

Engineering Adventures



Engineering Journal Go Green

Name: _____



reply forward archive delete

from engineeringadventures@mos.org
subject Engineering a tower
to You 10:36 AM

Hi everyone,

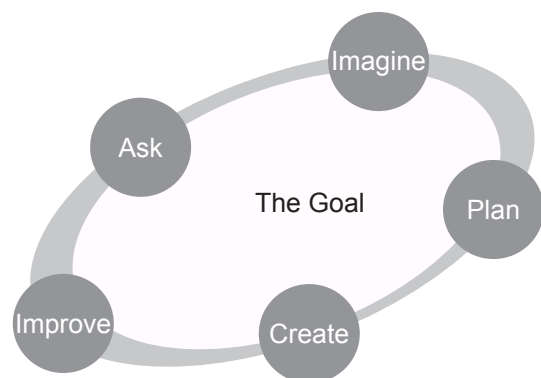
We're so excited to meet you! Our names are India and Jacob. We do a lot of traveling all over the world. We meet interesting people and see some amazing countries. Each place is unique, but we've found one thing in common. Everywhere we go in the world, we find problems that can be solved by engineers.

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!

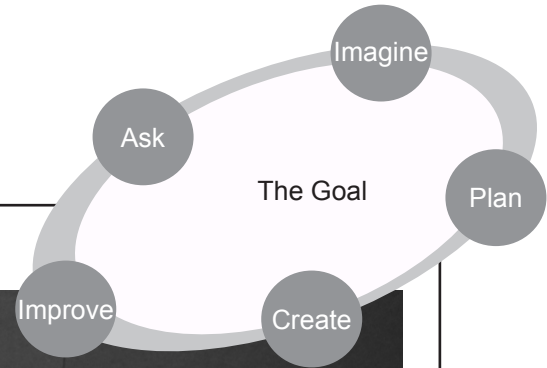
Today, we came across an engineering challenge we think you can help us solve. There are some animals living in a swamp along with lots of hungry alligators. The animals need to be at least 10 inches above the alligators to be out of their reach. India and I thought we could build a tall tower that the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

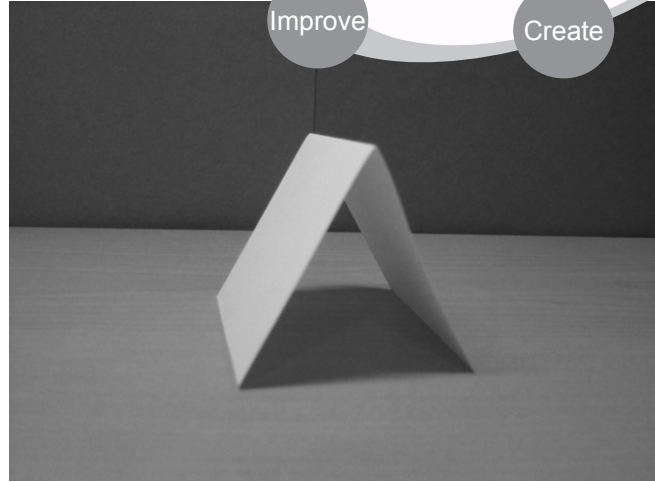
Good luck!
India and Jacob



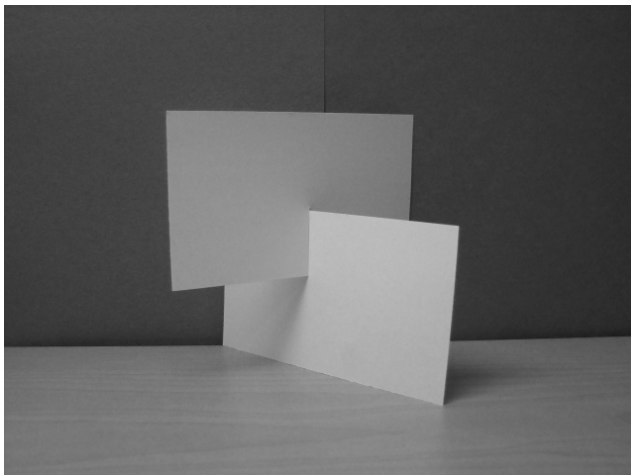
Here are three ways to build with index cards.



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!

