

THE THREE LITTLE PIGS

music by W.A. MOZART adapted by JOHN DAVIES

SCIENCE: “Tornado-Safe House”

Students will

- Discuss hazards associated with tornados
- Brainstorm ways in which homes and other structures can be made to be tornado-safe
- Become familiar with the “Enhanced Fujita Scale” and its purpose
- Design and build a model house to test against simulated tornado-force wind
- Record their findings on a chart

Copies for each student: “The Story of the Opera”, Activity Worksheet 1&2

Copies for the Teacher: Activity Worksheet 1&2, Enhanced Fujita Scale Chart

Getting Ready

Decide which section(s) of the lesson you wish your group to complete. Be sure students are familiar with “The Story of the Opera” as it relates to content of this lesson.

Gather materials:

- Pencils & Blank Paper for drawing
- Hairdryer or Motorized fan
- Materials per group:
 - 2 Large sheets of cardstock or construction paper
 - 4 Straws
 - Glue or Glue sticks
 - Plastic wrap
 - Aluminum foil
 - Styrofoam tray
 - Ruler
 - Scissors
 - 4 Paper clips

Instructional Time: Two to three 45-minute class periods

Introduction

Explain to students that while we do not have wolves who “huff and puff” to blow our houses down in Texas, we do experience a lot of tornados. With tornados come strong winds which can cause damage to homes and other structures. As a class, discuss other hazards associated with tornados. (Answers may include: heavy rain, thunder, hail, flooding, power outages, etc.) Then, have students brainstorm ways in which they think homes and other structures could be made to be tornado-safe.

Next, explain that engineers and architects strive to design newer and stronger homes and structures that are able to protect people against the damages of tornados. One way to test a structure’s design is to build a small model and re-create tornado conditions in a lab setting. Using the first three columns of the “Enhanced Fujita Scale

Chart”, introduce students to the six ratings of tornado strength. Be sure that students understand that this particular scale is a tool used to rate the strength of tornados based on the damage they cause.

Finally, tell students that they will design and build a model house using simple building materials to test against simulated tornado-force wind.

Guided/Independent Practice

House Design and Construction

Divide the class into groups. Distribute a set of building materials and Activity Worksheet 1 to each group. Have each group draw a design of the house they will build and allow 30-45 minutes for construction. Aluminum foil may be used for support, but not for a main building material.

Testing and Observation

Once construction time is complete, the hairdryer will be used to test each house for wind resistance. Begin by setting the hair dryer on “high” at a distance of 6 feet away from each house, and progressively move the hairdryer closer by one foot to represent the tornado ratings. You may choose to have markers on the floor designating the different tornado ratings listed on the Enhanced Fujita Scale Chart.

Ask the groups to record their observations in the chart on Activity Worksheet 2 as their constructions are tested at each tornado rating. If their construction was not successful, have them write down possible ideas to fix it. If time permits, have the students modify their design and try again.

Evaluation

- Do students understand the Enhanced Fujita scale and its purpose?
- Did students successfully design and construct a model house using the provided materials and requirements?
- Did the students’ house constructions prove to be tornado-safe? If not (time permitting), were they able to modify their design to be tornado-safe?

Prove it!

The Dallas Opera wants to see your classroom’s hard work! Take pictures or videos of your students’ work and email them to: education@dallasopera.org for a chance to be featured on The Dallas Opera Website (<http://dallasopera.org/learn/>) and/or at the pre-show for the Student Matinees™!

TEKS – Science

5th Grade

112.16 b. 2 A,B,E,F Scientific investigation and reasoning

The student uses scientific methods during laboratory and outdoor investigations. The student is expected to: (A) describe, plan, and implement simple experimental investigations testing one variable; (B) ask well-defined questions, formulate testable hypotheses, and select and use appropriate equipment and technology; (E) demonstrate that repeated investigations may increase the reliability of results; (F) communicate valid conclusions in both written and verbal forms

6th Grade

112.18 b. 1 A Scientific investigation and reasoning

The student conducts classroom and outdoor investigations following school and home safety procedures and environmentally appropriate practices. The student is expected to: (A) demonstrate safe practices as described in the Texas Safety Standards during classroom and outdoor investigations, including observing a schoolyard habitat

112.18 b. 2 B,C Scientific investigation and reasoning

The student uses scientific inquiry methods during laboratory and field investigations. The student is expected to: (B) design and implement experimental investigations by making observations, asking well-defined questions, formulating testable hypotheses, and using appropriate equipment and technology (C) collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers

Correlates: Language Arts

Gardner's Intelligences: Visual-Spatial, Interpersonal, Logical-Mathematical

Bloom's Taxonomy: Understand, Analyze, Evaluate, Create

Online Resources:

<http://operatales.com/three-little-pigs.shtml>. Accessed on 12/11/15

<http://www.learnnc.org/lp/editions/careerstart-grade7/4375>. Accessed on 3/8/16

https://en.wikipedia.org/wiki/Enhanced_Fujita_scale. Accessed on 3/21/16

The Story of the Opera

The Three Little Pigs is a one-act opera adapted by John Davies from the traditional fairy tale featuring music by Wolfgang A. Mozart.

