

Wet N' Wild



Jacob Schwartz, Kimberly Torres, Mohammed Alhafith,
Morgan Curry, Nicholas Matha, Sharif Donkor

Introductions : Kimberly Torres



Hello my name is Kimberly Torres I am an education major at Old Dominion University. I am a Senior at Old Dominion University and I want to someday be a Kindergarten Teacher. One thing I like to do is swimming.



Jacob Schwartz



Major: Mechanical Engineering Technology

I am a Junior at Old Dominion University

Hobbies

- Goalkeeper and Captain for ODU Club Soccer Team
- Brother in Sigma Phi Epsilon Fraternity

Fun Fact: I was in Chorus and an Acapella group in high school and still love to sing.



Nicholas Matha



- Elementary Education Major
- Junior at Old Dominion University
- From Ocean City, Maryland
- Fun Fact: I run a sneaker business



Morgan Curry



- Mechanical Engineering Technology
- Baja SAE
- Senior
- Fun Fact: I love going hiking in the summer



Sharif Donkor



- Senior at Old Dominion University
- Mechanical Engineering Technology major
- My career aspiration is to be an Officer in the Air force
- Fun Fact: I play football, soccer, and a ping pong champ!



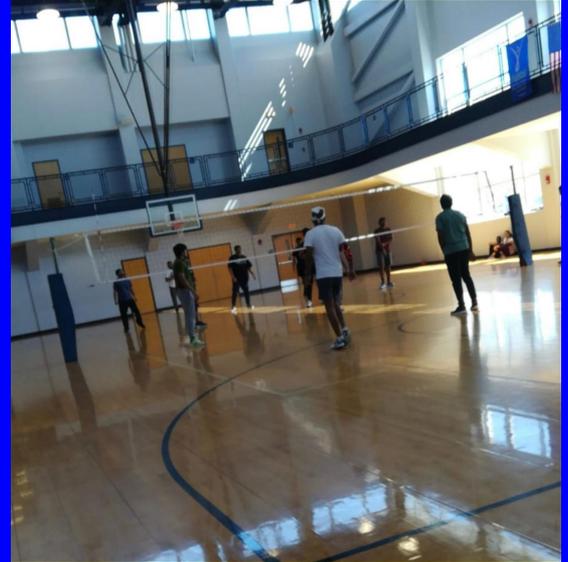
Mohammed Alhafith



Mechanical Engineering Technology

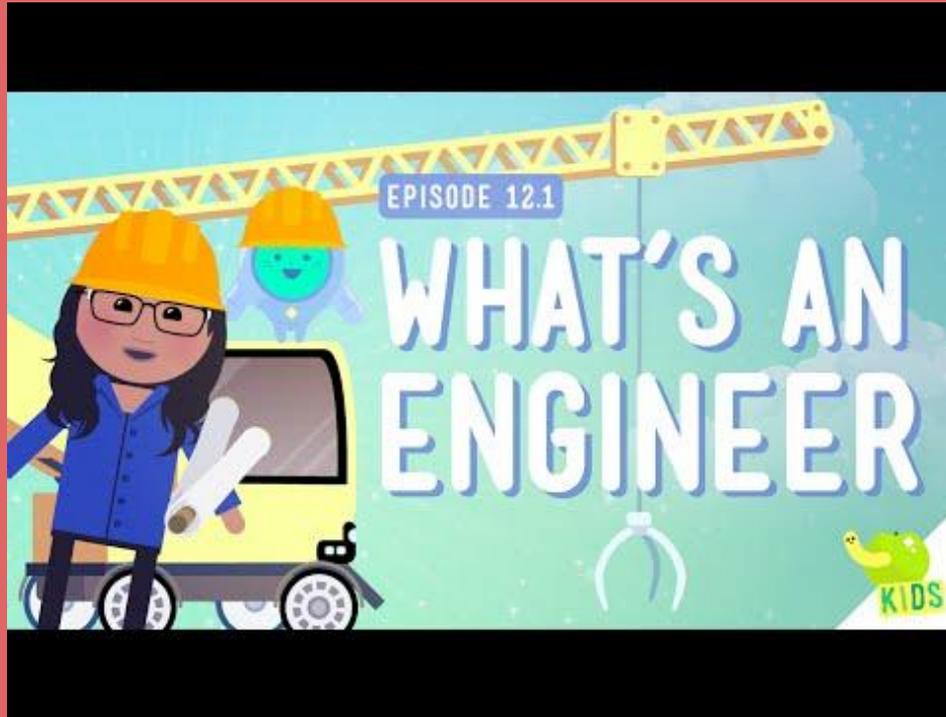
Senior

Fun fact: I play volleyball, soccer, and table tennis



What is Engineering?