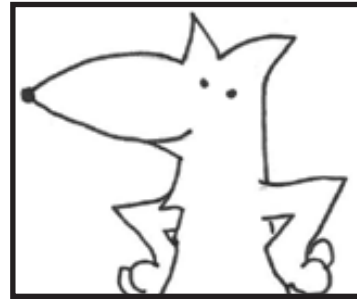
Prep Adventure 1

Heightened Emotions

Fearless
8 inches and up



Confident
6-8 inches



Calm
4-6 inches



Nervous
2-4 inches



Terrified
0-2 inches

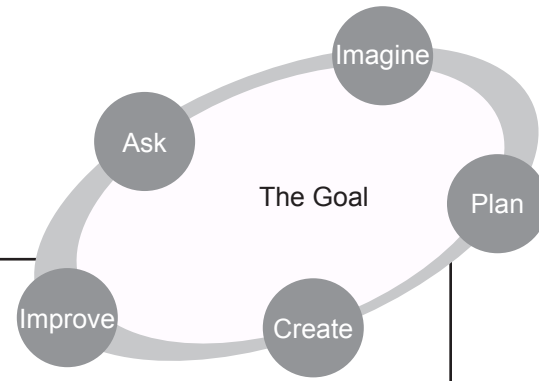


PANIC!



Draw Your Tower

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



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
- _____

reply forward archive delete

from engineeringadventures@mos.org
subject What is technology?
to You 11:23 AM

Hi engineers,

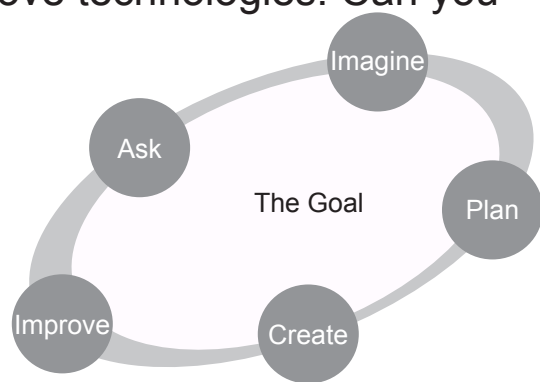
You did a great job engineering a tower to protect the animals in the swamp! Now you can help us engineer more technologies.

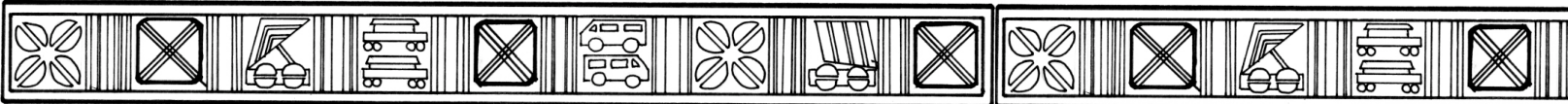
Do you know that the things engineers create to solve problems are called technologies? Most people think technologies have to be electronic, but this isn't true. A technology is actually anything engineered by a person that solves a problem.

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 to 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

Does it help you solve a problem?

Yes

No

Bonus: What problem does your object solve?

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 | Welcome to Senegal! |
| To | You |
| | 9:01 AM |

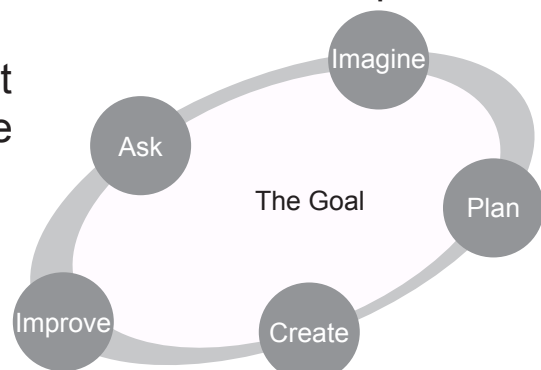
Salut! (Pronounced “sa-loo.” It means “Hi!”) We’re writing from Senegal, a country in West Africa.

This morning we were walking around the capital city of Dakar when a toy car raced across the street. When we got closer, we were surprised to see it was made out of a soda bottle and bottle cap wheels! It moved really fast. The kid who engineered the racer saw us watching so he came over to show us his design. His name is Amadou.

Amadou is a green engineer. This means he uses the Engineering Design Process to create things that don’t hurt the environment. Amadou only uses recycled materials to make his racers. He told us there used to be a big car race that ended in Senegal. It was called the Dakar Rally. Amadou and his friends have decided to hold their own Recycled Racer Rally. Can you be a green engineer and design your own racer for the Recycled Racer Rally?

Amadou said getting wheels that work well is often the hardest part of engineering a recycled racer. He showed us a few designs that he has tried. We sent you directions for these two wheel and axle systems so you can try them, too!

India and Jacob





Here's Senegal!





Some of Amadou's friends used the Engineering Design Process to engineer these toy cars! Look at the cars closely. Do you recognize any of the materials?



