Viscosity Curiosity



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Who are we?

- Old Dominion University Students
- Studying Engineering or Education
- Engineers are in Fluid Mechanics Class
 - Education student is in Developing Instructional Strategies

-



Presenter: Nathanael

Hello, My name is Ed!

Let me know what you like to do, by leaving a comment!



l love...





Video Games!!



and Basketball!!!



Hi, My name is Jake and I enjoy...

Playing Video Games



And watching movies



Building Stuff





Tell me about yourself in a comment!!

Hi, my name is Adam!

3d Printing

I like...

Music



Cooking

0

Hi, My name is Nathanael and I enjoy...

Photography.



Remote Control Airplanes





Presenter: Nathanaei



I like to:

- Go to the beach
- Shop
- Netflix binge

Idaliz Lawrence







Now, who are YOU?

Leave a comment: Tell us your name and something you do for fun!

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Presenter: Adam



Or

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What is engineering? What do engineers do?

CLICK HERE!!!



Light bulbs were invented to give people a more consistent and reliable source of light.





Phones were created to establish better connections and provide better communication in the world.

Presenter: Jake



Meet an Engineer - Quentin Cooper



- Mechanical Engineer
- Works for John Deere
- Works with the National Society of Black Engineers (NSBE) CLICK HERE!!!





The Engineering Design Process (EDP)



CLICK HERE!!!



Today's Engineering Design Challenge... Ice cream in a bag! How does this work? MAGIC?!? 00 Will it work? Is it good? -Through this presentation we will find out!

Presenter: Ed

Make your own worksheet

Copy on a piece of paper : Name:_____

Date:

<u>Trial one</u>

Choice of milk picked:

Observation:

How can I improve?:

<u>Trial two</u>

Choice of milk picked:

Observation:

How can I improve?:

How do the two trials compare?



Ice cream in a bag..?

- Have you made Ice cream in a bag before?
 - Leave us a comment!
- Is it really Ice cream?YES it is!!
- What can be put into it?
 - Anything that normally goes
 - into ice cream can go into the bag!

CLICK HERE!!!

Presenter: Ed

What are we going to do? 💌

1. We will be making delicious ice cream through an experiment to help you understand viscosity by churning milk and other fatty liquids.

2. By the end of this experiment, you will be able to describe and define viscosity and how it relates to food preparation by explaining how churning relates to viscosity.



Presenter: Idaliz Lawrence

Viscosity



- Viscosity is a property of fluids, that shows the resistance to flow.
 - Ex. Honey has a higher viscosity than water.
 - Think of how honey sticks together and doesn't just spill.
- When the fat from the dairy tangles up, the mixture will thicken.
- As the the mixture thickens, the viscosity of the mixture increases because of the fat molecules tangling up.
 - This is the ice cream changing from liquid to almost a solid.

Viscosity Continued



Presenter: Ed

How is it going to turn into ice cream?

Frame the question first!



How does the runny mixture get thicker on its path to ice cream?

Break the question down even further.

What is inside the milk or sugar that will change as the whole thing cools down and is shaken?

Will the sugar change? Will the milk change?

Presenter: Adam

How does the ice cream get thicker?

The sugar will dissolve into the mixture, but it is already a solid.

The sugar will not change the mixture as it cools.

Now that we know that, what's in the milk that thickens it all into ice cream?

Let's make our first batch!



Presenter: Nathanael

First trial Milk choices: 📀

Follow along on a piece of paper. Write down a couple things: Ingredients used: (for example the Milk used)

- Skim Milk
- 2% Milk
- Whole Milk
- Almond Milk

- Coconut Milk
- Soy Milk
- Condensed Milk

If you don't have any of these, just use what you have!

Presenter: Nathanael

Collect your Supplies 📀



Milk: 1 cup



Ice: 2 cups



Sugar: 2 tbsp



1 small and 1 large resealable bag



Vanilla Extract: 1/2 tsp



Salt: ⅓ cup

Presenter: Jake

CREATE

- In a small resealable plastic bag, combine milk, sugar, and desired flavoring . Push out excess air and seal.
- Into a large resealable plastic bag, combine ice and salt.Place small bag inside the bigger bag and shake as much as you can for 7 to 10 minutes. The mixture should get less runny over time.
- 3. Open up the ice bag and take out the ice cream bag inside! Re-seal the ice bag and put it in the sink for now.
- Get a spoon and eat the ice cream! You may add some toppings if you have some.



CLICK HERE!!!





Presenter: Idaliz Lawrence

Time for the testing phase. EAT YOUR ICE CREAM!!



Did that milk turn into ice cream?

If it didn't turn solid, that's ok! This is just the first trial.

If yours did though, it wasn't just the cream cooling down! Something else changed too.

Cream is fat particles in water. As you shake up the mixture, the fat breaks free and starts to capture water inside it!

Ice cream is called an "emulsion", which means it has a bunch of small particles suspended inside and mixed up.

Presenter: Adam





Fat

- The fats inside milk are molecules!
- Molecules are combinations of different elements in our world, like water being H₂O.

Fat molecules are really really long, like a jellyfish. When shaken, they tangle together with each other like string, or headphone cords!

Presenter: Adam

Just like churning butter

Churn: Mixing liquid by hand

CLICK HERE!!!



Historical origins: Before the 18th century, churning was a method people would use to create heavy cream that turns into butter.

With technology today, factories can make heavy cream and other products with the help of electric mixers.



Presenter: Idaliz

IMPROVE your design!

- Now that we know that the fattiness of the milk is the thickener of our ice cream, what kind of milks are the fattiest milks?
- Whole milk is good, but what's thicker?
- Half and Half, Coffee Creamers, Condensed Milks and Heavy Cream are all fattier dairy products which would work here.



Presenter: Jake

Second trial milk options: 📀

Select one milk!

- Coffee cream
- Fat milk
- Condense coconut milk

Hint: These milk are fattier then the original ideas



Presenter: Nathanael

Collect your Supplies 📀



Fatty Dairy: 1 cup



Ice: 2 cups



Sugar: 2 tbsp



Vanilla Extract: 1/2 tsp

Salt: ⅓ cup

Presenter: Jake

CREATE AGAIN!

Do what you did before and make the ice cream AGAIN!

In a small resealable plastic bag, combine milk, sugar, and desired flavoring . Push out excess air and seal.

- Into a large resealable plastic bag, combine ice and salt.
 Place small bag inside the bigger bag and shake it fast for 7 to 10 minutes. The mixture should get less runny over time.
- 2. Open up the ice bag and take out the ice cream bag inside! Re-seal the ice bag and put it in the sink for now.
- 3. Get a spoon and eat the ice cream! You may add some toppings if you have some.

 Can use the same large bag because there is no difference.

Presenter: Idaliz Lawrence

Time for the testing phase. EAT YOUR ICE CREAM!!

Fill out the comparison on your worksheet!

How do ice cream companies do it? 📀

- Large scale, big machines, and milk from nearby.
- Dippin Dots ice cream is made by dripping a little ice cream through really cold air, turning the droplets into a ball!

- How do they keep it cold?
- Ice cream trucks have freezers that keep their ice cream cold for a long time!

Presenter: Ec

Share Your Results From Each Trial!

Click the share button then click on the link to start sharing!

CLICK HERE!!!

Presenter: Jake

What did you learn?

Quiz Time! Find out how much you learned today. CLICK HERE!!!

Presenter: Jake