no vacuum between them' **or** 'there is no vacuum to block the sound' **or** 'the sound can go through the helmets' **or** 'the helmets vibrate'*

*do not accept 'the sound isn't blocked any more' **or** 'they are in contact'*

1

(c) it is below zero **or** less than 0°C

*accept 'below freezing' **or** 'a minus temperature'*
do not accept 'it is very cold'

1

(d) (i) melt **or** thaw the ice

*accept 'heat it up' **or** 'move the mixture to a warmer part of the Moon'*

1

filter the water

accept 'filter it'

***or** 'filter out the dust and rock'*

accept 'distill it'

*do not accept 'sieve it' **or** 'pour off the water'*

1

(ii) to melt the ice

accept 'to boil the water' if distill it was an answer in (d) (i)

accept 'to move the mixture to a warmer part of the Moon'

*do not accept 'to lift it up' **or** 'to dig it up'*

do not accept 'to filter the water'

1

(iii) sunlight **or** solar energy

*accept 'heat' **or** 'light from the Sun'*

do not accept 'the Sun'

1

[8]

2

- (a) any **one** from
- light travels faster than sound
 - sound travels more slowly than light
accept 'light travels faster'
accept 'sound travels slower'
accept 'light is faster than sound'
do not accept 'light travels fast' or 'sound travels slow'
do not accept 'light travels before sound'
- 1 (L4)
- (b) (i) a bar halfway between 8 and 10 seconds
the top of the bar must be in the middle third between 8 and 10
- 1 (L3)
- (ii) C
accept '3.0'
- 1 (L3)
- (iii) any **one** from
- the storm became closer then moved further away
accept 'the storm passed over' or 'it passed by'
 - towards then away from Omar
accept 'at Flash A Omar was closer and at Flash F Omar was further'
 - the distance decreased then increased
accept 'it increased'
accept 'it went further away'
- 1 (L4)

[4]

3

- (a) solids
accept 'solid'
- 1 (L3)
- (b) any number between 333 and 353 inclusive
- 1 (L4)
- (c) (i) as waves **or** vibrations
accept 'the string vibrates' or 'it vibrates'
- 1 (L4)
- (ii) it vibrates
accept 'it makes the air vibrate'
- 1 (L4)

[4]

- 4 (a) bar for material A drawn to 40 decibels
*allow a tolerance of one small square for the drawn line, either above **or** below 40 decibels* 1 (L3)
- (b) 4 1 (L3)
- (c) D
accept '35' 1 (L4)
- (d) • Use the same box each time. ✓ 1 (L4)
- Keep the distance between the sound sensor and the bell the same each time. ✓
if more than two boxes are ticked, deduct one mark for each incorrect tick minimum mark zero 1 (L4)

[5]

- 5 (a) ruler ✓
if more than one box is ticked, award no mark 1 (L3)
- (b) any **one** from
- tubes had different widths
accept 'tubes had different shapes'
 - the tubes had different bores
 - he blew in different ways
 - different thickness of paper
 - different paper
accept 'tubes were different sizes'
accept 'tubes are one big, one medium, one little'
*do **not** accept 'different lengths'*
- 1 (L3)
- (c) the longer tube will make a lower sound ✓
if more than one box is ticked, award no mark 1 (L4)
- (d) 5 1 (L3)

[4]

6

(a) (i) vibrate

accept 'move in and out'

'move' is insufficient

1 (L4)

(ii) any **one** from

- it stops the sound waves **or** vibrations reaching our eardrums

accept 'it stops sound reaching our eardrum'

accept 'it absorbs sound'

accept 'it blocks the ear'

- it stops the eardrum vibrating

accept 'it stops the eardrum moving in and out'

- the eardrum vibrates less

accept 'soundwaves are reflected by the wax'

1 (L3)

(b) (i) human *and* sparrow *and* rabbit

accept 'bird' for sparrow

answers may be in any order

all three answers are required for the mark

1 (L4)

(ii) cat

1 (L4)

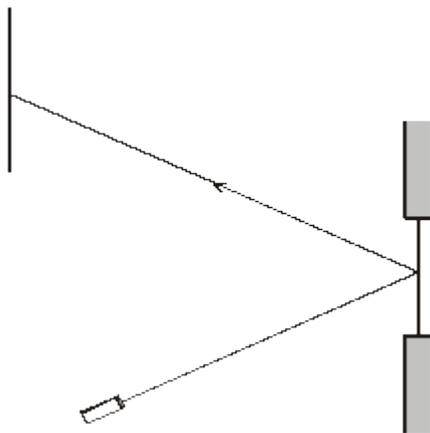
[4]