Credit: Maya Lau, Senegal

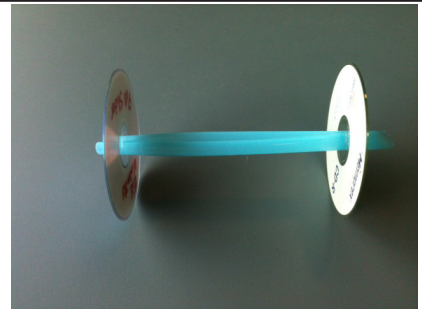


Credit: TMS Ruge, Uganda



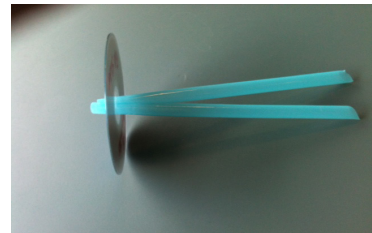
To make one wheel and axle you need:

- 2 jumbo milkshake straws (the axle)
- 2 CDs (the wheels)



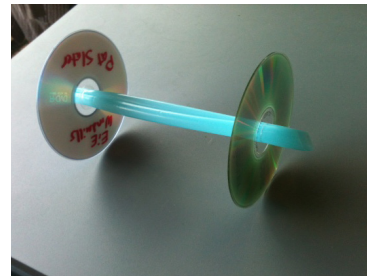
Step 1

Push two jumbo straws through the hole in the middle of the CD.



Step 2

Stick the other CD on the opposite end.



Roll your wheels!

Think About It:

What do you notice about how this wheel system rolls?

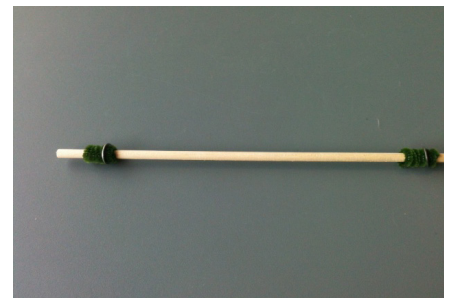
What do you think would happen if you used one straw instead of two?

Imagine: What would you try next time?



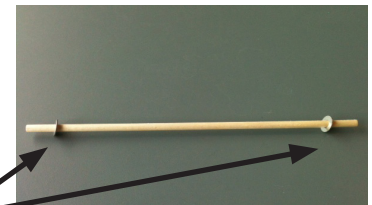
To make one wheel and axle you need:

- 1 dowel (the axle)
- 2 1/4" inch washers (the wheels)
- 1 pipe cleaner
- scissors



Step 1

Slide the two washers onto the dowel and move the washers so there is one on each end.



washers

Step 2

Try rolling your wheels. What do you notice about how they roll?



Step 3

Cut your pipe cleaner into 4 pieces.

Step 4

Wrap one pipe cleaner piece around the dowel on each side of the washers. This will stop the washers from wobbling!



pipe cleaner

washer

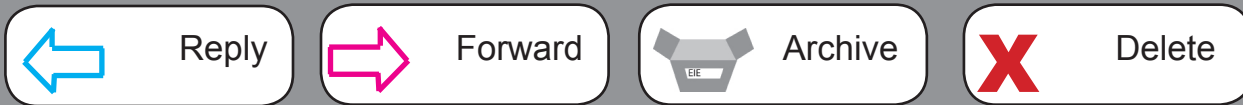
Roll your wheels!

Think About It:

What do you notice about how this wheel system rolls?

Why do you think using the pipe cleaners changes how the system rolls?

Imagine: What would you try next time?



From engineeringadventures@mos.org
Subject Ready, Set, Go!
To You 9:18 AM

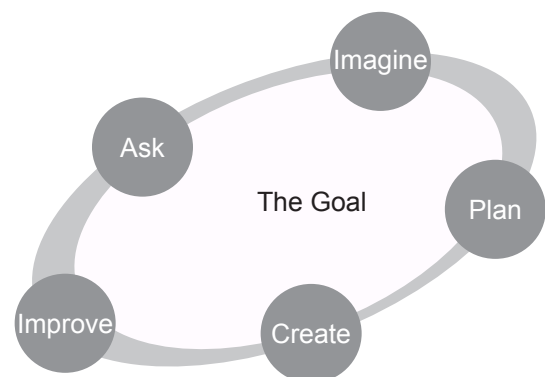
Hi everyone!

Today we got to see all the amazing recycling the people of Senegal do. We went to the Scrap Market where you can buy and use discarded materials to create lots of new things. All of the materials Amadou uses to engineer his racers come from the big Scrap Market in Dakar. By using things from the Scrap Market, Amadou reuses materials and stops them from becoming trash!

Before the Scrap Market, Jacob and I looked at some toy cars to see what parts they have. This helped us Imagine what materials we wanted to look for when we went to the Scrap Market. You should think about toy car parts, too, so you can make sure you gather materials for all of the different parts from your own Scrap Market.

After the market, Jacob and I started to test some possible racers. I want to make a racer with wheels that help it move easily over bumps and obstacles. Jacob said he wants to make a racer that goes as far as possible. What do you want your racer to do?

Think about the parts of a car and make your Scrap Market. Try creating a racer or two and test how different wheels work. You and your group should decide on a goal for your racer. Then you will be ready to start engineering your own Recycled Racer!

