

# Sound Intensity, the Decibel Scale and Beats

Use this worksheet after reading the lesson to practise the key ideas and prove you can meet the success criteria.

Name \_\_\_\_\_

Date \_\_\_\_\_

Class \_\_\_\_\_

## 1. Key Ideas

Why does music sound quieter as you move away from a speaker, why does a 10 dB increase matter so much, and why do two nearby notes sometimes produce a pulsing wah-wah effect? This lesson links sound intensity, logarithmic decibels, and beats.

- The inverse square law for sound intensity
- Why sound intensity drops rapidly with distance

## 2. Success Criteria

By the end, you should be able to:

- The inverse square law for sound intensity
- That the decibel scale is logarithmic
- That +10 dB means 10 times more intense

## 3. Key Terms

### Work

The product of force and displacement in the direction of the force;  $W = Fd$ .

### Energy

The capacity to do work, measured in joules (J).

### Kinetic Energy

The energy of motion;  $KE = \frac{1}{2}mv^2$ .

### Potential Energy

Stored energy due to position or configuration.

### Power

The rate at which work is done or energy is transferred;  $P = W/t$ .

### Conservation of Energy

The principle that energy cannot be created or destroyed, only transformed.

## 4. Activity: Build the Lesson Map

Use the lesson to complete the table. Keep answers brief but specific.

Prompt	Your answer
Main concept	
Important example	
Common mistake to avoid	
How this links to the next lesson	

## 5. Short Answer Questions

1. 7. Explain why sound intensity decreases with distance from a point source.

**BAND 3** **3 MARKS**

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2. 8. A listener moves from 3 m to 9 m from a speaker. Compare the intensities at the two positions.

**BAND 4** **3 MARKS**

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3. 9. Two notes of 440 Hz and 444 Hz are played together. Calculate the beat frequency and explain how this helps a musician tune an instrument.

**BAND 5** **4 MARKS**

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## 6. Extend: Apply the Idea

BAND 5/6

5 MARKS

**A student gives a memorised answer about Sound Intensity, the Decibel Scale and Beats but does not use evidence or reasoning.**

Improve the answer by writing a stronger response that uses accurate terminology, a relevant example and a clear explanation.

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## 7. Multiple Choice

1. What is the best first step when answering a question about Sound Intensity, the Decibel Scale and Beats?

- A. Identify the key concept being tested
- B. Write every fact from memory
- C. Ignore the command word
- D. Skip examples and evidence

2. Which answer would show stronger understanding of Sound Intensity, the Decibel Scale and Beats?

- A. An answer with accurate terms and reasoning
- B. A copied definition only
- C. A single-word response
- D. An answer with no example

3. What should you do if a question asks you to explain?

- A. Link the idea to a reason or cause
- B. List unrelated facts
- C. Only draw a diagram
- D. Write the shortest possible answer

## 8. Success Criteria Proof

Finish with evidence that you can do each success criterion.

### SUCCESS CRITERION 1

**Prove that you can: The inverse square law for sound intensity**

**BAND 3**

**2 MARKS**

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### SUCCESS CRITERION 2

**Prove that you can: That the decibel scale is logarithmic**

**BAND 4**

**3 MARKS**

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### SUCCESS CRITERION 3

**Prove that you can: That +10 dB means 10 times more intense**

**BAND 5**

**4 MARKS**

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**One thing I still need help with:**

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