7

(a) the angles of incidence and reflection must be equal

1 (L5)

the ray must be continuous and straight with an arrow in the correct direction



accept one arrow in the correct direction on either the incident or the reflected ray

the ray must hit the screen in the middle 2 cm

1 (L5)

- (b) (i) any **one** from
- sound waves travel to the window **or** glass
accept 'sound travels to the window'
 - vibrations pass through the air
 - sound waves **or** vibrations hit the window
accept 'sound hits the window'
- 1 (L5)

- (ii) the beam will vibrate **or** move **or** jump about
- accept 'scatter' for vibrate*
accept 'it would go to other places in the room'
accept 'it would go in different directions'
accept 'it shakes' or 'it wobbles'
do not accept 'it is blurred'
'it goes in a different direction' is insufficient
- 1 (L5)

- (c) B ✓
- if more than one box is ticked, award no mark*
- 1 (L6)

[5]

8

- (a) pluck them harder
- 'make the strings vibrate more or move more*
do not accept 'make the strings vibrate more quickly'
- 1 (L5)

- (b) The sound has a higher pitch ✓
- if more than one box is ticked, award no mark*
- 1 (L5)

- (c) the sound from the thicker string has a lower pitch **or** a lower frequency
- accept 'it has a lower pitch or a lower frequency'*
accept 'the sound from the thicker string is louder
or 'it is louder'
answers must include a comparison
'it is lower' is insufficient
- 1 (L5)

- (d) (i) the sound in A has a higher pitch **or** a higher frequency
- accept 'it has a higher pitch or higher frequency'*
answers must show a comparison
'the vibrations are quicker' is insufficient
'it is higher' is insufficient
- 1 (L6)

- (ii) the sound in A is louder
accept 'it is louder'
accept 'the sound in C is quieter'
accept 'it has a greater amplitude'
'the vibrations are stronger
or of greater amplitude' is insufficient
*do **not** accept 'it is higher'*
- 1 (L6)

[5]

9

- (a) (i) five circles not touching and randomly arranged
accept at least three circles
accept pairs of similar atoms
- 1 (L6)

- (ii) they are closer
*do **not** accept 'they move faster'; 'they are close'*
- 1 (L6)

- (b) greater than
accept 'greater'
- 1 (L6)

- (c) (i) the amplitude gets smaller
accept 'the height of the waves gets less'
*accept 'the waves get shorter **or** smaller'*
*do **not** accept 'it vibrates less'*
- 1 (L6)

- (ii) any **one** from
- the peaks **or** troughs are equally spaced
accept 'the waves are the same distance apart'
*accept 'there are four peaks **or** waves*
***or** troughs between the lines'*
accept 'the width of each wave is the same'
accept 'the lines are equally spaced'
 - the frequency is constant **or** does not change
accept 'the wavelength is the same'
- 1 (L6)

[5]

10

(a) (i) Paul, James, Sylvia

accept 'light'; 'vibration'; 'sound'

answers must be in the correct order

all three answers in the correct order
are required for the mark

1 (L7)

(ii) 3

accept $\frac{1020}{340}$

1 (L7)

(b) (i) the energy **or** the sound is more spread out

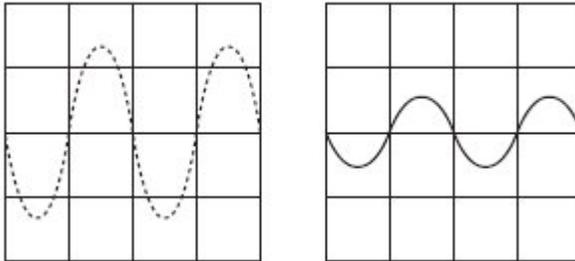
accept 'some of the sound is absorbed by the air'

accept 'the amplitude decreases'

'vibrations decrease' is insufficient

1 (L7)

(ii)



award one mark for a wave with a smaller amplitude

award one mark for a wave with the same frequency

*award the marks for a wave with the correct amplitude
and frequency but which is not centred*

*on the middle line of the grid **or** which is not in phase
with the drawn wave*

the marks may be awarded for a wave drawn on Sylvia's grid

2 (L7)

[5]