Click Here!



What is Engineering?



- Design: engineers need to run through a design figuring out the stresses on objects and the amount of material needed.
- Forces: when designing airbags an engineer needs to understand the forces acting on the object due to an impact.
- Physics: if someone is falling engineers need to know the laws of physics to account for the weight

Meet an Engineer - Rebecca



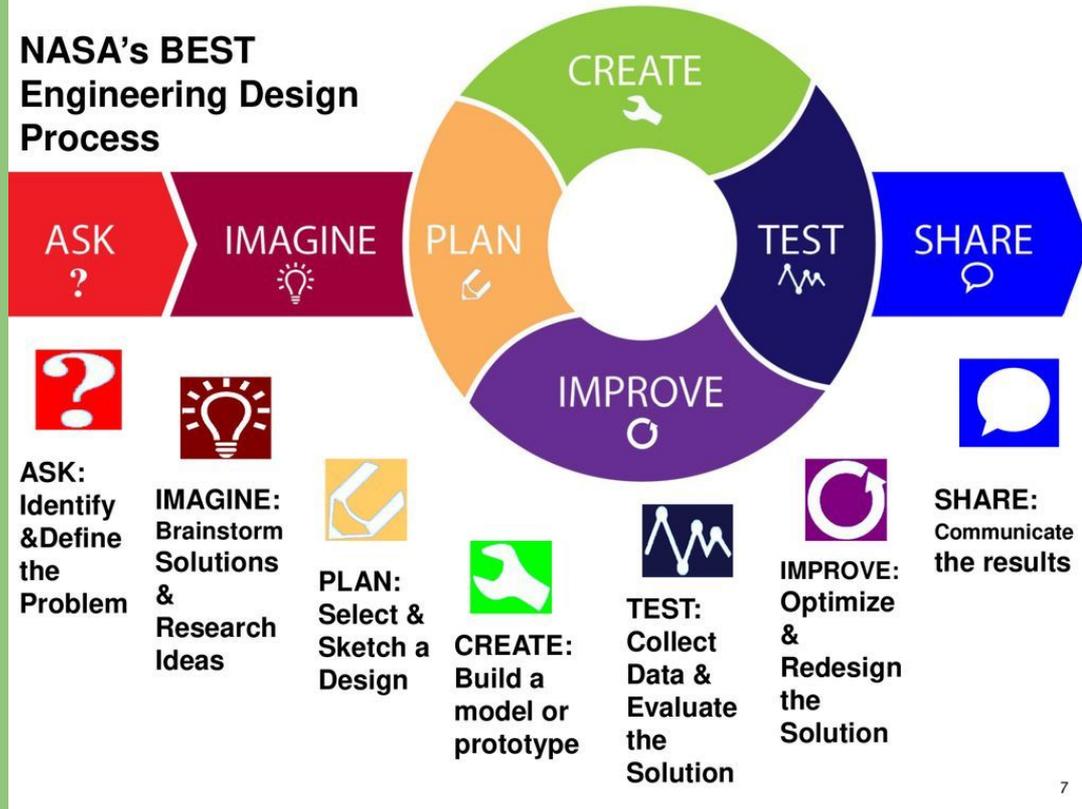
- Mechanical Engineer
- Designs Water Slides!
- Watch the video to learn more about Rebecca and her job!



The Engineering Design Process (EDP)



NASA's BEST Engineering Design Process



Building your own Water Slides!

Based on the beginning of the video to the right, do you think the object will make it to the end of the water slide?

Comment your answer on the slide before watching!

(Right click the slide to comment)

Click Here!



Open Channel Flow



The Manning's equation shows the relationship in open channels between channel velocity, area and channel slope. The slope affects the velocity in an open channel as steep slope will generate a faster velocity compared to a more flattened surface.

