WASHINGTON STATE FAIR

IT'S TIME ...

Teacher's Guide | Grades 4–12

Washington STATE FAIR 2013
DO THE PUYALLUP!
SEPT. 6 - 22

The Seattle Times NEWSPAPERS IN EDUCATION
INSPIRING STUDENTS TO LEARN

INTRODUCTION

Nearly every teacher and student in the Puget Sound region receives a complimentary gate ticket to the Washington State Fair. This year's theme for the fair is "It's Time ..." This guide explores the variety of activities at the fair through discussion, projects and hands-on experiments for grades 4 through 12. These lessons are to be used with content that will appear in The Seattle Times on September 5, 12 and 19. The guide will appear in September on both The Seattle Times Newspapers In Education (NIE) website (**www.seattletimes.com/nie**) and the Washington State Fair's website (**www.thefair.com**).

NOTE TO EDUCATORS

Activities in this guide are built on knowledge and information provided in the e-Edition of The Seattle Times on September 5, 12 and 19. On each Thursday, you will find a full page of Washington State Fair exhibits, fun facts and thought-provoking questions in the newspaper. You can visit the NIE website (**www.seattletimes.com/nie**) to find the exact location of these pages in the newspaper. Have students take notes from the in-paper content each week to use in combination with this guide. Teachers are encouraged to modify the guide to fit their individual classroom needs.

THE SEATTLE TIMES NEWSPAPERS IN EDUCATION (NIE)

To enroll in The Seattle Times NIE program and receive free access to the electronic version (e-Edition) of the newspaper, lesson plans and curriculum guides, as well as the in-paper content for this guide, please e-mail **nie@seattletimes.com** or call **206.652.6290**.

WASHINGTON STATE SCIENCE STANDARDS

This guide addresses Washington State Science Standards for grades 6-8 listed below. Please adapt the lessons to meet your classroom needs.

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WASHINGTON STATE SCIENCE STANDARDS

The Seattle Times Newspapers In Education (NIE)
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LESSON 1
Illuminated Lanterns

Objective
Observe how light travels through different mediums by constructing lanterns.

Materials
Paper and fabric made of a variety of thicknesses such as tissue paper, newspaper, wax paper, butcher paper, computer paper, construction paper, cardstock, cardboard, bed sheets, towels, and other fabrics or paper cups. Flashlight, scissors, rulers, ribbon, glue or a stapler.

Lesson Steps
Start by discussing with students that when light hits an object, it can bounce off the object, go through it or be absorbed by it. Before making the lanterns, ask students to predict what materials will block light or allow it to pass through by showing different paper and fabric materials. Have students define the terms opaque, transparent and translucent. What does the lantern material need to be in order to transmit light?

Dim the classroom lights and use the flashlight to demonstrate how light passes through the different materials. Then have students select a material and create their lanterns. Students can make a lantern using paper or paper cups.

1. **Using paper**
   Decorate paper with Chinese symbols or another design. Fold the paper in half. Cut slits in the material perpendicular to the fold. Unfold the material and attach the ends together using glue or staples to create a cylinder. Students may also want to make an inner part of the lantern with a solid piece of paper in which they do not cut slits.

2. **Using two paper cups**
   Starting at the rim, cut vertical slits in the cup. Then trim the edge of the cup to remove the "lip." Use another paper cup to make a lantern lid by removing the body of the cup and creating "tabs" in the base. The number of tabs should coincide with the number of vertical strips you made for your lantern. Poke a hole in the center of both your lantern and lantern lid and thread the cotton thread through the center of the lantern's lid and bottom. Once the thread has been run through the center of the lantern, affix the lantern lid tabs to the lantern vertical strips using a small dab of glue. Using ribbon, wrap the lantern lid and lantern base together. Paint the cup and add tassels and ribbons as decoration. See photos at: **http://www.lantern-festival.com/how-to-make-lantern/how-to-use-paper-cups-to-make-a-chinese-red-lantern.html**

Expansion
Once the lanterns are complete, experiment with materials and designs. Discuss the following questions:

- What materials and shapes allowed light to pass through the easiest?
- How do you think the Chinese determined the best materials and shapes for their lanterns?
- What materials interact most interestingly with light?
- What other cultures use light as a way to celebrate or recognize important events?

