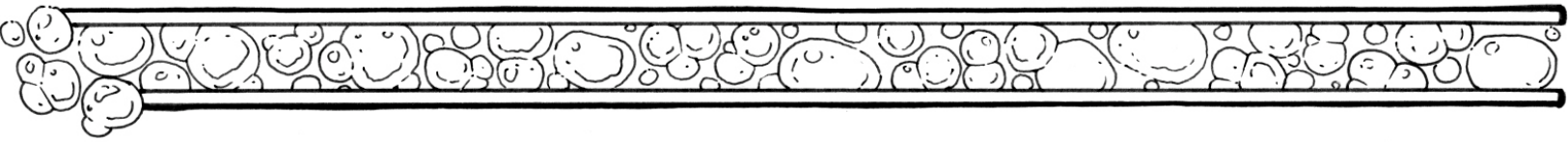


Engineering Adventures



Engineering Journal Bubble Bonanza

Name: _____



reply forward archive delete

from engineeringadventures@mos.org
subject Engineering a Tower
to You 11:11 AM

Hi everyone,

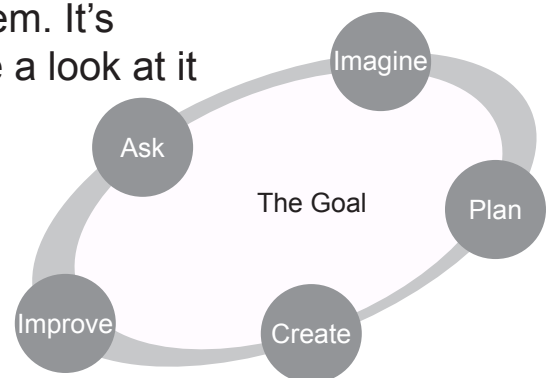
We're so excited to meet you! Our names are India and Jacob. We do a lot of traveling all over the world. We meet interesting people and see some amazing countries. Each place is unique, but we've found one thing in common. Everywhere we go in the world, we find problems that can be solved by engineers.

Engineers are problem solvers. They're people who design things that make our lives better, easier, and more fun! We heard you might be able to help us engineer solutions to some of the problems we find. That means you'll be engineers, too!

Today, we came across an engineering challenge we think you can help us solve. There are some animals living in a swamp along with lots of hungry alligators. The animals need to be at least 10 inches above the alligators to be out of their reach. India and I thought we could build a tall tower that the animals could stand on. Do you think you can engineer a tower to help?

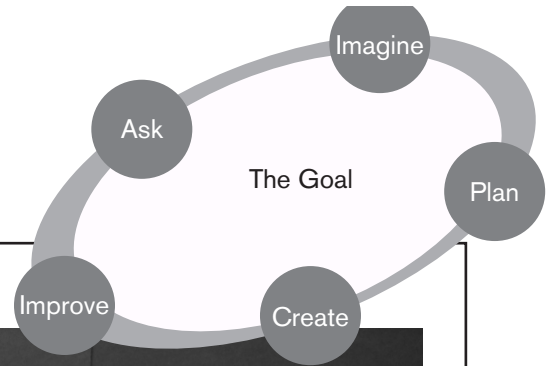
We sent you one tool that we usually find really helpful when we're trying to engineer a solution to a problem. It's called the Engineering Design Process. Take a look at it and see if it can help you!

Good luck!
India and Jacob

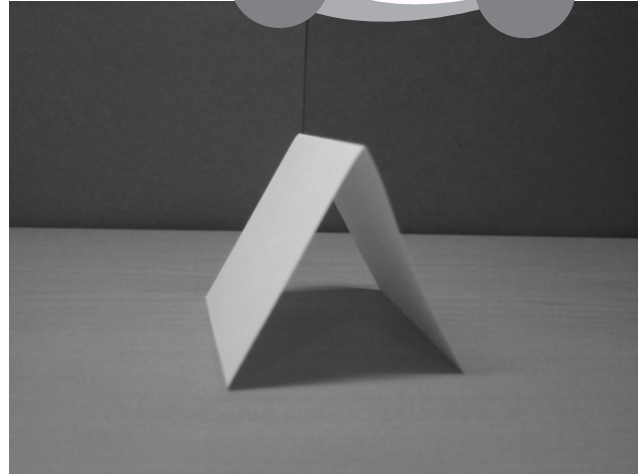




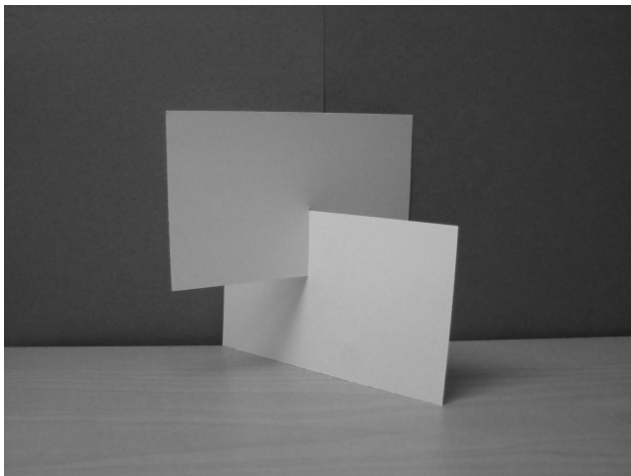
Here are three ways to build with index cards.



