

**USING A FOUR-TIER DIAGNOSTIC TEST TO IDENTIFY THE  
MISCONCEPTIONS HELD BY JUNIOR HIGH SCHOOL STUDENTS  
ABOUT MECHANICAL AND LIGHT WAVES**

**RESEARCH PAPER**

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# Using A Four-Tier Diagnostic Test To Identify The Misconceptions Held By Junior High School Students About Mechanical And Light Waves

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Sebuah skripsi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana Pendidikan pada Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam

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## DECLARATION

I do hereby declare that every aspect was written in this research paper entitled “**Using A Four-Tier Diagnostic Test To Identify The Misconceptions Held By Junior High School Students About Mechanical And Light Waves**” is the original result of my idea, efforts, and works without copying or plagiarizing from other papers. The theories, opinions, and others that are contained in this paper have been quoted or referenced based on scientific code from UPI and under scientific ethics that applies in scholarly society. This declaration is created truthfully and mindfully. Unless it is eventually considered to be a violation of scientific ethics, or whether there is a statement by the other to the authenticity of this research paper, I can accept the authorization of scholars or copyright that are found. Hence, I am willing to take responsibility and accept academic sanctions corresponds to the rules.

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**ABSTRACT**

This study delves into the significance of mechanical and light waves in comprehending diverse scientific concepts. Waves and vibrations are essential topics for students due to their numerous real-life applications. However, individual students' perspectives and everyday experiences may lead to misconceptions that hinder their learning process. To tackle this issue, a four-tier diagnostic test was designed and validated to assess students' conceptions and misconceptions. Content validity and reliability tests were conducted to ensure the instrument's accuracy and consistency. This research primarily focused on two prominent misconceptions related to wave behavior and properties, specifically involving light diffraction, reflection, and refraction. The results revealed varying levels of misconception among students, highlighting the necessity for targeted interventions in physics education. Educators play a crucial role in enhancing students' conceptual understanding by providing clear explanations of complex concepts, fostering discussions, and incorporating real-life examples. The findings underscore the importance of addressing misconceptions and cultivating meaningful learning experiences in physics education. A deeper understanding of scientific concepts enables students to develop critical thinking and reasoning skills, contributing to their overall academic achievement and real-world applications. By recognizing and rectifying misconceptions, educators can empower students to excel in their academic pursuits and apply their knowledge effectively in various practical scenarios.

**Keyword** : Four-tier Diagnostic Test, Misconception, Wave Behavior, Wave Properties.



**PENGUNAAN TES DIAGNOSTIK EMPAT TAHAP UNTUK  
MENGIDENTIFIKASI MISKONSEPSI PADA SISWA MENENGAH  
DASAR TENTANG GELOMBANG MEKANIK DAN CAHAYA**

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**ABSTRAK**

Penelitian ini bertujuan untuk menjelaskan pentingnya pemahaman tentang gelombang mekanis dan cahaya dalam menggali berbagai konsep ilmiah. Gelombang dan getaran merupakan topik yang krusial bagi para siswa karena memiliki banyak aplikasi yang relevan dalam kehidupan sehari-hari. Namun, pandangan dan pengalaman individu para siswa seringkali menyebabkan munculnya miskonsepsi, yang pada akhirnya dapat menghambat proses pembelajaran mereka. Oleh karena itu, dalam penelitian ini telah dirancang dan divalidasi yaitu sebuah tes diagnostik empat tahap yang bertujuan untuk menilai tingkat pemahaman dan miskonsepsi para siswa. Uji validitas konten dan reliabilitas telah dijalankan guna memastikan akurasi dan konsistensi instrumen penilaian tersebut. Penelitian ini menitikberatkan pada dua miskonsepsi utama yang berkaitan dengan perilaku dan sifat gelombang, khususnya yang terkait dengan fenomena pembelokan, pantulan, dan pembiasan cahaya. Hasil penelitian mengungkapkan adanya tingkat miskonsepsi yang beragam di antara para siswa, yang menegaskan perlunya intervensi yang sesuai dalam upaya meningkatkan kualitas pendidikan fisika. Para pendidik dapat meningkatkan pemahaman konseptual para siswa dengan mengklarifikasi konsep-konsep yang kompleks, mendorong terjadinya diskusi interaktif, dan mengintegrasikan contoh-contoh nyata dalam pembelajaran. Temuan penelitian ini menegaskan pentingnya penanganan miskonsepsi serta pendekatan pembelajaran yang memadukan makna dan pengalaman nyata dalam dunia fisika. Dengan mengembangkan pemahaman yang lebih mendalam mengenai konsep-konsep ilmiah, para siswa dapat mengasah keterampilan berpikir kritis dan penalaran, yang pada gilirannya akan berkontribusi pada prestasi akademis secara menyeluruh serta kesuksesan dalam mengaplikasikan pengetahuan dalam situasi dunia nyata.

**Kata Kunci:** Miskonsepsi, Perilaku Gelombang, Sifat Gelombang, Tes Diagnostik Empat Tahap.

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