Climbing the stairs builds up a certain amount of potential energy, which turns into kinetic energy as you head down the slide. Water slides have a constant stream of water flowing from the top to the bottom. The water lubricates the slide to reduce the friction between the slide and your body.

$$Q = VA = \left(\frac{1.49}{n} \right) AR^{\frac{2}{3}} \sqrt{S} \quad [\text{U.S.}]$$

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Open Channel Flow

- Slope affects rider's speed, the steeper the slide, the faster the velocity of the water is, thus the faster you go.
- Weight also affects your velocity, heavier people tends to go slower due to more friction.
- Watch the video below as an example for how climbing the stairs builds up a certain amount amount of potential energy, which turns into kinetic energy as you head down the slide.

As you can see from the video, steeper slope makes you go down faster depending on your weight.

Faster flow rate can also generate faster velocity! When there is more water being pushed down the slide, this creates less friction from the person going down it!



Open Channel Flow and Gravity

What is Gravity? A force that attracts a body toward the center of earth or toward any other physical body.

Open Channel Flow: Is a type of liquid flow within a conduit with a free surface known as channel. Open channel flow is also called gravity flow because of the water flow induced by the effects of gravity.



Today's Engineering Design Challenge...



Create your own water slide that will take two objects to the bottom and keeps the water in the slide!

One object should be larger than the other!



IMAGINE



Think about what you want your slide to look like and be made of!

- What household item could be good for the tube of the slide?
- How are you going to combine them together?
- What can you do to the tubes to make them “slippery” or “smooth”?
- Supports on actual water slides are metal and concrete, what could you use to keep it standing?



The design of the slide is up to you! As long as it holds water and transports your “person”, it is successful!



PLAN



After you've thought about your slide for a while, pick one!

Draw out your idea on a piece of paper, or start to model it out!

Collect the supplies you thought of, or suggested ones in the next slide.



Presenter: Jacob

Supplies

You may use materials you thought of and experiment with them on your model, but below are some materials we suggest for your water slide!



Saran Wrap



Straws



Paper/Plastic Cups



Tape



Paper Towel/Toilet Paper rolls



Bowl

CREATE



Time to start! You have 30 minutes!

You are making what engineers would call a prototype, or a model.



TEST YOUR WATER SLIDE

Test your water slide by collecting some water in a bottle, and pouring it down your slide with your object in it! See how the speed of water affects the speed of your objects, and how much water it takes for the objects to reach the bottom!



Above are some examples of testing for other classes!

What happened?



We want to see how you did!

Tell us or show us with a picture or video how you did with your water slide!

Comment on the slide to show us!

How are some ways you can improve your design?

Here are some questions you can ask yourself below!

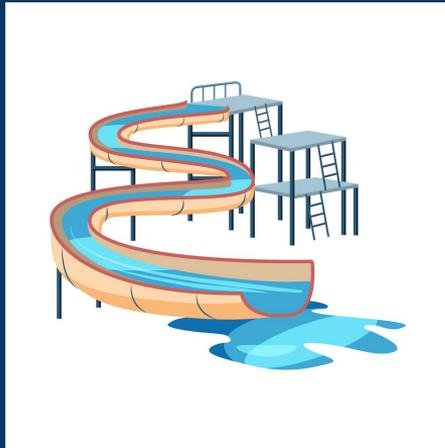
- How to make the Water Slide faster?
- How does water help the water slide go faster?
- Does the density help to make it faster?
- Why do you think your water slide did not go fast?

Engineering/Science Concept Revisited



Think of ideas of how you may be able to redesign or fix your slide!

- How can you get to the bottom of the slide fastest?
- Heavier or lighter items?
- Should your slide have more or less elevation?



Improve your design!



Where and when would this design solution be needed?
What would need to be different in a real world build?

What did you learn?

Take the quiz posted here!



(Click here!)



Water Slide Quiz

Complete this quiz after you have have finished making your water slide! Make sure to answer every question before you submit the quiz.

What is gravity?

0 points

- A man made item
- something you find on the internet
- a water slide
- A force that attracts a body toward the center of earth or toward any other physical body.