Roll it!



Fold it!



Cut it!

Will any of these ideas help your group build a tower?
What other ideas do you have?

Talk with your group to figure it out!

Prep Adventure 1

Fearless
8 inches and up

Heightened Emotions



Confident
6-8 inches



Calm
4-6 inches



Nervous
2-4 inches



Terrified
0-2 inches

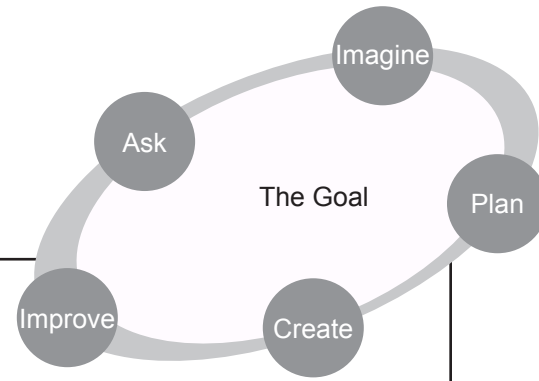


PANIC!



Draw Your Tower

Use the space below to draw a picture of your tower.



A large, empty rectangular box for drawing the tower design.

What parts of your tower design would you change if you could do it again?

For the Record

I think engineering is:

- Fun
- Exciting
- Difficult
- _____

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  forward
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from engineeringadventures@mos.org
subject What is Technology?
to You 10:36 AM

Hi engineers,

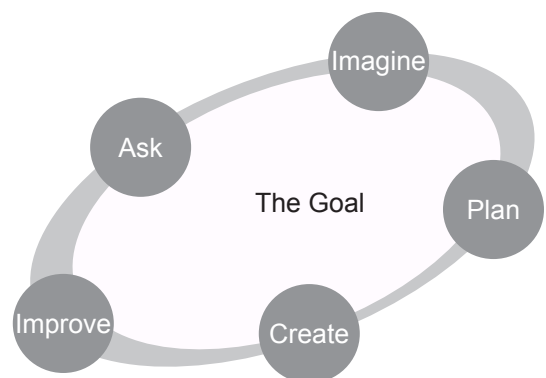
You did a great job engineering a tower to protect the animals in the swamp! Now you can help us engineer more technologies.

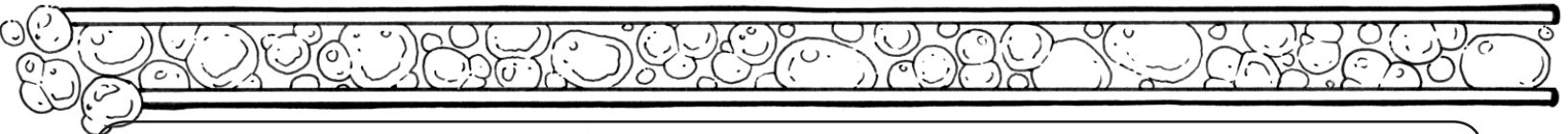
Do you know that the things engineers create to solve problems are called technologies? Most people think technologies have to be electronic, but this isn't true. A technology is actually anything engineered by a person that solves a problem.

Think about an airplane as an example. An airplane is a technology because people engineered it and it solves the problem of traveling long distances quickly. But something as simple as a paper cup is also a technology. A person engineered it, and it helps people hold drinks without spilling them everywhere.

We have a detective challenge for you today. We sent you some objects and we want you to figure out if they are technologies. Lots of times engineers think about ways to improve technologies. Can you use the Engineering Design Process to imagine ways make some of these technologies even better?

Talk to you soon,
India and Jacob





What is your group's object?

Is it a technology?

Did a person engineer it?

Yes

No

Bonus: What problem does your object solve?

Does it help you solve a problem?

Yes

No

If you answered YES to both questions, it is a technology!

You're an engineer. Write or draw how you would make this technology better.

If you could engineer a brand new technology, what would it be? What would it do?



from	engineeringadventures@mos.org
subject	Engineering a Tower
to	You
	9:25 AM

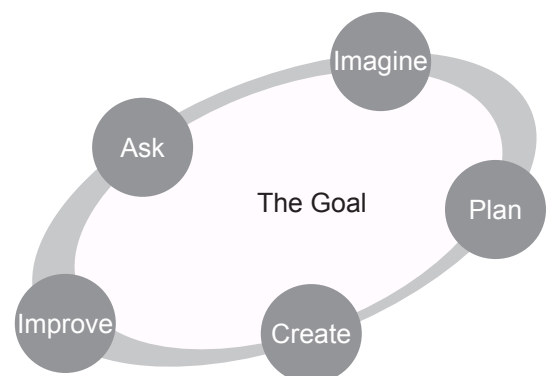
Hi everyone,

We are visiting our friend Miguel in California. He has an awesome job—he's a materials engineer at an amusement park! Right now he's helping the park design a bubble show. People who visit the amusement park will come to the show to see all the things bubbles can do. We think they should call the show Bubble Bonanza!

