

LESSON: Wind, Investigating an Invisible Force GRADE: K**TIME: 60 min.****SUMMARY:**

Although the wind is an invisible force, it is mighty. Students plan and conduct an investigation, analyzing the results to determine the effect different wind strengths and directions have on leaves. They apply their learning by taking the investigation outdoors and observing how the wind moves their leaf. Finally, students will connect how this invisible force can be converted into electrical energy in wind turbines throughout Iowa.

OBJECTIVES:**Science****Motion & Stability: Forces & Interactions**

- K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes or pulls on the motion of an object.
- K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or pull.

MATERIALS & RESOURCES:

- Leaves – 1 per small group; find dry leaves outdoors, or use silk leaves *
- Photos of seasons: winter blizzard, autumn leaves falling, hair blowing in the wind, wind turbines *
- *Feel the Wind* by Arthur Dorros *
- Optional extension: Mini Wind Turbine kit¹

¹ Materials are included in our free TGG Wind Energy teaching kit, available for checkout by contacting shellyjohnson010@gmail.com

PRESENTATION:

Read *Feel the Wind* by Arthur Dorros, or take a walk outside. How do you know when the wind is blowing? Did you know wind is an invisible **force**? Even though we cannot see it, it still **pushes** us as well as other things in nature. We are able to see the effects of the wind's pushes. **Today we will investigate how the wind's force affects objects.**

DIRECTIONS:

1. Show pictures of the different seasons. What season do you think this picture shows? Why? Do you think the wind was blowing in this picture? What effect did the wind have on objects?
2. What is the difference between a gentle breeze and a gust of wind? Which one has a stronger force? Students practice these by blowing on their palms.
 - Show pictures of seasons again. Do you think there was a gentle breeze or a strong wind in this picture? ie. strong winds – blizzards, hair blowing in the wind, gentle breeze – leaves falling. What direction do you think the wind was blowing?
3. **Leaf investigation:** Demonstrate how to conduct an investigation.
 - Our task today is to try two strengths of wind on the leaf and observe the effects of the wind. The force is invisible but the effects will be visible.
 - What question are we trying to answer in this investigation?
 - On the investigation sheet, use an arrow to record the wind speed (gentle breeze = 1 arrow) and the wind direction.
 - Model making a prediction on a three column chart (perhaps in science notebooks).
 - Place the leaf on the starting line on the investigation sheet. Hold down the paper and gently blow.
 - Model recording what happened on the three column chart. Why did the leaf move? What force was present? Did it push or pull the leaf? How did the wind affect the leaf? How far did it move?

4. **Plan an investigation:** On the “Leaf Investigation” sheet, have each group make a plan for what direction and how strong they want their wind to be. They should choose to change either the wind speed or direction, not both.
 - What question are you trying to answer in your leaf investigation? You blow on the leaf twice – what will be the same and what will be different?
 - What do you think will happen? Have each group record a prediction.
5. **Conduct an investigation:** Have each group conduct their investigation and record results on their three column chart.
 - What caused the leaf to move? How did the strength of the wind affect your result?
6. **Analyze the data:** Each group can add their results to a class data chart.
 - What do you notice about the data? Did the results surprise you? Did the investigation work as intended? Does any of the data seem different than the rest? Maybe we had an error and need to redo that trial.
 - Based on our class data, what happens when there is a gentle breeze? When there is a wind gust? When the wind changes directions? When a force pushes on something?
 - What made our investigation a fair test? What are other things we could do to further investigate the wind?
7. **Application:** Take it outdoors! A new question to investigate: What effect will the wind outside have on their leaf? In a new two column chart, have students predict what will happen if they hold their leaf at shoulder height and let go outdoors. Take students outdoors and try it out. Note: if using silk leaves, remind students to bring them back inside to avoid littering.
8. **Extension:** We have seen how wind affects leaves. How does this invisible force affect other objects? Show a picture of a wind farm. Where have you seen wind turbines like this? Explain how wind turbines turn the invisible force of the wind into electrical energy that can power the lights in our classroom. Demonstrate how the mini wind turbines can play music and light LEDs.
 - a. We know the wind can affect many objects. How is the wind affecting the wind turbine? Why is this important? How can wind energy help us?

REFLECTION/JOURNAL PROMPT:

How well did your group work together? How were you a good teammate? What is something you could do better next time?

Leaf Investigation

1. Add arrows to **predict** the wind direction and speed.
2. **Conduct** the experiment, and **record** the results in your science notebook.

Starting line

