

Early Learning Engineering



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Early Learning Engineering

The Early Learning Engineering Kit introduces young learners to engineering, design, and creative problem-solving through hands-on building challenges. Using colorful interlocking building manipulatives, students explore how structures are designed, built, tested, and improved while developing fine motor skills and spatial reasoning. As students create towers, bridges, vehicles, animals, and their own imaginative designs, they practice collaboration, perseverance, and the engineering design process. Designed for Pre-K through 2nd grade, this kit encourages curiosity, creativity, and early STEM learning through open-ended exploration and guided challenges.



Grade Level

Pre-K - 2nd

Group Size

1 - 2

Time Duration

15 - 60 minutes

Content of Kits

Components

- 550 interlocking building manipulatives



Usage

Getting Started

1. Inventory and Sort the Building Pieces

Begin by unpacking the three building sets and organizing the pieces by shape, size, or color. Sorting the manipulatives before students begin makes it easier for teams to locate materials and encourages early classification skills.

2. Explore How the Pieces Connect

Give students time to freely explore the building pieces before introducing a challenge. Encourage them to experiment with different connections and discover how changing the arrangement of pieces affects the strength and stability of their structures.

3. Build a Simple Model Together

Introduce the kit by building a simple structure as a class, such as a tower, bridge, or animal. Model how engineers plan, build, test, and improve their designs by discussing what makes a structure stable and what changes could make it stronger.

4. Introduce the Engineering Design Process

Encourage students to think like engineers by asking them to imagine, create, test, and improve their designs. Remind students that redesigning after something doesn't work is an important part of engineering and helps create better solutions.

Storage

- **Sort and Store Pieces by Set**

After use, collect all building pieces and return them to their designated storage containers. Keeping each set together makes inventory easier and ensures enough materials are available for future classroom activities.

- **Inspect and Organize Before Storing**

Before packing the kit, check that all pieces are clean and free of damage. Remove any debris from the manipulatives and store them in a dry location to keep the kit organized and ready for the next group of learners.

Troubleshooting

- **Structures Keep Falling Apart**

If students' creations are unstable, encourage them to build on a flat surface and check that each piece is securely connected. Suggest widening the base or adding additional support pieces to improve stability.

- **Students Are Unsure How to Begin**

If students are struggling to get started, encourage them to build a simple object such as a tower, bridge, animal, or vehicle. Providing a simple building challenge or allowing students to work with a partner can help spark ideas and build confidence.



Activity Guide

Beginner

Build the Tallest Tower

Students work in teams to build the tallest freestanding tower they can using the engineering manipulatives. After testing their towers, students discuss what made their designs strong or unstable.

Oregon Science Standards Alignment

K-2-ETS1-1 & K-2-ETS1-2

Procedure

1. Divide students into teams of 2–3.
2. Challenge each team to build the tallest tower possible.
3. Test whether each tower can stand on its own for at least 10 seconds.
4. Measure the height of each tower and compare results.
5. Discuss what design features helped towers remain stable.

Intermediate

Bridge Builders

Students design and build a bridge that spans a gap between two surfaces. Teams test whether their bridges can support small classroom objects and improve their designs using the engineering design process.

Oregon Science Standards Alignment

K-2-ETS1-1 & K-2-ETS1-3

Procedure

1. Create a gap between two stable surfaces.
2. Challenge each team to build a bridge that spans the gap.
3. Test each bridge by placing small objects on top.
4. Identify any weak points and redesign the bridge.
5. Compare how different designs supported weight.

Advanced

Design Something That Moves

Students use the engineering manipulatives to design and build a creation with a moving part, such as a robot, vehicle, animal, or machine. Teams test how the moving parts function and redesign their models to improve movement, stability, or creativity.

Oregon Science Standards Alignment

K-2-ETS1-1, K-2-ETS1-2, & K-2-ETS1-3

Procedure

1. Challenge each team to build a creation that includes at least one moving part.
2. Encourage students to plan their design before building.
3. Test how the moving part works and identify any improvements that could be made.
4. Redesign the model to improve its movement, strength, or appearance.
5. Invite each team to demonstrate their creation and explain how it moves and what it was designed to do.



Learning Extensions

STEAM Connections: Engineering - Math - Science

Learning Objectives:

- Explore the engineering design process by planning, building, testing, and improving structures and simple machines.
- Develop spatial reasoning and fine motor skills through hands-on construction activities.
- Investigate how shape, balance, and connections affect strength and stability.
- Use creativity and problem-solving to design models that meet specific challenges or goals.
- Communicate ideas, observations, and design improvements using drawings, discussion, and demonstrations.
- Work collaboratively to solve engineering challenges and reflect on how redesign improves a solution.

Career Connections:

- **Mechanical Engineer** – Designs machines, moving parts, and mechanical systems.
- **Architect** – Designs buildings and other structures that are safe, functional, and visually appealing.
- **Construction Manager** – Oversees building projects and coordinates teams.
- **Industrial Designer** – Creates toys, tools, furniture, and everyday products that are both functional and attractive.
- **Product Designer** – Develops and improves products by testing ideas and making changes based on feedback.

Essential Employability Skills:

- Creativity and Innovation
- Problem Solving
- Collaboration
- Communication
- Critical Thinking
- Perseverance
- Observation and Attention to Detail





Resources and Accessibility

Safety Guidelines

- **Build in a Safe Workspace**

Encourage students to build on a flat, stable surface and keep their work area organized. Pick up loose pieces promptly to help prevent slips, trips, or accidental stepping on building components.

- **Handle Building Pieces Responsibly**

Use the engineering manipulatives as intended and avoid throwing or forcing pieces together. Remind students to keep small pieces away from their mouths and to use materials carefully while working with classmates.

Accessibility

- **Provide Multiple Ways to Participate**

Students can contribute by planning designs, sorting pieces, assembling models, testing creations, recording observations, or explaining how their designs work. Offering a variety of roles allows all learners to participate according to their strengths and abilities.

- **Support Learning Through Visual and Hands-On Exploration**

Use picture cards, model examples, teacher demonstrations, and guided questioning to introduce engineering concepts. Encourage students to sketch ideas, build collaboratively, and learn through trial and error, supporting a variety of learning styles and developmental needs.

Library Catalog



Library Resources



Feedback

QR to feedback survey