Miguel is working on engineering some bubble wands for the show, and we said we would help out. But before we help engineer bubble wands, we need to know a lot more about bubbles. What do they look like? What can they do? Are there things they can't do?

We're going to start with the Ask step of the Engineering Design Process. Can you help us Ask lots of questions about what bubbles can and can't do?

India and Jacob, the Duo





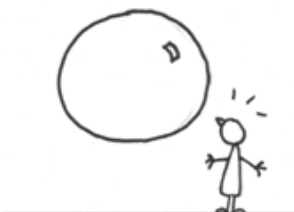
What are some things bubbles can do? What can't they do?



Brain Twisters

- What do you think would happen if you tried to blow a bubble underwater?
- What about in outer space?

What's one thing you saw a bubble do that you think should be in the Bubble Bonanza show?



Did you know?
Some whales blow bubbles to help them catch fish for dinner!



from	engineeringadventures@mos.org
subject	Engineering a Tower
to	You
	2:30 PM

Hi,

Jacob and I learned a lot when we explored what bubbles can and can't do. We've been working with Miguel to do more cool things with bubbles. Yesterday Jacob blew a bubble that floated onto the table. I thought it would pop, but it sat on the table for five whole minutes!

I tried to blow a bubble that would land on the table, but mine kept popping. I asked Jacob how he did it, but he said it was magic. I know that's not true!

I think I can use the Engineering Design Process to help me Ask more about bubbles and Imagine how to blow a bubble that will land on the table without popping. Maybe I could even figure out how to blow a bubble onto some other materials, like something rough. Maybe sandpaper would work? Or maybe I could catch a bubble and hold it in my hand! That would really impress Jacob and Miguel. Let me know what you find out!

India



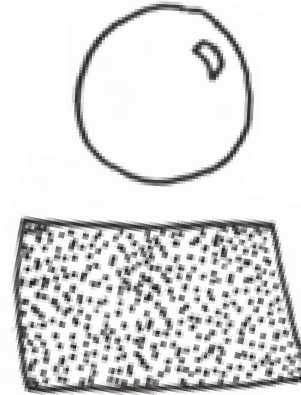


Is it possible to make a bubble land on these things without popping?

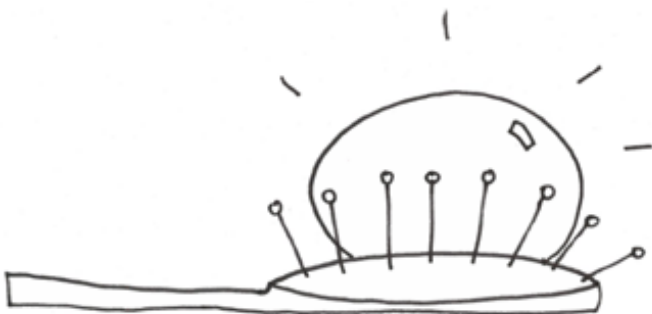
Bubble on a Table



Bubble on Sandpaper

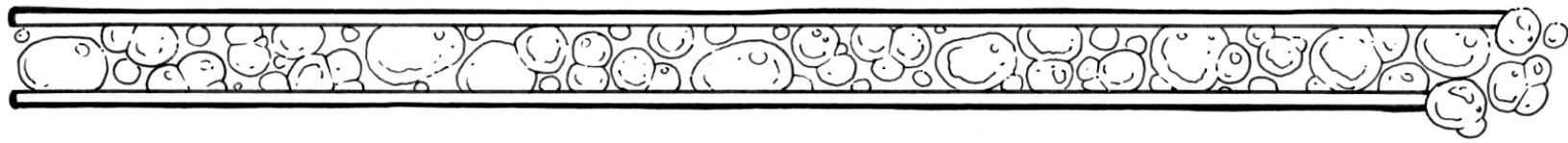


Bubble on a Hairbrush



Bubble on your Hand



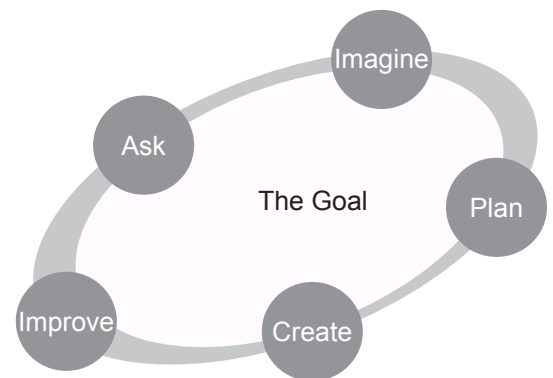


What does it look like when a bubble pops?