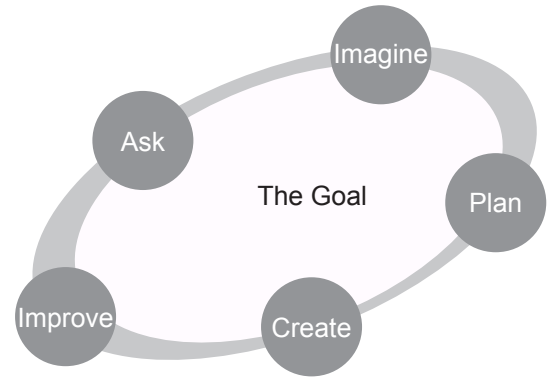


India



What could our recycled racer do?

- Use as few wheels as possible
- Carry lots of weight
- Go far
- Use as few materials as possible
- Go fast



Our goal is to engineer a recycled racer that will:

Draw your Recycled Racer below. Circle parts you would like to improve.



| | |
|---------|-------------------------------|
| From | engineeringadventures@mos.org |
| Subject | A Recycled Rally Race Track |
| To | You |
| | 2:15 PM |

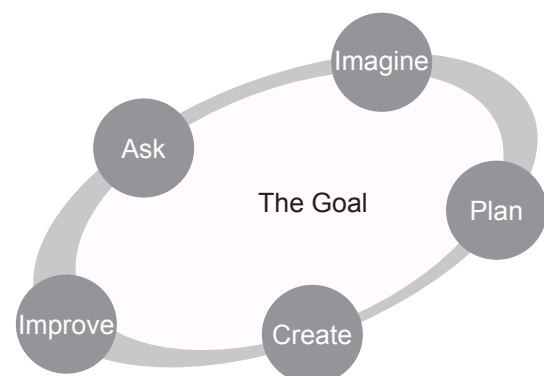
Hey everyone,

We've been working away on our racers. Amadou had us take a break to help create a special track that we will use for our Recycled Racer Rally. He said that in the Dakar Rally racers would drive across flat plains, hilly jungles, and sandy deserts. We added some obstacles to the track for our racers to roll over. You should make your own track, too!

After we tried out the wheels and axles Amadou showed us, India started brainstorming tons of questions about wheels. She tested some big wheels first, and now she's testing small wheels. Then she started to ask about the number of wheels. Will lots of wheels make the car go far? Just a few wheels? We're still working to create wheels that help us meet the goals we decided on for our racers. Talking to Amadou and his friends to get advice has helped us a lot.

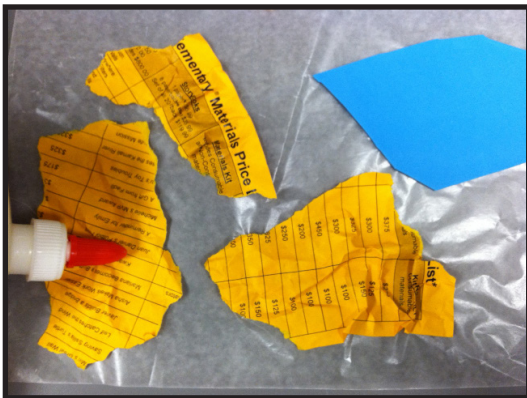
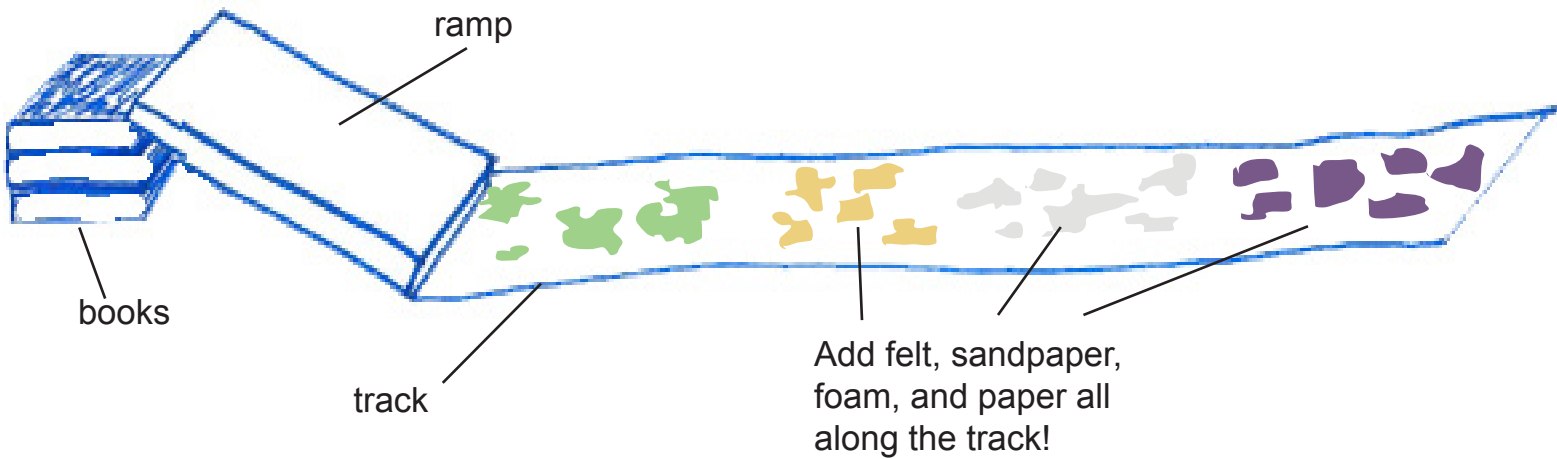
You can create your own track to use for your Recycled Racer Rally. Then keep using the steps of the Engineering Design Process to engineer racers that meet your goal. Make sure to share what you find with each other!

