




PER User's Guide

Physics Education Research
Evidence-based resources for teaching physics



Thinking Problems

 Indicates a research-demonstrated benefit

Overview

A collection of homework problems, clicker questions, and exam questions, created for teachers and education researchers by the University of Maryland's Physics Education Research Group. Includes estimation problems, ranking tasks, and problems designed to help students connect mathematical and conceptual reasoning and relate physics to the real world.



Type of Method

Curriculum supplement



Level

Designed for: Intro College Calculus-based, Intro College Algebra-based, Intro College Conceptual

Can be adapted for: Teacher Preparation, Teacher Professional Development, High School, Intermediate Undergraduate



Setting

Designed for: Lecture - Large (30+ students), Lecture - Small (<30 students), Recitation/Discussion Session, Homework, Studio

Can be adapted for: Lab



Coverage

Few topics with great depth, Many topics with less depth



Topics

Mechanics, Electricity / Magnetism, Waves / Optics, Thermal / Statistical, Modern / Quantum





Skills

Designed for: Problem-solving skills, Conceptual understanding of physics content, Connecting conceptual and mathematical understanding, Coherent framework for physics, Understanding how physics relates to the real world, Think like a scientist

Can be adapted for: Reflecting on one's own learning, Self-confidence around physics, Enjoyment of physics



Research Validation

Based on research into: how students learn  , student ideas about specific topics 



Compatible Methods

[Peer Instruction](#), [PhET](#), [UW Tutorials](#), [JiTT](#), [Ranking Tasks](#), [ILDs](#), [CGPS](#), [Physlets](#), [Context-Rich Problems](#), [TIPERs](#), [ABP Tutorials](#), [SCALE-UP](#), [OSP](#), [SDI Labs](#), [OST Tutorials](#), [Workbook for Introductory Physics](#), [LA Program](#), [CAE TPS](#), [MBL](#), [New Model Course](#), [CPU](#), [SCL](#), [TEFA](#), [CU Modern](#), [IQP](#), [M&I](#), [Tutorials](#), [Clickers](#), [Responsive Teaching](#)

 **Similar
Methods**

[Ranking Tasks](#), [TIPERs](#)

 **Developer(s)**

E. F. Redish and the University of Maryland Physics Education Research Group

 **Website**

<http://www.physics.umd.edu/perg/problems.htm>