For the Record

Do you think people would like to see some bubbles that pop during the Bubble Bonanza show?

- Yes
- No
- Maybe
- _____





from	engineeringadventures@mos.org
subject	Engineering a Tower
to	You
	1:12 PM

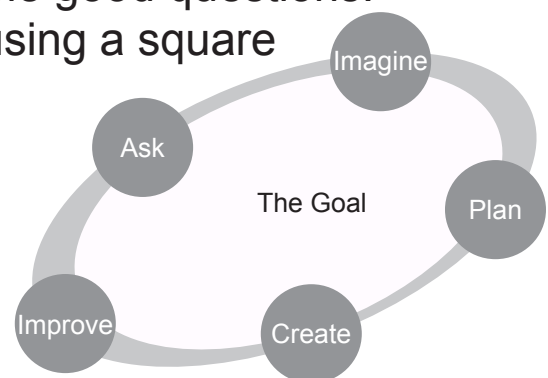
Hi everyone,

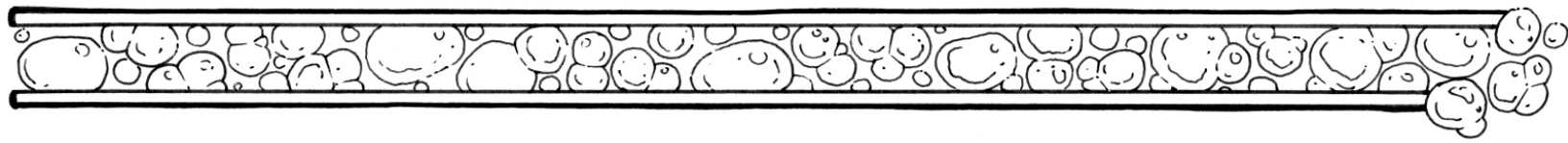
India and I are having a blast playing with bubbles! We can make them stick together, catch them with our hands, and even make them land on a hairbrush. We did all this using the round plastic bubble wand that comes with store-bought bubble solution. But Miguel's job is to engineer wands for the show that do even more cool things than the round store-bought wands. We need to help him engineer even better wands.

Miguel tells us that materials engineers test and explore properties of materials before they use the materials to create things. We found two materials we think would be good for making wands: wire and twist ties. You'll have to let us know which material you like best.

Let's start by making wacky-shaped wands! We can use the Engineering Design Process to Ask some good questions. What kind of bubble can you make by using a square wand? What about a triangle? Can you Imagine other shapes to try?

Jacob

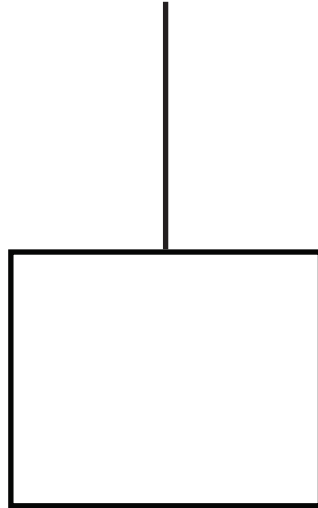




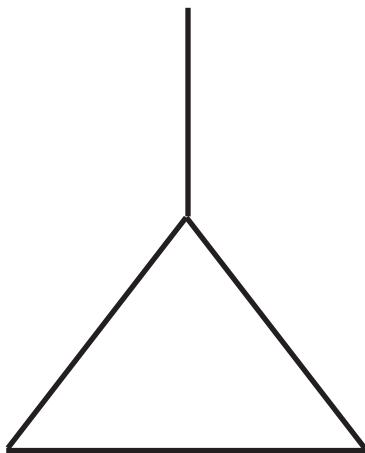
Wacky Wands

Bend wire along the lines below so that the wire makes the same shape.

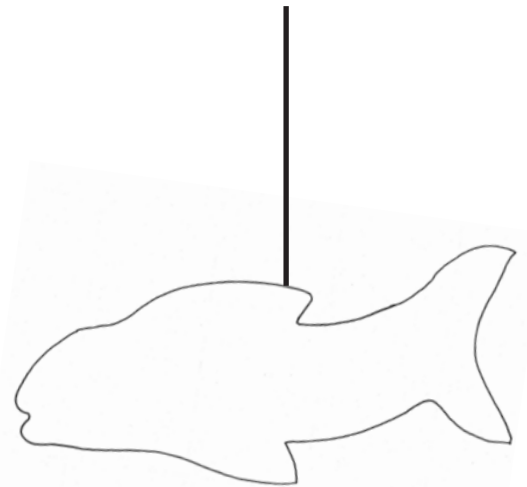
Square Wand



Triangle Wand

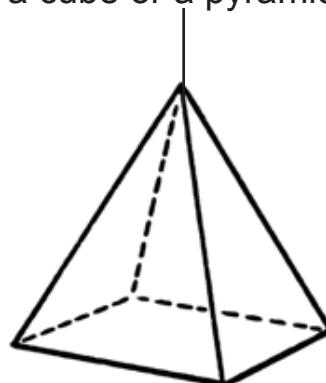
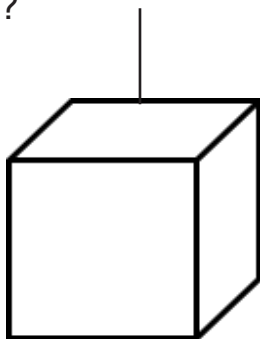


