

Performance Assessment—Unit 1.1 and 1.2

Up the Incline

Grade 7 Science

Overview

Students lift a 1.0 kg mass and pull it up an incline. They calculate the work done. They describe how the forces required to do the work differ.

Content Standards

GLE 0707.11.2 Apply the equation for work in experiments with simple machines to determine the amount of force needed to do work.

Science GLE 0707.Inq.2 Use appropriate tools and techniques to gather, organize, analyze, and interpret data.

Science GLE 0707.Inq.5 Communicate scientific understanding using descriptions, explanations, and models.

MCS Learning Outcomes: Compare the work done by different forces. Compare the work done in pulling a load up an incline plane with the work done in lifting the load straight up.

Materials

Pegboard assembly, 1.0 kg mass, several books

Resources

See STCMS Energy, Machines and Motion, Lesson 1, Inquiry 1.7, for a description of this activity. Use the following questions on the instruction card:

1. Compare the force required to lift the mass directly to the top of the incline plane to force required to pull the mass up the incline.
2. Calculate the work done in each task.
3. Use your knowledge of forces, simple machines, and work to explain your observations.

Assessment Rubric

Criteria	Advanced	Proficient	Below standard
Describing forces	Correctly describes the force needed to pull the mass up the incline as less than that needed to lift the mass straight up	Generally compare the two forces but does not specifically state which task requires greater force	Makes no comparison of forces required
Calculating work	Correct math and units for both tasks	Correct formula but one or both calculations have errors or lack appropriate units	Incorrect formula or both calculations have errors
Explanation	A clear explanation that uses the observations and calculations to support ideas	Reasonable explanation that contains errors due to incorrect calculations or does not address errors in calculations	No explanation or an incomplete explanation or an explanation not clearly presented