

**vectors**  
**Hanging Mass Lab**

<p><b>Physics Goal</b></p> <ul style="list-style-type: none"> <li>Students will find the mass of objects using vector analysis.</li> </ul> <p><b>Behavioral Objective</b></p> <ul style="list-style-type: none"> <li>All students can demonstrate ability to setup lab. Ninety percent of students can perform appropriate calculations.</li> </ul> <p><b>Technology:</b> ELMO/Video Projector, SmartBoard, Netbook</p> <p><b>Materials:</b> Paper, Pencil, Scales, Pulleys, Masses, String, Paperclips, Washers, Scissors, Lab Sheet.</p> <p><b>Pacing:</b> 55 minutes</p>	<p><b>State Standards</b></p> <p><b>P3.2C,D</b> <b>P3.4A</b></p>
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**1. ANTICIPATORY SET (10 minutes)**

Take attendance during music. Remind students of homework due tomorrow and Practice Quiz. Load "Vector Lab" and inform students on our goal for the day. Describe procedures with pictures. **Model** the Fw and T of a hanging mass. **Model** the level protractor. Hand out lab worksheets.

**Ask students:**

- What forces are acting on this hanging mass? How is that related to the tension in the string?
- What components did we have for tension?
- What problems have we worked on that will help us solve this one? How are these problems different in one important way?

**Materials:**  
"Vector Lab" SMART

**Thinking Levels:**  
Application

**Learning Styles:**  
Visual, Logic, Audio

**Checking for Understanding:**  
Question/Answer

**2. EXPLORE (30 minutes)**

Generate groups and release students to set up and complete lab. **Walk around** observing proper procedures and calculations. Make mental checks for students as they demonstrate each. Offer advice, ask questions, and answer students' questions.

Problems to check for:

- Are the pulleys aligned?
- Are all masses off the ground? Are masses different?
- Is the knot of the fishing line stuck in the pulley?
- Is this the correct angle to measure?
- Are masses being weighed properly?

Students may move to their seats as they're finished with the lab equipment. Assist students with calculation of percent error. Recognize times to answer many students' questions by responding to the entire class.

- I'd like everyone's attention for a moment. A few students have asked how to.....

**Materials:**  
Lab Equipment

**Thinking Levels:**  
Comprehension, Application

**Learning Styles:**  
Visual, Logic, Kinesthetic

**Checking for Understanding:**  
Question/Answer  
Student Demonstration

**3. SUMMARIZE (10 minutes)**

Students that finish the lab early should be working on homework or the practice quiz.

Class discussion on error:

- Did anyone have an error above 5%? 10%?
- What were possible causes for error?
- If we were to do the lab again, how could we avoid this error?

Labs and homework are due Friday. Practice Quiz key will be available next week. Look forward to projectiles.

**Materials:**

**Thinking Levels:**  
Comprehension  
Evaluation

**Learning Styles:**  
Logic, Audio, Visual

**Checking for Understanding:**  
Question/Answer  
Student Discussion

**4. ASSIGNMENT GUIDE**

**Exit Slip**

- "Write down two things you have learned and one that you're struggling with."

**Assignment**

- Vector Non 90° #1
- Vector Lab

**Materials:**

Scrap Paper, Pencil

**Thinking Levels:**  
Evaluation

**Learning Styles:**

**Checking for Understanding:**  
Exit Slip  
Assignment