The story begins with three little pigs at their mother's house. Despina, a little girl pig who loves going to the library, is reading a book. Her brothers, Cherubino and Don Giovanni, have not yet learned how useful the library can be. But they are about to find out, for Wolfgang Bigbad, the Big Bad Wolf, is on his way. Despina explains that it is time for them to build their own house, and immediately her two brothers begin to argue about the choice of building materials. Cherubino claims that straw is the best; however, Don Giovanni is sure that sticks would be better. They turn to Despina to settle the argument and she tells them that she is going to the library to check out books that will teach her about building houses. The boys laugh as if it is the most ridiculous idea they have ever heard!

Despite Cherubino and Don Giovanni's doubts, they follow Despina as she makes her way through the woods to the library, where Wolfgang Bigbad himself is pacing back and forth in front of the building. He hasn't eaten all day and would love to get his paws on a small pig, or better yet, two or three! When he sees the three little pigs, he "hides" himself by pretending to be a statue in order to surprise them. Despina goes directly into the library while the boys play outside. Soon they realize that the "statue" is really Wolfgang Bigbad! Cherubino sees that Don Giovanni is terrified, and makes him approach the "statue" to invite him to dinner. The "statue" (Wolfgang) nods his head to accept the invitation.

Meanwhile, Despina has found all of the books she needs, and the three pigs prepare to build their houses. Don Giovanni has built his house of sticks, which Wolfgang blows down. Cherubino has gone ahead with his plans to build a straw house, but it proves to be even less "huff-proof, puff-proof" than his brother's because Wolfgang blows it down, too! Now that both of the boys' flimsy homes are gone, they run to the safety of Despina's house, which she has made of bricks. Wolfgang, now very, very hungry, cannot blow it down! He tries every trick he can think of to get into Despina's sturdy home, but it is no use!

In the end, after their scary, hair-raising encounter with Wolfgang, Cherubino and Don Giovanni both wholeheartedly agree that Despina's idea of going to the library and reading books is a pretty smart thing to do after all.

The Characters

Despina: (soprano or mezzo) A little girl pig who loves the library.

Cherubino: (mezzo or tenor) Despina's older brother.

Don Giovanni: (bass or baritone) Despina's younger brother.

Wolfgang Big Bad: (bass or baritone) The Big Bad Wolf, himself.

Enhanced Fujita Scale Chart

Tornado Strength Rating	Wind Speed	Potential damage
EF0	65-85 mph	<i>Minor or No Damage:</i> Peels surface off some roofs; some damage to gutters or siding; branches broken off trees
EF1	86-110 mph	<i>Moderate Damage:</i> Roofs severely stripped; mobile homes overturned or badly damaged; windows broken
EF2	111-135 mph	<i>Considerable Damage:</i> Roofs torn off well-constructed homes; foundations of frame houses shifted; mobile homes completely destroyed; large trees snapped; cars lifted off the ground
EF3	136-165 mph	<i>Severe Damage:</i> Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked
EF4	166-200 mph	<i>Extreme Damage:</i> Well-constructed homes and whole frame houses completely leveled; cars and other large objects thrown
EF5	>200 mph	<i>Total destruction of buildings:</i> Strong framed, well built houses leveled off foundations and swept away; steel-reinforced concrete structures critically damaged; tall buildings collapse or have severe structural deformations; some cars and trucks can be thrown approximately 1 mile.

Name: _____

Date: _____

The Three Little Pigs
Activity Worksheet 1
Building Your Tornado-Safe House

Step 1: Design

Design a model house that will withstand tornado-force wind. Your team must draw a top view and side view of the house you want to build.

Step 2: Construction

Teams may only use the materials listed below*:

- 2 large sheets of cardstock or construction paper
- 4 straws
- Glue or glue stick
- Plastic wrap
- Aluminum foil
- Styrofoam tray
- Ruler
- Scissors
- 4 paper clips

***Note:** Aluminum foil may be used for support only, not as a main building material.

Construction requirements:

Your house may be any shape, but it must:

- Include at least 2 windows and 1 door

Name: _____

Date: _____

The Three Little Pigs
Activity Worksheet 2
Testing Your House

Instructions: Use the hairdryer on the highest setting as your simulated tornado-force wind. Starting at a distance of 6 feet away, point the hairdryer toward the house. Move the hairdryer closer by one foot and observe how your house resists the increased wind strength. Repeat until the house is destroyed or you reach EF5 level.

Record what you observe as your model house is tested for each tornado category under “Observation” in the chart.

Tornado Strength Rating	Wind Speed	Testing Distance from House	Observation
EF0	65-85 mph	6 ft	
EF1	86-110 mph	5 ft	
EF2	111-135 mph	4 ft	
EF3	136-165 mph	3 ft	
EF4	166-200 mph	2 ft	
EF5	>200 mph	1 ft	

If your house was damaged, write down possible ideas to make it stronger. Reconstruct the house using those ideas and test it again.
