

Western Engineering Outreach

Tornado in a Jar

SK- Grade 2

Meet Today's ENG HERO!



Gregg Kopp - Associate Professor with Western Engineering

Dr. Kopp is the lead researcher in the Northern Tornadoes Project and a professor in the Civil and Environmental Engineering department at Western University. His expertise and research relate to limiting damage to structures during extreme wind storms such as tornadoes and hurricanes. He is a former research chair in Wind Engineering and is the lead researcher for the Three Little Pigs Project at the Insurance Research Lab for Better Homes. Learn more about Dr. Kopp and his research by visiting

<https://www.eng.uwo.ca/research/tlpp/>

Learning Goal:

- Students will learn about tornadoes and how they are formed
- Students will learn about environmental engineering
- Students will understand some of the engineering challenges brought on by extreme weather
- Curriculum Connections: Grade 1 - Materials, Objects, and Everyday Structures and Daily and Seasonal Changes

Materials Needed:

- 3 cups of tap water
- 1 teaspoon dish soap
- 1 teaspoon vinegar
- A jar
- Glitter or very small objects (ie beads) (optional)
- Food colouring (optional)



Engineering and Science Connections:

Today we will be talking about extreme weather and civil and environmental engineering!
What are some examples of some extreme weather?

Tornadoes

What is a tornado?

- High winds spinning in a tight circle
- Caused by warm winds hitting cool winds
- Can create a lot of destruction, with speeds up to 300 mph

How do tornadoes form?

Most tornadoes form from thunderstorms. When the warm, moist air from the Gulf of Mexico and cool, dry air from Canada meet, it creates instability in the atmosphere. This results in a change of wind direction and an increase in speed and height, which creates an invisible spinning effect. Most strong tornadoes form within this area of rotation.

Connection to Engineering

Civil and environmental engineers care about extreme weather effects because they can improve buildings and infrastructure by seeing how they react in tornadoes and storms. If a house is destroyed in a tornado, a team of engineers would look at what went wrong and how the building collapsed. This allows civil and environmental engineers to come up with new ideas about how to build stronger and more stable structures.

Video Recommendation: *Tornado Simulation at Western's WindEEE Research Institute:*

<https://www.youtube.com/watch?v=PreqRRXZxoE>

Activity:

Before you start, think about the following questions:

- Why is it important to have engineers investigate buildings' damage after severe weather events?
- What are the two winds that have to meet up to make a tornado?

Our Own Tornado Simulation

Some environmental engineers are investigating the damage caused by a recent tornado on a nearby subdivision. Unfortunately, the simulator at the WindEEE Research Institute is out of order! The engineers have reached out to us to create an alternative simulation to understand the nature of the tornado that hit the subdivision.

Follow these steps to create a tornado simulation:

- Fill jar with water (stop about an inch from the top)
- Add vinegar and dish soap
- Seal jar
- Swirl for 5 - 10 seconds → hold with one hand on top and one hand on the bottom
- Place the jar on the table and watch the tornado!
- Customize it however you would like (you can use food colouring, glitter, beads, etc)

What Did You Learn?



- What is a tornado?
- How are tornadoes formed?
- What kind of engineers investigate tornado damage?
- Which major winds contribute to tornado formation?

Future Learning



- How are other types of extreme weather events formed?
- How might engineers alter buildings being built in high tornado risk zones?

Share your creations!

We would love to see what you made. Email us at discover@uwo.ca or tag us on social media.

Instagram: @westernueng

Twitter: @westernueng

Facebook: @westernueng

Thanks for discovering with us!