Jacob

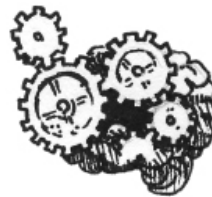




Glue different materials to the track. Use a box top or tape a piece of cardboard to a stack of books to create the ramp.



To make the track extra challenging, add texture by crumpling the materials you add and making bumps. What else can you add to the the track to make obstacles?



Brain Twister

- What landscape does each material represent on your track? What other materials could you add?

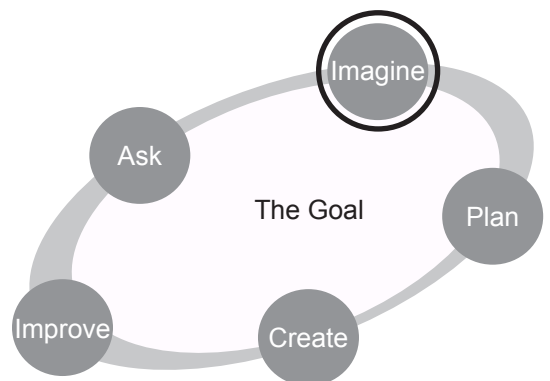


Now that you have had a chance to talk with other engineers about your racer, what improvements will you make? Write or draw below.



What part of the track will be the easiest for your racer to go over?

What part of the track will be the most difficult for your racer to go over?





| | |
|---------|-------------------------------|
| From | engineeringadventures@mos.org |
| Subject | Let's Roll! |
| To | You |
| | 4:05 PM |

Hi everyone!

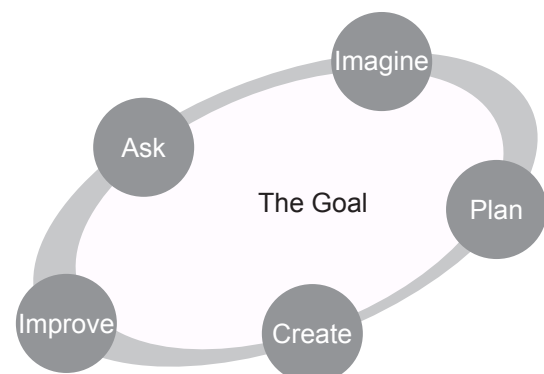
Amadou came by this afternoon and we told him about the goals we decided on for our recycled racers. He said he's also working to Create his racer. He reminded us to think about the track we made, as well as our goal. What type of racer would be best to help us reach our goal and roll over the track?

Luckily, even though all the kids here are competing in the Recycled Racer Rally, everyone is willing to help one another! It turns out that engineers do this all the time. Sometimes one group has a great solution to a problem that works well with another group's solution to a different problem. We met up with Amadou and his friends to share our ideas and get some advice from them. We used their advice to help us create our first racer designs.

See if you can work together with some of the other groups. With their help and the Engineering Design Process, we know you'll be able to make your racers go far.

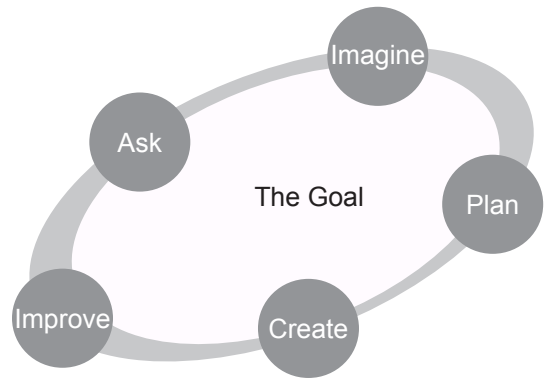
Good luck!

India





Do you think it's important for engineers to share ideas? Why?



Are there any parts of your racer you want to improve next time?
Draw your improvement ideas below.



Think About It

- What advice would you give to someone just starting to engineer a racer?



| | |
|---------|-------------------------------|
| From | engineeringadventures@mos.org |
| Subject | Air Power! |
| To | You |
| | 3:01 PM |

Hi everyone!

