

Engineering Challenges

Introduction

The centers in this unit are designed to encourage young learners to think like engineers by:

- **investigating cause and effect**
- **exploring simple machines**
- **planning and designing structures using tools**

Engineering #1 Fix it!

The simple and safe activity helps young scientists explore electronics and how they work. Children assemble a flashlight and are delighted when it turns on!

Learning Objectives:

- The student will identify a problem and develop a solution to it.
- The student will design, build, and test theories through their play.

Recommended Supplies:
Flashlight - Purchase an inexpensive, regular flashlight. The best option for a flashlight is one that requires 2 batteries.

Procedure:

1. ...
2. ...
3. ...



Engineering #2 Light it!

Set up this simple Christmas lights display at the science center and invite students to explore and discover how to turn on the Christmas lights.

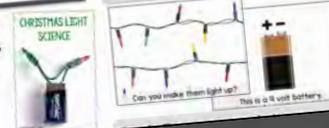
Learning Objectives:

- The student will identify a problem and develop a solution to it.
- The student will design, build, and test theories through their play.

Recommended Supplies:
String of Christmas lights
- Insulated, non-LED lights
scissors - for teacher use only
9V batteries

Procedure:

1. ...
2. ...
3. ...



Engineering #3 Nuts & Bolts

Young children love "finkering". This simple investigation with nuts and bolts will help develop both problem-solving skills and fine motor coordination.

Learning Objectives:

- The student will identify a problem and develop a solution to it.
- The student will improve hand strength and fine motor coordination.

Recommended Supplies:
bolts and nuts - a variety of large metal nuts and bolts (3/4 in, 1 in, and larger work well). Alternatively, purchase a set of large toy nuts and bolts. (They are available in wood or plastic.)

Procedure:

1. ...
2. ...
3. ...



Engineering #4 Unlock it!

Children are naturally curious and drawn toward tinkering. Padlocks and keys provide an enticing opportunity to "unlock" a problem.

Learning Objectives:

- The student will identify a problem and develop a solution to it.
- The student will design, build, and test theories through their play.

Recommended Supplies:
padlocks with keys - These are often inexpensive and available with back-to-school supplies.

Procedure:

1. ...
2. ...
3. ...



Engineering #5 Which lid fits?

Experimenting with tools, simple machines, and engineering does not have to be complicated. Set up this collection of jars and lids and let children explore.

Learning Objectives:

- The student will identify a problem and develop a solution to it.
- The student will strengthen hand muscles and fine motor coordination.

Recommended Supplies:
A collection of jars and lids - Collect clean, plastic jars and lids or ask families to save them and donate them to the classroom. (Jelly, BBQ, spaghetti sauce, round glassware containers, orange juice jugs, and fruit jars all work well.)

Procedure:

1. Display the open jars and lids.
2. Challenge the students: "Can you find the lid that fits?"
3. Provide the students with plenty of time to tinker, test, and problem-solve at the science center.
4. Like the other engineering centers in this unit, this activity provides a satisfying self-checking solution.

Book Recommendations:
Who Stole the Cookies from the Cookie Jar? by Jan Manning
My Little Like the Nifty Jar by Brenda Swann
Bread and Jam for Frances by Russell Hoban

Safety: Supervise children closely at this center. Use your best judgment in determining its appropriateness with your age group.



Engineering #6 Screwdrivers

Engineering in preschool involves learning about tools and how they are used. Provide young learners with an opportunity to explore screwdrivers at this center.

Learning Objectives:

- The student will demonstrate explain the safe and appropriate use of tools and materials.
- The student will design, build, and test theories through their play.

Recommended Supplies:

- screwdrivers - both flat head and crosshead
- screws
- block of craft foam or balsa wood

Procedure:

1. Set up a tinkering construction area for your preschoolers.
2. Provide a variety of large screws, as well as 2 types of screwdrivers.
3. Invite the students to screw the screws into the craft foam (or wood block). Ask them how they could get the screws out? Allow plenty of time for exploration.

Book Recommendations:
Fix It! by George Birkel
Whose Tools? by Toni Buzzeo

Safety: Supervise children closely. Use your best judgment in determining its appropriateness with your age group.



Engineering #7 Wheels & Axles

Young children use their understanding of ramps, force, motion, tools and engineering to design a vehicle that will roll. This is a great simple machine challenge for the end of the year!

Learning Objectives:

- The student will identify a problem and develop a solution to it.
- The student will design, build, and test theories through their play.

Recommended Supplies:
axles - pencils, thin markers, drinking straws, and/or dowel rods
wheels - empty spools, round plastic containers (with holes in the middle), ceramic, cylinder blocks, and/or washers

Procedure:

1. Provide a variety of supplies. Then, offer this challenge to the students: "Can you build a car that will roll?"
2. Allow students the opportunity to tinker with the wheels and axles. Encourage them to test their inventions and make changes as necessary over the course of time.

Book Recommendations:
If I Built a Car by Chris Van Dusen
Build, Dogs, Build A Tail by James Horvath

Safety: Supervise children closely at this center. Use your best judgment in determining its appropriateness with your age group.



Engineering #3

Nuts & Bolts

Young children love “tinkering”. This simple investigation with nuts and bolts will help develop both problem-solving skills and fine motor coordination.

Recommended Supplies:

bolts and nuts – a variety of large metal nuts and bolts (3/4 in, 1 in, and larger work well)

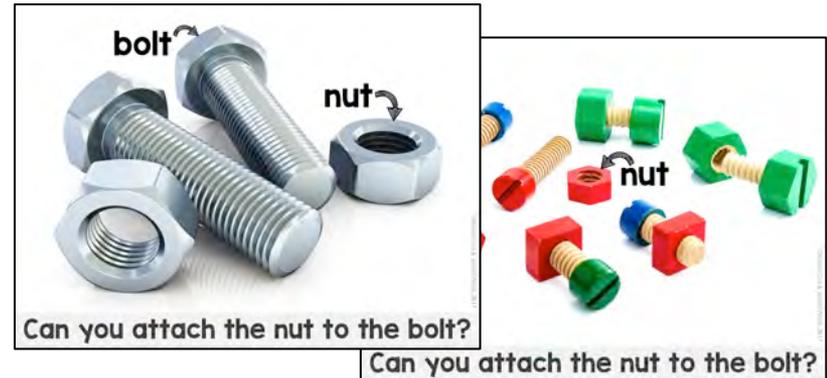
Alternatively, purchase a set of large toy nuts and bolts. (They are available in wood or plastic.)

Procedure:

1. Display a few large nuts and bolts at the science center.
2. Challenge the students figure out which ones fit together.

Learning Objectives:

- The student will identify a problem and develop a solution to it.
- The student will improve hand strength and fine motor coordination.



Book Recommendations:

The Toolbox by Anne Rockwell

Tool Book by Gail Gibbons

Safety: Supervise children closely at this center. Use your best judgment in determining its appropriateness with your age group.

Engineering #5

Which lid fits?

Experimenting with tools, simple machines, and engineering does not have to be complicated! Set up this collection of jars and lids and let children explore.

Recommended Supplies:

A collection of jars and lids -

Collect clean, plastic jars and lids or ask families to save them and donate them to the classroom. (Jelly jars, spaghetti sauce, round gladware containers, orange juice jugs, and fruit jars all work well.

Procedure:

1. Display the open jars and lids.
2. Challenge the students: "Can you find the lid that fits?"
3. Provide the students with plenty of time to tinker, test, and problem-solve at the science center.
4. Like the other engineering centers in this unit, this activity provides a satisfying self-checking solution.

Learning Objectives:

- The student will identify a problem and develop a solution to it.
- The student will strengthen hand muscles and fine motor coordination.



Book Recommendations:

Who Stole the Cookies from the Cookie Jar? by Jan Manning
Joyful Jake the Jelly Jar by Brenda Swain
Bread and Jam for Frances by Russell Hoban

Safety: Supervise children closely at this center. Use your best judgment in determining its appropriateness with your age group.