




## 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>