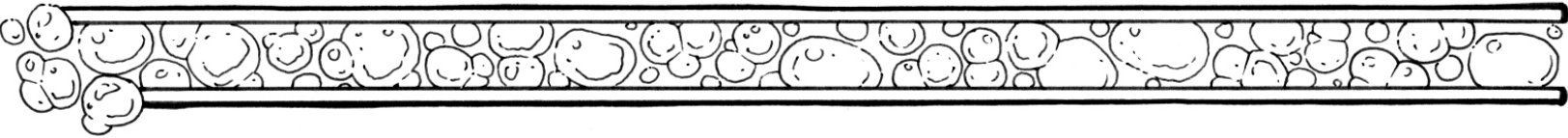
Fish Wand



Can you make a not-round bubble with these wands?

What will happen if you make a wand shaped like a cube or a pyramid? Can you make a not-round bubble?





Directions: *Keep track of your experiments! Draw the bubble wands you use and the shapes of the bubbles they create.*

Wand #1

- the bubble I made was round
- the bubble I made was not round

Wand #2

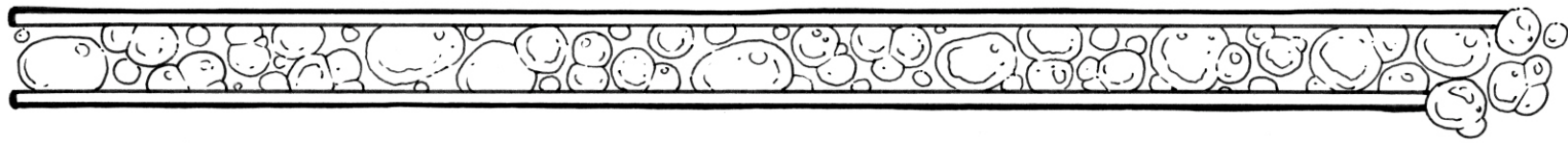
- the bubble I made was round
- the bubble I made was not round

Wand #3

- the bubble I made was round
- the bubble I made was not round

Wand #4

- the bubble I made was round
- the bubble I made was not round



Is it possible for a bubble wand to make a not round bubble?

Four horizontal lines for writing an answer to the question.

For the Record

My favorite wand material was:

- Wire
- Twist ties
- I'm not sure yet.
- _____

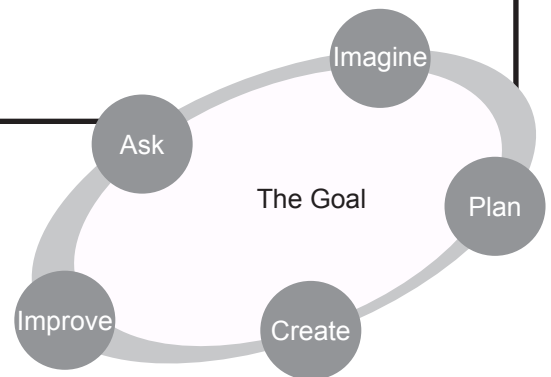
Draw a picture of a wand design you would like to try making next time.

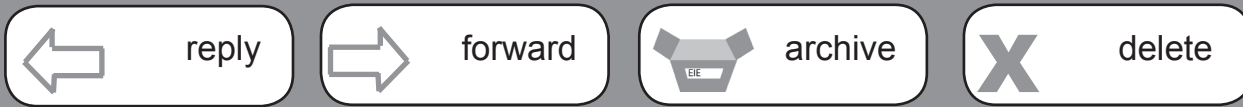
A large empty rectangular box for drawing a wand design.



Did you know?

All sorts of people play with bubbles. Even mathematicians use bubbles to help them solve math problems.





