# Workbook for Introductory Physics

Indicates a research-demonstrated benefit

## Overview

Carefully structured sequences of multiple-choice questions designed for use with classroom communication systems such as flash cards and clickers. Questions emphasize qualitative reasoning and multiple representations (graphs, diagrams, etc.), and are accompanied by lecture notes, exams, and free-response worksheets designed for use in the environment of a large-enrollment class. The conceptual "step-size" from one question to the next is fairly small, ideal for students with less preparation.

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| **Type of Method** | Instructional strategy, Curriculum supplement |
| **Level** | **Designed for:** Intro College Algebra-based<br>**Can be adapted for:** Teacher Professional Development, High School, Intro College Calculus-based, Intermediate Undergraduate |
| **Setting** | **Designed for:** Lecture - Large (30+ students)<br>**Can be adapted for:** Lecture - Small (<30 students), Recitation/Discussion Session, Studio |
| **Coverage** | Few topics with great depth |
| **Topics** | Electricity / Magnetism, Waves / Optics, Modern / Quantum |
| **Instructor Effort** | Medium |
| **Resource Needs** | Flash cards |
| **Skills** | **Designed for:** Conceptual understanding of physics content , Representing knowledge in multiple ways , Connecting conceptual and mathematical understanding<br>**Can be adapted for:** Problem-solving skills, Reflecting on one's own learning, Self-confidence around physics |

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| **Research Validation** | **Based on research into:** how students learn , student ideas about specific topics<br>**Demonstrated to improve:** scores on multiple choice conceptual tests<br>**Studied using:** conceptual pre/post exams , student interviews , classroom observations , research conducted at multiple institutions |
| **Compatible Methods** | Peer Instruction, PhET, UW Tutorials, JiTT, Ranking Tasks, ILDs, CGPS, Physlets, Context-Rich Problems, RealTime Physics, TIPERs, ABP Tutorials, SCALE-UP, OSP, SDI Labs, OST Tutorials, Thinking Problems, LA Program, CAE TPS, MBL, CPU, SCL, TEFA, Tools for Scientific Thinking, Tutorials, Clickers |
| **Similar Methods** | Peer Instruction, CAE TPS, TEFA, PI QM |
| **Developer(s)** | David E. Meltzer and Kandiah Manivannan |
| **Website** | http://physicseducation.net |
| **Intro Article** | 2780 |
| **Intro Article** | Transforming the lecture-hall environment: The fully interactive physics lecture |