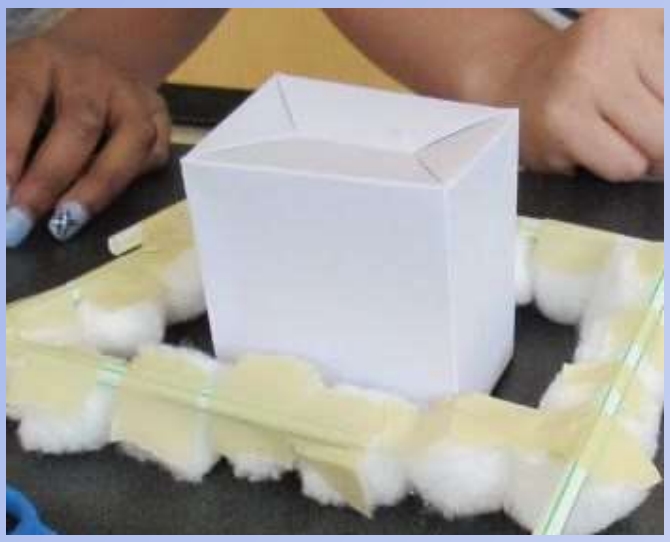
STEM: Beat the Flood

Introduction

Floating houses are permanently in the water, while amphibious houses are situated above the water and are designed to float when the water levels rise. If the water level rises, they can move upwards and float. The fastenings to the mooring posts limit the motion caused by the water..



Your Challenge!

Design a home for your community on a low lying Island able to withstand the effects of flooding, and make a model of your design so you can test it.

Things to think about

- How will you make your house float?
- How will you cut down on the wight of the house?
- How are you going to provide your house with electricity?
- How are you going to make sure your house doesn't float off?
- How will you provide your house with clean water?

Reflection Questions

What should I do first?

Is something confusing me?

Could I explain this to someone else?

Where can I look for help?

How can I do it better?

Can I explain the importance of each part?

Do I know why it might be important to think about floating houses?

STEM: Make a Conveyor Belt

Introduction

One of the basic tools in material handling industry, belt conveyors are most commonly used in transportation of bulk materials (grain, salt, coal, ore, sand, etc.). Belt conveyor systems consist of two or more pulleys (a.k.a. drums). An endless loop of carrying medium the conveyor belt— rotates about them..

Reflection Questions

What should I do first?

Is something confusing me?

Where can I look for help?

How can I do it better?

Your Challenge!

Design and build a small conveyer belt to transport lego bricks from one are to another. Try and make your conveyer belt as long as possible and remember it needs to move!

What you'll need:

- Glue
- Paper
- Cardboard
- Pens

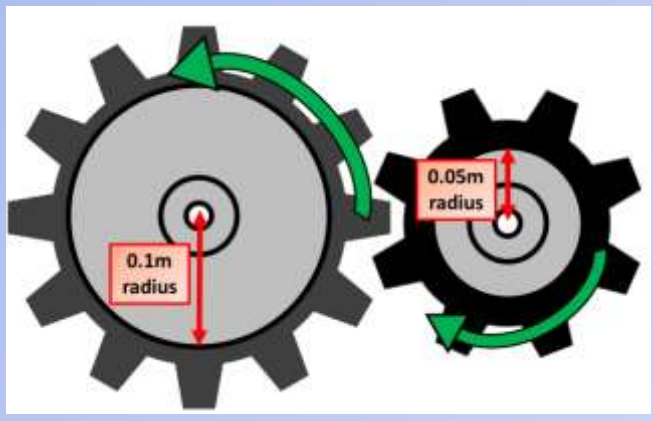
Things to think about

- How will you make it turn?
- How long will you make it?
- How wide will you make it?
- How will your wrap the paper around the pens?
- How will you make it look like a conveyer belt?

STEM: Stick Gears

Introduction

Gears are wheels with toothed edges that rotate on an axle or shaft. The teeth of one gear fit into the teeth of another gear. This lets one gear turn the other, meaning one axle or shaft can be used to turn another shaft..



Your Challenge!

Build a series of gears out of lollipop sticks, bottle tops and cardboard. You need to start at one side of a cardboard box with your first gear and make your final gear change at the opposite end of the box

Things to think about

- How are you going to attach the lollipop sticks to the bottle tops?
- How are you going to make them spin?
- How many cogs are you going to have on each gear and how will this effect how quickly the gear turns?

Reflection Questions

What should I do first?

Is something confusing me?

Could I explain this to someone else?

Where can I look for help?

How can I do it better?

What you'll need:

- Lollipop sticks
- Glue
- A carboard box
- Scissors
- Cocktail sticks , nails or screws

Test Your Dominant Side

What you'll need:

- A pen or pencil
- Paper or a notepad to write your findings on
- An empty tube (an old paper towel tube is good)
- A cup of water
- A small ball (or something soft you can throw)

Instructions:

Eye tests:

- Which eye do you use to wink?
- Which eye do you use to look through the empty tube?
- Extend your arms in front of your body. Make a triangle shape using your fore fingers and thumbs. Bring your hands together, making the triangle smaller (about the size of a coin is good). Find a small object in the room and focus on it through the hole in your hands (using both eyes). Try closing just your left eye and then just your right, if your view of the object changed when you closed your left eye mark down 'left', if it changed when you closed your right eye mark down 'right'.

