Fulcrum Scales

Mid-Valley
STEM-CTE HUB

www.midvalleystem.org
midvalleystemctehub@linnbenton.edu
Linn-Benton Community College
Albany Campus - CC-212

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Fulcrum Scales

The Fulcrum Scale STEAM Kit introduces students to the fundamental principles of levers and mechanical advantage. By engaging with this hands-on tool, learners explore how varying the distance from the fulcrum affects balance and force distribution. This kit fosters an understanding of simple machines, specifically levers, and encourages experimentation with real-world applications. Ideal for students from upper elementary through middle school, the Fulcrum Scale provides a tactile experience to grasp concepts of force, balance, and mechanical advantage.

Grade Level

4th - 10th

Group Size

2 - 4 students

Time Duration

20 - 40 minutes

Content of Kits

Components

- 10 fulcrum scales

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Usage

Getting Started

1. **Introduce the Fulcrum Scale -** Present the Fulcrum Scale to students, explaining its components: the base, lever arm, fulcrum, and adjustable notches or holes for placing weights.

2. **Demonstrate Basic Functionality -** Show how to place weights on the lever arm and adjust the fulcrum's position to achieve balance. Discuss the concept of torque and how it relates to the distance from the fulcrum.

3. **Safety Briefing -** Emphasize the importance of handling the scale gently to avoid damage. Ensure that weights are securely placed to prevent them from falling.

Storage

- Store the Fulcrum Scale in the provided storage container to protect them from damage.
- Ensure all parts are dry and free from debris to maintain functionality.

Troubleshooting

- **Scale not balancing properly:**
  - Check that weights are evenly distributed and that the fulcrum is positioned correctly.
  - Ensure that the lever arm is not warped or damaged.
- **Difficulty adjusting the fulcrum:**
  - Verify that the notches or holes are clear of debris and that the fulcrum moves smoothly.
  - If resistance persists, apply a small amount of lubricant to the moving parts.

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Activity Guide

Beginner

Balance the Beam
Students place equal weights at equal distances from the fulcrum on both sides of the lever arm. They observe the balance achieved and discuss the concept of equilibrium.

Intermediate

Exploring Mechanical Advantage
Students place unequal weights at varying distances from the fulcrum and adjust until balance is achieved. They calculate the mechanical advantage and discuss how levers can amplify force.

Advanced

Design Your Lever System
Students design a lever system using the Fulcrum Scale to lift a specific object. They experiment with different fulcrum positions and weight placements to achieve the desired outcome, documenting their findings.

Extension Activities:

Real-World Applications of Levers
Students research and present on various tools that utilize lever systems, such as crowbars, scissors, and seesaws. They explain how the principles observed in the Fulcrum Scale apply to these real-world examples.

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Learning Extensions

STEAM Connections: Engineering - Math - Science

Learning Objectives:

- Understand the concept of levers and mechanical advantage.
- Explore how varying the distance from the fulcrum affects balance and force distribution.
- Develop problem-solving skills through experimentation.
- Connect theoretical knowledge to practical applications.

Career Connections:

- **Mechanical Engineer -** Designs and analyzes lever systems in machinery.
- **Industrial Designer -** Applies principles of levers to create ergonomic tools and devices.
- **Physicist -** Studies the forces and mechanics involved in lever systems.
- **Educator -** Teaches fundamental physics concepts using hands-on tools.

Essential Employability Skills:

- Critical Thinking
- Collaboration
- Communication
- Creativity

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Resources and Accessibility

Safety Guidelines

- Handle the Fulcrum Scale gently to avoid damage.
- Ensure weights are securely placed to prevent accidents.
- Supervise younger students during activities to ensure safe usage.

Accessibility

- Provide tactile markers on the scale for students with visual impairments.
- Allow extra time for students with motor challenges to adjust the fulcrum and place weights.
- Use verbal descriptions and demonstrations to support diverse learning needs.

Library Catalog

Library Resources

Feedback

QR to feedback survey