PHYSICS YEAR 11 - MODULE 3 - LESSON 3

Wave Intensity and the Inverse Square Law

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

A sound or light source feels weaker as you move away from it, not because it runs out of energy instantly, but because the same energy is spread over a larger area. That spreading gives us the inverse square law.

- The inverse square relationship $I \propto 1/r^2$
- Why intensity falls with distance from a point source

2. Success Criteria

By the end, you should be able to:

- The inverse square relationship $I \propto 1/r^2$
- The ratio form $\dfrac{I_1}{I_2} = \dfrac{r_2^2}{r_1^2}$
- The relationship $I \propto A^2$

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 = ½mv^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. Explain this lesson goal in your own words: "The inverse square relationship $I \propto 1/r^2$". Use one specific example from the lesson.

BAND 3 2 MARKS

2. Apply this idea to a new example: "The ratio form $\dfrac{I_1}{I_2} = \dfrac{r_2^2}{r_1^2}$". Show your reasoning clearly.

BAND 4 3 MARKS

3. Analyse why this idea matters for understanding Wave Intensity and the Inverse Square Law: "The relationship $I \propto A^2$".

BAND 5 4 MARKS

6. Extend: Apply the Idea

BAND 5/6 5 MARKS

A student gives a memorised answer about Wave Intensity and the Inverse Square Law 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.

7. Multiple Choice

1. What is the best first step when answering a question about Wave Intensity and the Inverse Square Law?

☐ 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 Wave Intensity and the Inverse Square Law?

☐ 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 relationship $I \propto 1/r^2$

BAND 3 2 MARKS

SUCCESS CRITERION 2

Prove that you can: The ratio form $\dfrac{I_1}{I_2} = \dfrac{r_2^2}{r_1^2}$

BAND 4 3 MARKS

SUCCESS CRITERION 3

Prove that you can: The relationship $I \propto A^2$

BAND 5 4 MARKS

One thing I still need help with: