**Step 2: DEMONSTRATION (5 minutes)**

"Can we use these tools (hold up scissors and tape) and this material (hold up paper towel roll) to transform this ordinary object into something extraordinary? At each child's suggestion, model the idea with a TP roll and scissors.

"Let me show you another thing we can do." Demonstrate how to cut "petals" on one end of the TP roll, bending each down to become like a flower. "I call this a FLOWER FROM MARS because it's strange and fantastic!" "What other ways can we tinker to make unique looking flowers?" Demonstrate how to fold the petals in different ways, cut them at different widths, etc.

**Modeling perseverance (the whoo-hoo moment)**

Model an intentional error by cutting all the way through the roll, and exclaim, "Wooo-hoo!" Explain that "When we make a mistake, we say "Wooo-hoo!" because mistakes are opportunities to learn." Can we all say "Wooo-hoo!" if you make what you think is a mistake, don’t get upset, just say "Wooo-hoo!" and try again."

There is no "WRONG" in Tinkering, but there are a few rules:

1. **RESPECT** the Materials and Tools - Use tools properly, be mindful to use materials wisely, not wastefully
2. **RESPECT** your classmates - share materials, share tools. Be encouraging! Work together!
3. **RESPECT** yourself - always try your hardest. It's OK to feel frustrated, but keep working and keep trying. Be PROUD of what you do.
**Step 3: Tinkering time! (25 minutes)**

For the first 10 minutes, children will work independently, exploring the materials on their own. Remember, the flowers are just a suggestion. Students should feel free to tinker and experiment with the tools and materials, so long as they are following the 3 rules of respect.

After 10 minutes, stop and get the children's attention to issue a new challenge. "Now challenge you to see if you can connect what you've created with the other kids' flowers at your table." Demonstrate how two rolls can come together to make an even more fantastic flower.

Watch for signs of frustrations while students are working. Remind students to just say "Whoo-hoo!" when they've made what they think is a mistake.

When you see collaboration happening, call it to everyone's attention and celebrate it!

At the last 5 minutes, give a 5 minute warning to clean up time and say, "I challenge you to take it even further. Can you connect even more together? Can you cut or fold it in a way that it hasn't been done yet?"

> 2 minute and 1 minute warnings.

**Step 4: Clean Up and Reflection (10 minutes)**

Clean Up: Students should clean up their tables, placing scraps into the recycling bin, and returning scissors and unused rolls to their proper containers. Cleaning up after ourselves is an important part of Tinkering.

Reflection Time: In a circle on the rug, facilitate a dialogue about the tinkering experience.

"When we tinker, it's good to share our ideas and the things we discovered with each other."

"It's important that only one person talks at a time and they give respect to each other."

"Does anyone have any discoveries they'd like to share?"

"Does anyone have a story about what they created?"

"Does anyone have a "Whoo-hoo" moment? A time when you felt stuck? How did you get unstuck?"

"Does anyone have an appreciation for a classmate? Something you noticed someone else doing that you thought was great?"

"I'll be back next week so we can tinker again!" End with the phrase & gesture. "When we tinker, we think with our hands."
Bucky Balls
**Introduction:** Powerful Triangles and Spheres: Paper Plate Buckyballs - 1st Grade Tinkering - Week 7

"Powerful Triangles and Spheres: Paper Plate Buckyballs" is the seventh lesson in a 10-week Tinkering series offered to first grade students. Using everyday materials in open-ended projects, we transform the ordinary to the extraordinary while nurturing problem-solving skills, building creative confidence, encouraging collaboration, and empowering students as agents of their own success.

**Is tinkering?** Tinkering is experimenting with ideas, tools, and materials to discover the myriad of possibilities that everyday objects can hold. Tinkering allows us to imagine marvelous creations through working with our hands, persevering through setbacks, and engaging with others in creative collaboration. Tinkering is "thinking with our hands." Why tinkering? Thanks to smart phones, video games, and good of TV, too much of our kids' world is virtual and their experiences are largely vicarious. Tinkering allows for empowered, active learning. It is real interaction with real objects, real tools, and real people.

**Description:** In this lesson, students will learn about another favorite tinkerer, Buckminster Fuller, artist, architect, designer, and inventor. A teacher and friend of Ruth Asawa, Fuller's unconventional "geodesic dome" design revolutionized architecture. Students will create a 20-sided geodesic sphere by folding circular paper plates into interlocking triangles to form a sphere.