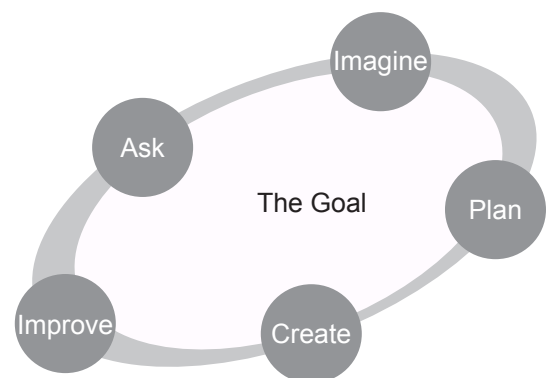
from	engineeringadventures@mos.org
subject	Engineering a Tower
to	You
	10:41 AM

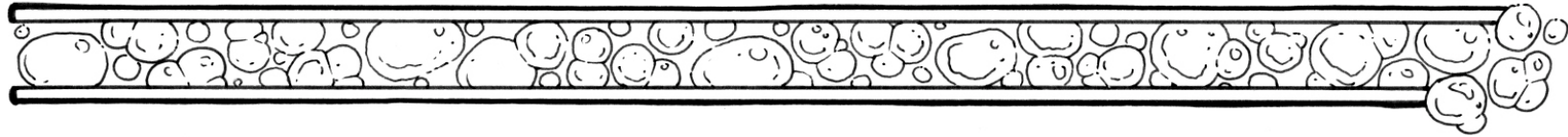
Hi everyone,

We learned a lot trying to engineer wands with different materials last week, but now we want to try even more materials. They're all different shapes, sizes, and made of different things like paper, wire, and plastic.

Miguel pointed out that some materials might be good to use to make certain kinds of bubbles, but not others. A material that's good for making tiny bubbles might not be good for making giant bubbles. We made a list of some bubble tricks we want to try out. Use the Engineering Design Process to help you Create and test different bubble wands with the materials. Let us know which materials are good for doing which tricks. After this, we think we'll be ready to design our bubble wands for the Bubble Bonanza!

India





What kinds of bubble tricks did you try? What wand materials did you use?

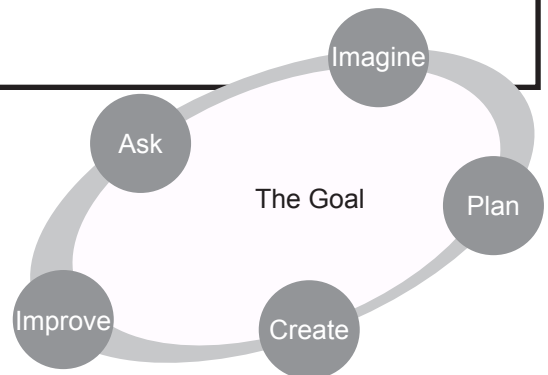
For the Record

My favorite wand material was:

- Wire
- Twist ties
- Paper tubes
- Screen
- Pipe cleaner
- Rubber band
- I'm not sure yet.
- _____



Did you know?
Some people play with bubbles for their job! They learn about bubbles the same way that you are doing now.





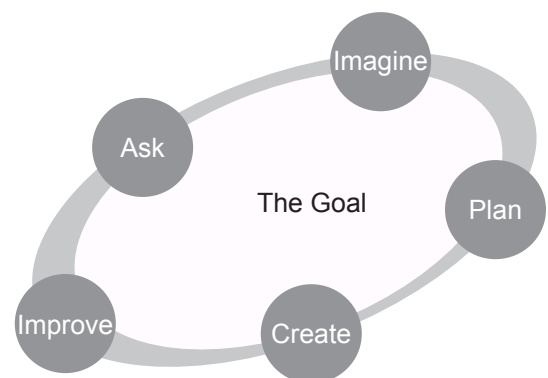
from	engineeringadventures@mos.org
subject	Engineering a Tower
to	You
	4:32 PM

Hi everyone,

Wow! You've done some great engineering so far! We've asked lots of questions about bubbles and saw what bubbles can and can't do. We've also asked good questions about the materials we can use to make our bubble wands. Now it's time to engineer our wands!

We want our bubble wand technologies to show people some of the amazing things that bubbles can do. First we need to Imagine some different ways to combine materials. Then we can Plan out our wand and work as an engineering team to Create it. The Engineering Design Process will help us engineer the best wands for the Bubble Bonanza show!

Jacob

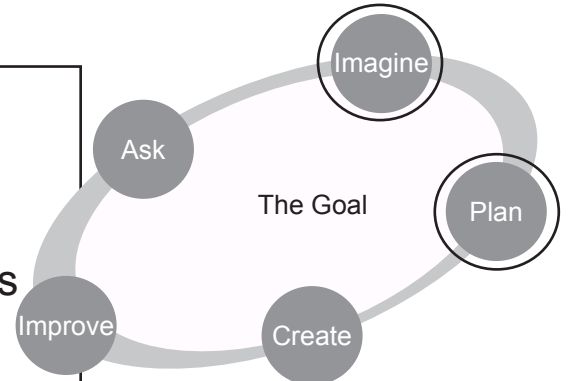


Choose your goal, then draw some ideas for your bubble wand. Be sure to label what supplies you will need!