Hand/Arm tests:

- Which hand do you use to write?
- Pick up the cup of water, which hand did you use?
- Throw the ball, which arm did you use?

Foot/Leg tests:

- Run forward and jump off one leg, which did you jump off?
- Drop the ball on the ground and kick it, which foot did you use?

Introduction

Check out this cool experiment that will teach you more about how your body and brain work together. Test your dominant side by completing a series of challenges. Which hand do you write with? Which foot do you kick with? Do you have a dominant eye? Do you throw with one side of your body but kick with the other? Are you ambidextrous? Answer these questions and much more with this fun science experiment for kids.

What's Happening

So what side do you favor? Are you left handed or right handed? Left footed or right footed? Is your right eye dominant or is it your left?

Around 90% of the world's population is right handed. Why most people favor the right side is not completely understood by scientists. Some think that the reason is related to which side of your brain you use for language. The right side of your body is controlled by the left side of your brain, and in around 90% of people the left side of the brain also controls language.

Others think the reason might have more to do with culture. The word 'right' is associated being correct and doing the right thing while the word 'left' originally meant 'weak'. Favoring the right hand may have become a social development as more children were taught important skills by right handed people and various tools were designed to be used with the right hand.

Around 80% of people are right footed and 70% favor their right eye. These percentages are lower than those who are right handed and this could be because your body has more freedom of choice in choosing its favored foot and eye than that of its favored hand. In other words you are more likely to be trained to use your right hand than your right foot and even more so than your right eye.

Blowing Up Balloons With CO2

Introduction

Chemical reactions make for some great experiments. Make use of the carbon dioxide given off by a baking soda and lemon juice reaction by funnelling the gas through a soft drink bottle and in to your awaiting balloon!
Pour some vinegar to the bottle and soda bicarbonate to the balloon. Set the balloon on the bottle neck and pour soda into the bottle. We get the reaction between vinegar and baking soda with CO2 as a result. The pressure of the gas "blows" the balloon

What you'll need:

- Balloon
- About 40 ml of water (a cup is about 250 ml so you don't need much)
- Soft drink bottle
- Drinking straw
- Juice from a lemon
- 1 teaspoon of baking soda

Instructions:

- Before you begin, make sure that you stretch out the balloon to make it as easy as possible to inflate.
- Pour the 40 ml of water into the soft drink bottle.
- Add the teaspoon of baking soda and stir it around with the straw until it has dissolved.
- Pour the lemon juice in and quickly put the stretched balloon over the mouth of the bottle.

What's Happening

If all goes well then your balloon should inflate! Adding the lemon juice to the baking soda creates a chemical reaction. The baking soda is a base, while the lemon juice is an acid, when the two combine they create carbon dioxide (CO2). The gas rises up and escapes through the soft drink bottle, it doesn't however escape the balloon, pushing it outwards and blowing it up. If you don't have any lemons then you can substitute the lemon juice for vinegar.

Reflection Questions

Is something confusing me?

Could I explain this to someone else?

STEM: Squashed Tomato Challenge

Introduction

In Nepal many farmers living on the mountainside grow fruit and vegetables, including tomatoes. To earn a living they need to sell these at the local market. The problem is getting to market involves a long, dangerous walk down the mountain side and over a river, at the end of which the tomatoes may well be a bit squashed..

Your Challenge!

Imagine you are a group of engineers working together on Global Goal 11. You need to find a way to help farmers in Nepal transport their tomatoes down the mountain to market.

- The tomatoes must be transported a minimum of one metre, not touching the ground.
- The tomatoes cannot be touched whilst they are moving, catapulted or 'flown' in any way! They must be moved in a controlled way.

Things to think about

You will need to think about:

- whether you want your model to float and if so, how you can make it do so.
- how to make the top of your model suitable to grow crops on. Does it need to be flat? Layered?
- the size of your model. It needs to be tested by placing it on water in a washing up bowl or sink.

Reflection Questions

What should I do first?

Is something confusing me?

Could I explain this to someone else?

Where can I look for help?

How can I do it better?

STEM: Re-green the Desert

Introduction

Desert greening is the process of man-made reclamation of deserts for ecological reasons (biodiversity), farming and forestry, but also for reclamation of natural water systems and other ecological systems that support life..

Your Challenge!

Can you come up with an ingenious solution to help families in Sudan overcome climate change and turn the desert green?

Things to think about

You will need to think about:

- Your model must be able to collect and store rain water.
- Water is precious so you need to be able to turn the flow of water on and off.
- We want your model to be able to water at least 6 plants at the same time.
- At least one of the plants your model waters should be 30cm or more away from where the water is stored.

Reflection Questions

What should I do first?

Is something confusing me?

Could I explain this to someone else?

Where can I look for help?

How can I do it better?

Have I describe the functions of the different parts?

Do I know why doing this might be important?