**Objectives & Goals:**
- Introduce students to the work of Buckminster Fuller as inspiration for tinkering
- Explore the use of 2-dimensional triangles to create a 3-dimensional sphere
- Develop perseverance and creative confidence through experimental Tinkering activity
- Encourage speaking and listening skills in group discussion

**Step 1: Materials & Introduction - 10 minutes**

**Materials:**
- 6-inch paper plates (the thin, white, inexpensive ones) - 20+ per student
- 5-inch equilateral triangle folding template cut from matte board - 1 per student
- Stapler

**Introduction & Demo (students on the rug) - 5 minutes**

"To students: For suggestions on guided conversations that introduce students to the idea of TINKERING, please see my Instructable "FLOWERS FROM MARS", which is week 1 of a 10-week tinkering curriculum"

Begin with the Tinkering motto call and response: "When we Tinker ... we think with our hands." and we make this gesture (wiggle fingers at your temple and move them outward). Explain to kids to imagine that their hands are holding all their ideas and when you wiggle your fingers it's like letting the ideas come out from your brain.

Inform students that today they're going to learn about another favorite tinkerer, artist, architect, innovator, and futurist Buckminster Fuller (Bucky). Share the attached

[http://www.instructables.com/id/Powerful-Triangles-and-Spheres-Paper-Plate-Buckyball/]
images with the students and explain to them that Bucky liked to envision designs that could make people's lives better. His Dymaxion car could carry 11 passengers, travel up to 120 miles per hour, and got 30 miles per gallon. With his Dymaxion house, and even a special project with Walt Disney for a community of the future, Bucky sought to create affordable stylish housing for all.

Bucky's most famous design used two of his favorite shapes, the triangle and the sphere. (If students have yet to study 3-D shapes, offer a brief explanation of spheres). Triangles are very strong shapes when they are placed together and when pieced together in a certain way, it becomes a very strong dome, or sphere that uses not too many natural resources and can be made very large. (Show picture of Epcot center). Share that today, students will work together to create their own Buckyball spheres.

Introduce TOOLS and MATERIALS:

MATERIALS - The main material we are using today are paper plates and we will transform them into triangles to create our spheres. Through the folding and stapling, we will create a 3-D object from a 2-D material.

TOOLS - Remember that are things we use to help us make, build and create. Today's tools are our folding triangle and staplers.
Step 2: Demonstration (5 minutes)

Demonstrate to students how to use the folding triangle template. With the template centered on the plate, use one hand to hold it still and the other hand to crease each side. Remove the template and strengthen each crease by rubbing with a finger a second time.

Have students fold at least 5 plates before beginning to staple together. To make a sphere, students should piece together 5 triangles into a star pattern. Make a 2nd star pattern and then piece together 10 triangles in a long row. The long row should be stapled like a “belt” with the two star pattern circles on the top and bottom. As always, students are also free to explore the materials as they wish and can also piece together the triangles in free-form geometry.

Remind them of the rules: There is no "WRONG" in Tinkering, but there are a few rules:

1. RESPECT the Materials and Tools - Use tools properly, be mindful to use materials wisely, not wastefully. Be careful with the wire. Pay attention to where the end is, so you don't poke yourself or your neighbor in the face. Don't wrap it around your fingers or your neck.

2. RESPECT your classmates - share materials, share tools. Be encouraging! Work together!

3. RESPECT yourself - always try your hardest. It's OK to feel frustrated, but keep working and keep trying. Be PROUD of what you do.
Step 3: Tinkering Time - 25 Minutes
As students work to create the elements that will be attached to the hat, the facilitator/teacher can circulate the room, fitting the sentence strips into headbands for each person.
Spaghetti
Art
**Intro: How to use spaghetti to paint like Jackson Pollock**

Painting with spaghetti is a pretty AWESOME kid activity for many reasons:

- Works those oh-so-important fine motor skills
- Can set it up to teach mixing primary colors to make secondary colors

**Extension activity for the Vermicomposting project you've been doing with the kids. Get it? "Worm painting."**

- Encourages kids to paint with non-traditional tools
- It's a good way to recycle leftover spaghetti noodles when you've made too much for dinner

- Set-up and clean-up is a snap with no paint-filled brushes to wash when finished
- It's cheap

Pollock was pretty crazy and so is painting like Pollock...crazy fun that is!