Our Goal

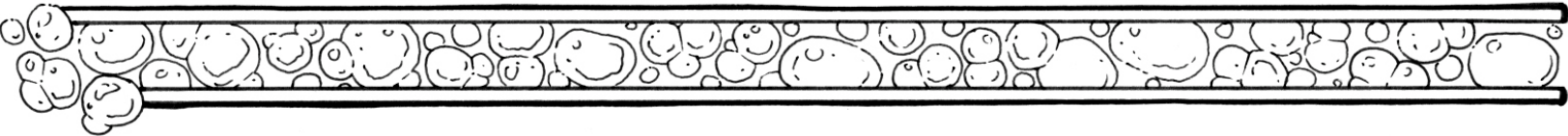
Our bubble wand will:

- make lots of bubbles
- make small bubbles
- make huge bubbles
- _____



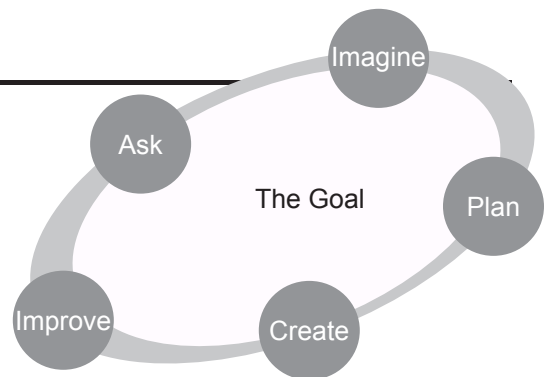
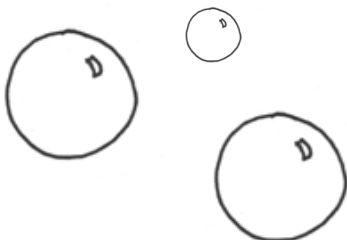
Idea #1

Idea #2



Draw what your wand looks like. Circle the parts you would like to improve for next time.

What are the materials you used to make your wand?



reply forward archive delete

from engineeringadventures@mos.org
subject Engineering a Tower
to You 2:15 PM

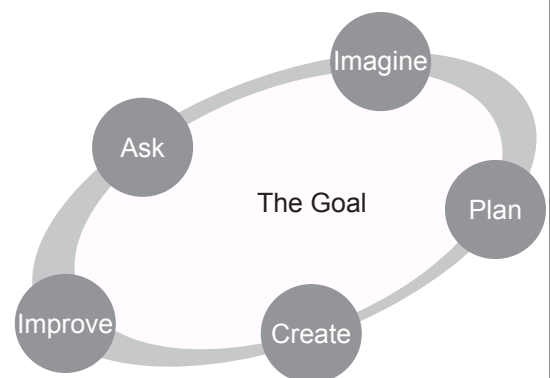
Hi everyone,

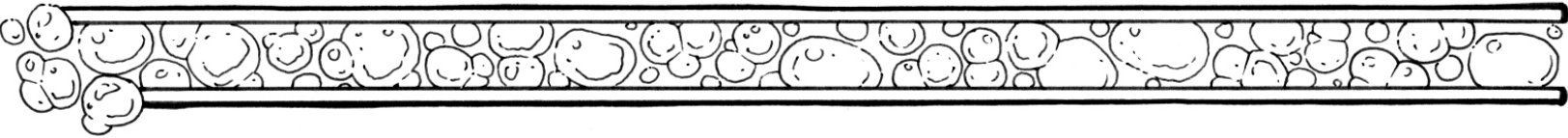
Jacob and I are so impressed with the wands you engineered. They are great technologies! We know you're using the Engineering Design Process to make these wands the best they can be.

Share your ideas with each other and try to Improve your wands even more! If your goal is to make big bubbles, can you Improve your wand so the bubbles it makes are giant? If your goal is to make lots of bubbles, can you Improve your wand so it makes fifty or even one hundred bubbles?

To help you out, we sent you one more special supply to make your wands even more exciting to watch during the Bubble Bonanza. Jacob and I can't wait to see your final designs.

India





What does your final wand look like? Draw a picture.

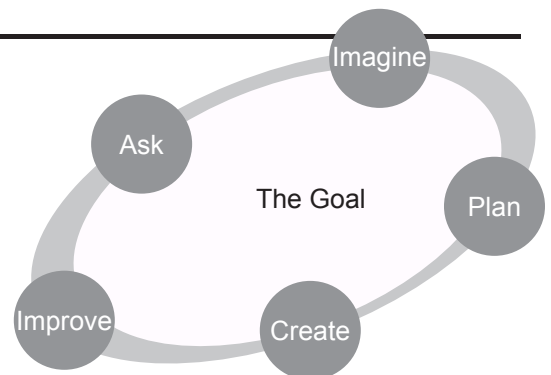
A large, empty rectangular box with a black border, intended for the student to draw their final bubble wand design.

What materials did you use to make your wand?

Three horizontal lines provided for the student to write down the materials used to create their bubble wand.

Did you know?

