

5" Contour Gauges



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5" Contour Gauges

The 5" Contour Gauge Kit introduces students to a specialized measuring tool used by engineers, designers, carpenters, manufacturers, and fabricators to copy the shape and profile of irregular objects accurately. Through hands-on investigations, students explore how contour gauges capture complex surfaces and transfer measurements for design, modeling, and construction projects. Students develop spatial reasoning, precision measurement, and problem-solving skills while experiencing how engineers use profile measurements to create accurate prototypes and finished products.



Grade Level

6th - 12th

Group Size

1-2 per group

Time Duration

30 - 60 minutes

Content of Kits

Components

- 15 5" Contour Gauges



Usage

Getting Started

1. Inventory and Inspect the Contour Gauges

Begin by confirming that all 15 contour gauges are present and that the sliding pins move freely. Demonstrate how the pins conform to an object's profile while maintaining its shape.

2. Demonstrate Proper Use

Show students how to press the contour gauge evenly against an object's surface without twisting or forcing the pins. Explain how the captured profile can be transferred to paper or another material.

3. Practice with Simple Shapes

Allow students to practice capturing the profiles of classroom objects such as books, bottles, pipes, or blocks before progressing to more complex surfaces.

4. Record and Compare Profiles

Provide graph paper or engineering notebooks for students to trace captured profiles and compare how different objects create unique shapes.

Storage

- **Keep Pins Clean and Straight**

Remove dust or debris from the contour gauges after use and ensure the pins move freely before returning them to storage.

- **Store Flat to Protect the Pins**

Store contour gauges flat in a clean, dry location where the pins will not be compressed or bent by other materials.

Troubleshooting

- **The Profile Is Incomplete**

If the captured shape is inaccurate, press the contour gauge evenly against the object using consistent pressure. Avoid rocking or twisting the tool while taking the measurement.

- **Pins Are Difficult to Move**

If the pins become stiff, gently move them back and forth to loosen them and check for dirt or debris lodged between the pins.



Activity Guide

Beginner

Copy the Shape

Students use contour gauges to capture the profiles of everyday classroom objects and compare the similarities and differences between simple and complex shapes.

Oregon Science Standards Alignment

Science and Engineering Practice

Procedure

1. Provide each student team with a contour gauge and several classroom objects.
2. Press the contour gauge firmly against each object to capture its profile.
3. Carefully transfer the profile onto paper by tracing the outline.
4. Compare the traced profiles and discuss how different objects create unique shapes.
5. Challenge students to identify an object using only its traced profile.

Intermediate

Engineering Reverse Design

Students investigate manufactured objects by capturing their profiles and creating scale drawings of the measured shapes. Students discuss why engineers need accurate measurements before designing or producing parts.

Oregon Science Standards Alignment

MS-ETS1-2

Procedure

1. Select a manufactured object with an interesting or irregular profile.
2. Use the contour gauge to capture its shape.
3. Transfer the profile onto graph paper.
4. Label important dimensions and compare profiles with another object.
5. Discuss how engineers might use these measurements to reproduce or improve the object.

Advanced

Design Challenge: Make It Fit

Students work in teams to solve an engineering problem that requires matching an irregular shape or designing a component that fits precisely around an object. Teams use contour gauges to collect measurements, test prototypes, and improve their designs.

Oregon Science Standards Alignment

MS-ETS1-3

Procedure

1. Present students with an object that requires a custom-fitting holder, support, or opening.
2. Capture the object's profile using the contour gauge.
3. Trace the profile onto cardboard or cardstock.
4. Cut out the traced shape and test its fit around the object.
5. Modify the design as needed until the component fits accurately, then discuss how engineers improve prototypes through repeated testing.



Learning Extensions

STEAM Connections: Engineering - Math - Science

Learning Objectives:

- Use contour gauges to accurately measure and duplicate irregular shapes.
- Apply precision measurement techniques to engineering and design challenges.
- Develop spatial reasoning by comparing two- and three-dimensional profiles.
- Create sketches and models using captured measurements.
- Analyze how accurate measurements improve engineering design and manufacturing.
- Communicate design ideas using technical drawings and measurement data.

Career Connections:

- **Mechanical Engineer** – Designs machines and mechanical components using precise measurements.
- **Industrial Designer** – Creates products by developing accurate models and prototypes.
- **Carpenter** – Uses contour gauges to fit flooring, trim, and cabinetry around irregular surfaces.
- **Cabinet Maker** – Measures and shapes custom wood pieces for precise installation.
- **Welder/Fabricator** – Creates custom metal parts that fit complex shapes and structures.
- **Architect** – Designs buildings using detailed measurements and technical drawings.
- **Product Designer** – Develops and refines products through measurement and prototype testing.

Essential Employability Skills:

- Critical Thinking
- Problem Solving
- Observation and Attention to Detail
- Communication
- Collaboration
- Spatial Reasoning
- Precision





Resources and Accessibility

Safety Guidelines

- **Use Contour Gauges Carefully**

Press contour gauges gently against objects and avoid forcing the pins or using excessive pressure. Keep fingers clear of the moving pins during use.

- **Maintain an Organized Workspace**

Keep work surfaces clear while measuring objects and return contour gauges to their storage location after use to prevent accidental damage.

Accessibility

- **Provide Multiple Ways to Participate**

Students can capture profiles, trace measurements, sketch designs, record data, or analyze results. Assigning different roles allows all learners to contribute to engineering investigations.

- **Support Learning with Visual and Hands-On Strategies**

Demonstrate proper contour gauge use with large examples before independent practice. Encourage students to communicate understanding through tracing, drawing, verbal explanations, and collaborative discussions to support diverse learning styles.

Library Catalog



Library Resources



Feedback

QR to feedback survey