And the best reason...it's messy, goofy fun!
**Step 1: Gather necessary materials**

To paint with spaghetti you'll need a few things:

- Newspaper to protect the workspace. Trust me, it's messy!
- Tempera Paint (I like to use this type of paint because it washes up and out so easily)
- A couple of shallow dishes to pour the paint into.
  (Tin pie plates work well for this and are a good excuse to go to Marie Callender's for a $5 pie...Mmmmm pie)
- Cooked spaghetti noodles
  (I like to put aside a few handfuls for later use when we're having spaghetti for dinner. I prefer thick noodles because they are easy for little hands to grip. However, any type will work. In fact, thinner noodles would really give young fingers a dexterity workout)
- A piece of art paper...the bigger the better.
  (I'd pull out a few pieces because this activity is so fun that the kid is bound to want more)
- One eager kid clothed in a paint-safe outfit

*Side note: String, yarn, twine, ribbon or really any kind of thick thread works well for this project and can be used instead of spaghetti noodles and would be fun to experiment with. You can also have kids clip a clothes pin to it for a less messy method... but who really wants that?*

**Step 2: Open up the daily press**

After you've taken care of gathering the necessary materials it's time to set up the fun!

First, you'll need to cover the workspace with newspaper.
Step 3: Pour some out
Next, carefully pour out a few different colors of tempera paint into shallow containers.

We've been talking a lot about primary and secondary colors in our household lately. As you probably guessed...my daughter decided today we'd make green!

Step 4: Plop some in
Plop a handful of clean, al dente spaghetti noodles into the paint and mix around, making sure to saturate the noodles with oodles of paint.

Step 5: Use yer noodle
Pull a paint covered noodle out of the paint and onto the clean art paper. Twirl, pull, swirl, drag, press the noodle all around the paper and see what happens!
Step 6: Art appreciation
When finished, step back and admire the Pollock-ish masterpiece.
When dry the painting can be framed or recycled into some awesome looking "Thank you" note cards by cutting it up into rectangles!

Step 7: Sloppy copy
When the kid has finished her first by-the-book painting she's going to want to keep going. Now's the time you hand over a clean piece of art paper and set her loose. You might not want to watch what happens next so take a deep breath, turn around, walk 40 paces to the coffee pot, fill up your favorite Nagel mug with a steaming cup o'joe and don't look until you hear "I'm ready to wash my hands mommy."
Trust me...Don't look...not even a peep...You don't want to know.
Creature Challenge
Cardboard Creature Challenge

supplies:

- Several hot glue guns and lots of glue
- Scissors
- Packing tape
- Acrylic paint and paintbrushes
- Tinfoil
- Plastic wrap
- Rubber bands
- Googly eyes

Design prompt: Use cardboard to create a creature that does something. You can work alone or choose your own group. This could also be a design challenge to create robots out of cardboard.
Knitting
Loom
KNITTING LOOM & KNIT WITH IT


SUPPLIES

a cheap, tube-shaped object (toilet paper tubes work great)
popsicle sticks
packing tape
yarn (particularly something thick and a little stretchy)
scissors
DIRECTIONS

Make the Loom: For your tube, you can use anything from toilet paper tubes to the cardboard rings from empty tape rolls to a plastic cup with its base cut off. You want it to be sturdy enough to hold up to being squeezed.

Cut a piece of yarn long enough to wrap exactly around your tube. Don’t stretch your yarn while you wrap the tube, you’re trying to get a measure of the circumference of the tube.

Cut a piece of tape a couple inches longer than your yarn piece. Arrange your desired number of popsicle sticks along the tape, using your yarn piece as a guide for how much of the tape should be encompassed by sticks. You want your popsicle sticks to be evenly spaced, and the tape to stick to each popsicle stick at approximately the same height.

Roll your cardboard tube along the tape and popsicle sticks, pressing on the tape to secure. All of your popsicle sticks should stick out the same amount past the tube. If you’ve got a longer
tube like a toilet paper tube, the tail ends of your popsicle sticks might not hang past the non-knitting end of the tube. They don’t need to.

Cast On

Find the end of your skein of yarn, Feed it into the center of your loom.

Holding the tail end against the inside of the loom, wrap the working (long) end of the yarn around your first popsicle stick.
Make sure your yarn is crossing over itself in back, as shown, when you’re wrapping it.

Wrap another loop in the same fashion around the next stick. Do NOT, for your own sanity, wrap it too tight. (Working with kids on this? Make sure to emphasize the need to relax with the yarn – beginning knitters, and I was one of them, often knit too tight. Too tight, and you’ll have a devil of a time trying to knit your project. You might even break your loom.)
Keep wrapping loops until each stick has one. It should look like this. See how the yarn always crosses over on the inside of the loom?

Knitting Method #1: One Stitch at a Time

Wrap another loop on the first stick of your loom. (Feeling lost? Note the color of the popsicle sticks in the photos.)

Grab the bottom loop with two fingers, pull it out and over the top loop and popsicle stick.
Yay! One stitch down. Just wrap a loop around the next stick, bring the bottom loop over the top loop & popsicle stick, and you’ve done two.