Some scientists think our universe is part of a giant bubble.



reply forward archive delete

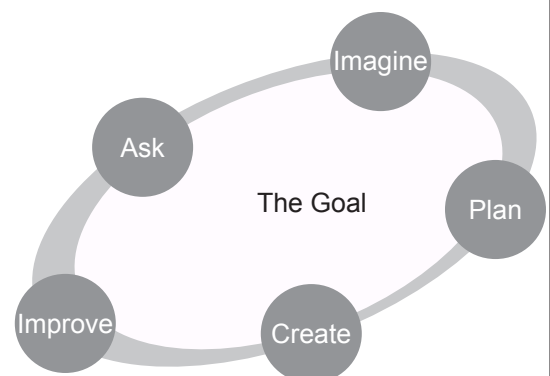
from engineeringadventures@mos.org
subject Engineering a Tower
to You 12:09 PM

Hi everyone,

Thank you for all of your great engineering! Who knew there were so many ways to make bubbles? The wands you engineered are amazing! We can't wait for you to share your designs with other people. Miguel thinks the amusement park will be really impressed.

We think you should do a test run of the Bubble Bonanza to show people the wand technologies that you engineered. Be sure to tell people your goal and show everyone what your wands can do. Don't forget to tell people how you used the Engineering Design Process to create your designs!

We'll be in touch,
India and Jacob, the Duo





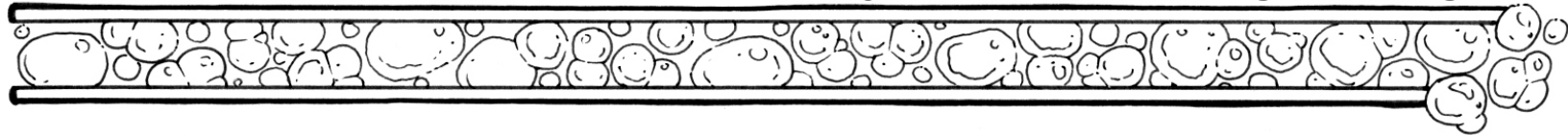
Plan your Bubble Bonanza presentation with your group.

- **What does your bubble wand do?**

- **How is your bubble wand a technology?**

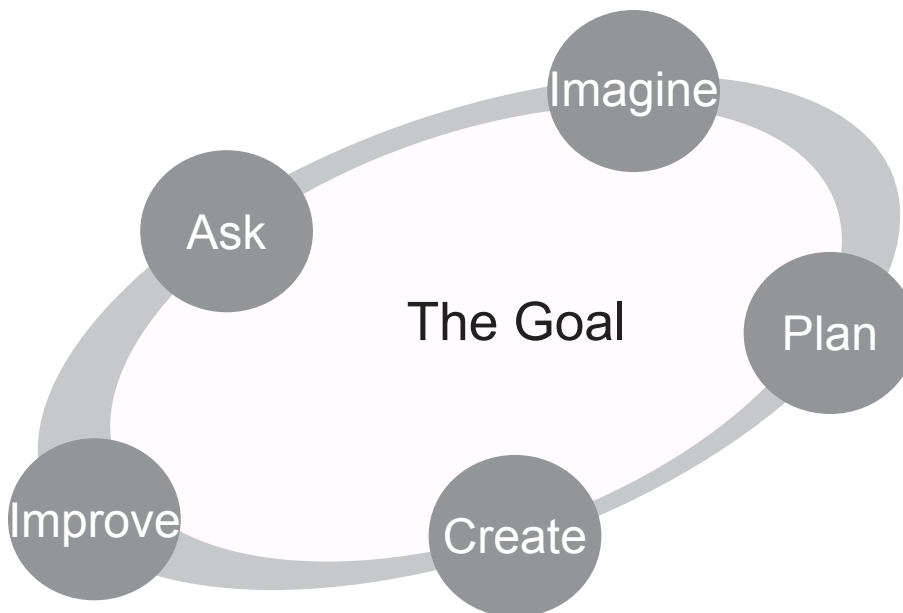
- **What materials did you choose? Why?**

- **What steps of the Engineering Design Process did you use to help you create your bubble wand?**



What was your favorite part about engineering your bubble wand?

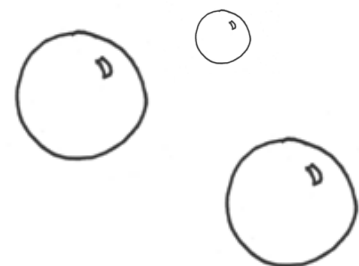
Circle the step of the Engineering Design Process that helped you the most.



For the Record

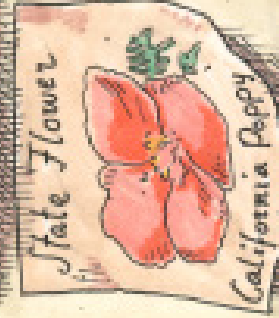
I think engineering is:

- more fun than I thought it would be.
- harder than I thought it would be.
- _____ than I thought it would be.



California

The Golden State



Notes:



California has America's lowest valley, tallest trees, and oldest living things, the Joshua Trees.



California is the third largest state by area, and has the largest population, 36 million.