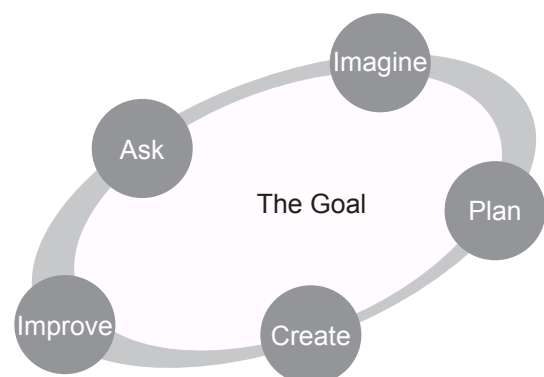
We love the work you've done on your racers! We have made a lot of progress engineering our racers, too.

Amadou had a great idea to make his racer even better. There are a lot of toy cars that use batteries to power them, but as a green engineer Amadou wants to use something that is more friendly for the environment. Batteries are difficult to get rid of, and there are so many other options to make a racer go. He said that he's going to add a sail to his racer so he can use air to power it. India quickly began to strap all kinds of sail materials onto her racer, but I suggested that we test a few parts out on their own first. It would be a good use of the Imagine and Plan steps of the Engineering Design Process!

Can you Imagine a way to use air to power your racer? Make a Plan, attach a sail to your racer, and give it a go!

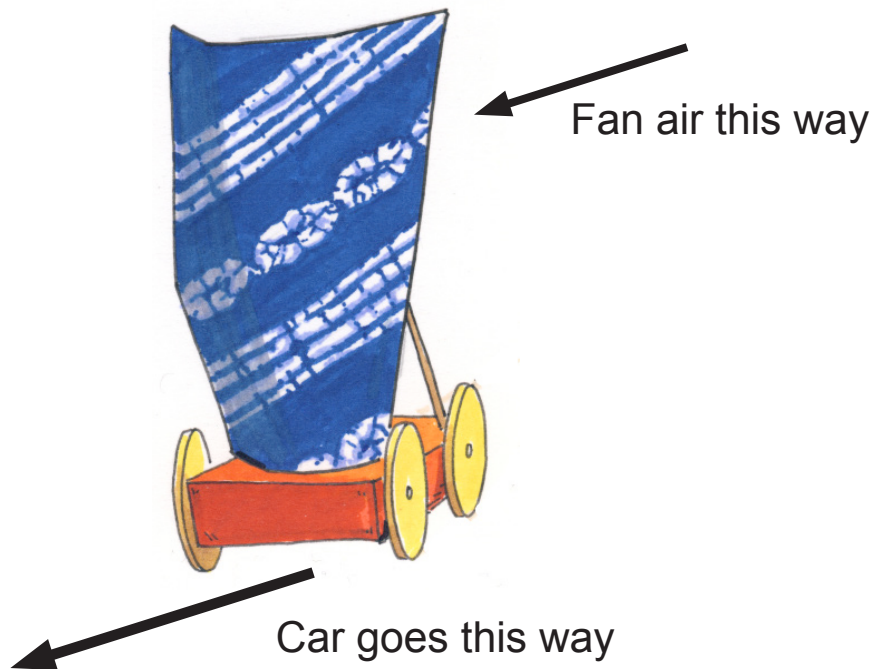
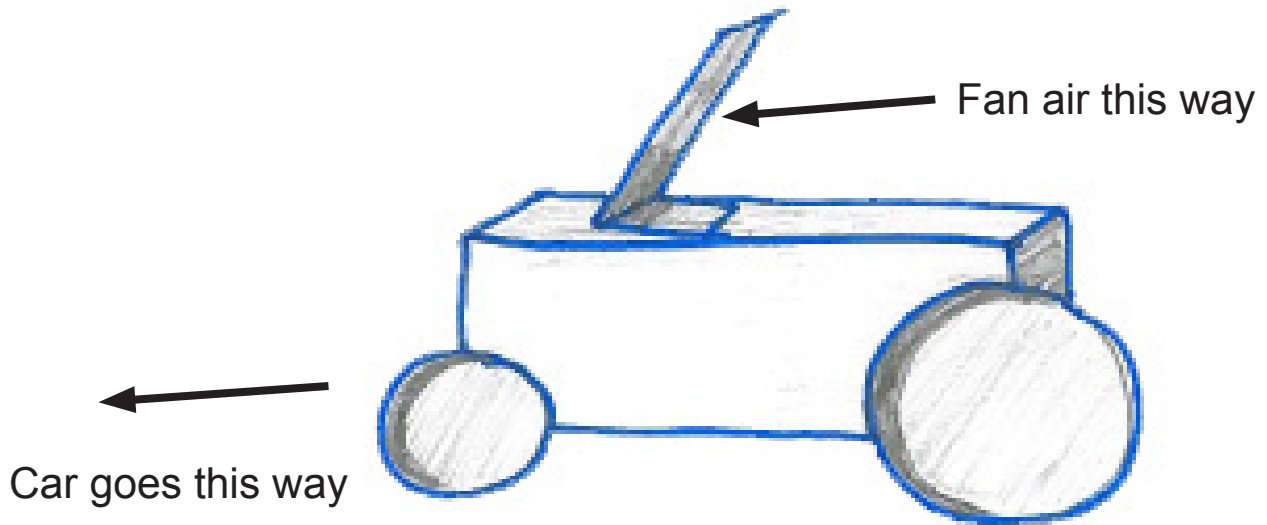
Jacob

P.S. We sent you a few materials to get you started.





Here are two examples of cars powered by air!





Draw your final racer here and show how you will use air power to move it. Circle parts you want to improve.

For the Record

I think my racer is a technology. Yes No

Why? _____



| | |
|---------|-------------------------------|
| From | engineeringadventures@mos.org |
| Subject | Almost Ready to Roll |
| To | You |

12:32 PM

Hey engineers!

India, Amadou, and I are impressed with the work you've done engineering your racers. Now it's time to use the Improve step of the Engineering Design Process to make your racers the best they can be. Make sure to think about the goal for your racer as you make improvements.

The latest news from Amadou is that each team will be able to race their car twice. Your team should aim for a personal best out of the two races.

If you have extra time, decorate your car before the Recycled Racer Rally! I want to use some scrap paper and markers I found to decorate our racer. We are green engineers, after all. While we were at the Scrap Market with Amadou, he showed us some great Senegalese fabrics. I sent you pictures so you could see, too. We're going to use ideas from these patterns to decorate our car. As a surprise for India, I'm also making us a team flag to wave during the Recycled Racer Rally.

The Recycled Racer Rally is just around the corner! Let's Improve our racers and decorate them so they're ready to roll!

Jacob

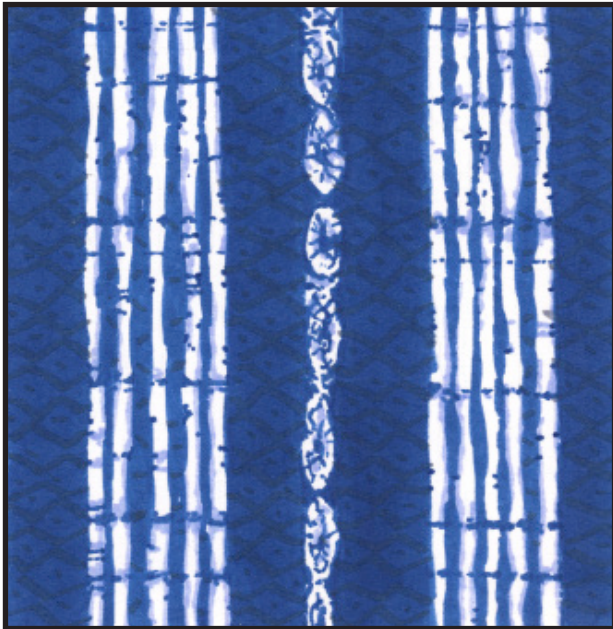




Hello!

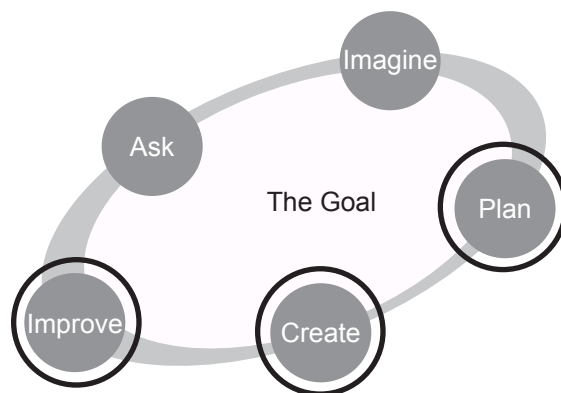
Here are some pictures of the fabrics I saw at the Scrap Market. I'm going to use the patterns to help decorate our Recycled Racer!

-Jacob





The goal of our racer is:



Draw the final version of your recycled racer below.

Which step of the Engineering Design Process helped you most today?
Write what you did for that step.



| | |
|---------|-------------------------------|
| From | engineeringadventures@mos.org |
| Subject | Start Your Engines! |
| To | You |
| | 9:01 AM |

Hi engineers!

It's time for the Recycled Racer Rally! Are you excited? We can't wait to hear how your racers do. Your goal is to test your racer two times to see how well it meets the goal you decided on for your racer!

Before the races begin, take some time to think about all of the engineering work you've done. You started with scraps, and now you have amazing racers! Can you believe that you engineered your racers out of things you'd normally just throw away? You have been fantastic green engineers.

A lot of people don't know about green engineering. They don't know that it's possible to engineer fun, useful things in ways that don't hurt the environment. Someone needs to tell them. And guess what? You are all experts now!

You can use the Recycled Racer Rally as an opportunity to teach people about the green engineering work you did, and explain how you used the Engineering Design Process to help you.

Let us know how it goes!
India and Jacob
engineeringadventures@mos.org





For the Record

I would like to be a green engineer. Yes No Maybe so

Why or why not?

What do you want to engineer next?

Draw your technology here!

My engineering checklist:

- Find friends to work with.
- Ask** questions about how to start.
- Imagine** lots of ideas.
- Make a **Plan**.
- Create** and test the plan.
- Improve** until you think it is ready.

.....

: What materials will you use? :

.....

.....

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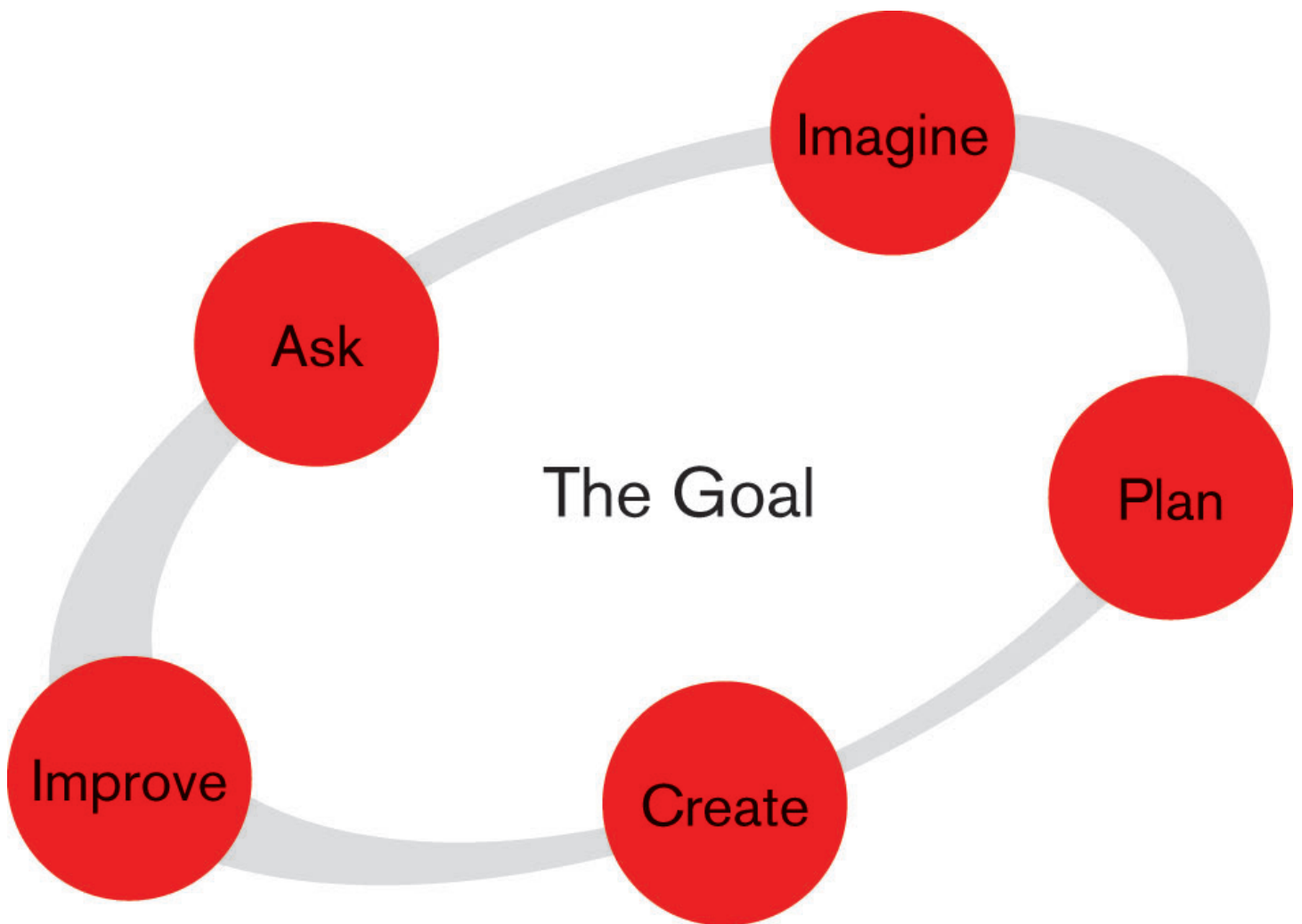
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The Engineering Design Process



Senegal

A Senegalese bazaar



Senegal's capital is Dakar. It is the westernmost point in Africa.



Senegal is a diverse country with several languages.



Senegal is proud of its recycling culture.

Unwanted objects are reused and remade into new ones.