Sources
science.howstuffworks.com/light2.htm

www.sciencecompanion.com/wp-content/uploads/2010/06/SCLightFieldTripLR.pdf

www.crayola.com/lesson-plans/chinese-lanterns-lesson-plan/

www.kinderartblog.com/2011/10/how-to-make-paper-lanterns.html

LESSON 2
Calendar Comparison

Objective
Distinguish between the lunar and Gregorian calendars. Explain and illustrate the phases of the moon.

Materials
Photographs of the phases of the moon. Paper and colored pencils, pens or crayons for students to depict the phases of the moon.

Lesson Steps
As the first important festival after the traditional Chinese New Year, the Lantern Festival is the first night to see a full moon, and it marks the end of the two-week New Year holiday period. During Lantern Festival, people get together to celebrate the beginning of spring by watching lanterns, fireworks and eating Yuanxiao (sweet stuffed dumplings made of glutinous rice flour served in soup). The Lantern Festival is celebrated on the 15th day of the first month of the traditional Chinese calendar, which is roughly between January 16 and February 19 each year. China uses a lunar calendar to mark the passage of time, which is known in the west as the Chinese calendar.

Discuss with students that the Chinese lunar calendar differs from the Gregorian calendar Westerners use. The lunar calendar is based on the time it takes the moon to travel around the Earth; while the Gregorian calendar is based on the time it takes the Earth to make one complete circle around the sun. The lunar calendar also contains 12 zodiac signs: Rat, Ox, Tiger, Rabbit, Dragon, Snake, Horse, Sheep, Monkey, Rooster, Dog and Pig. Ask students if they are familiar with these signs and if they know their Chinese zodiac sign.

Discuss with the class and show photographs of the phases of the moon: last quarter, waning gibbous, full moon (middle of the month), waxing gibbous, first quarter, waxing crescent, new moon (beginning of month) and waning crescent. Discuss how each phase relates to the calendar and days of the month. Ask the class to theorize what phase the moon is in now.

Have students depict the eight phases of the moon and describe in words what is happening at each stage.

Expansion
Have students research the history of the creation of the calendar:

- What math and science skills were necessary to develop calendars?
- Why did people see a need to create a calendar?
- What other cultures have created their own calendar?
- How do these compare to the Gregorian and lunar calendars?
- What are the pros and cons of using a Gregorian calendar?
- How were seven-day weeks developed?

Sources
www.brighthubeducation.com/lesson-plans-grades-3-5/15434-lunar-calendar-and-finding-your-chinese-zodiac-sign/

www.educationworld.com/a_lesson/lesson045.shtml

LESSON 1
Following Milk From Farm to Table

Objective
Understand the risks associated with bringing milk from farm to table.

Materials
Raw and pasteurized milk samples and small paper cups for studying. Dictionaries, paper and pencils for defining vocabulary.

Lesson Steps
Discuss with students the different types of cows they have seen or expect to see at the Washington State Fair. Discuss what they know about the process of getting milk from cows to the market. Who is involved? What risks are associated with this process?

Explain to students that bacteria grow in milk, and it is the farmers' job to keep the milk clean and fresh before it reaches the processing plant. Have students define the following term in pairs or groups: lactose, calcium, pasteurization, Lactococcus, Coliform, Salmonella, and E. coli. Ask different groups to share how these are relevant to milk production. What other farm products can become contaminated by bacteria?

Pass the samples of raw and pasteurized milk around the class. You may choose to predetermine which sample is pasteurized and ask students to make a guess at identifying the two. Ask students to compare the two samples on the basis of smell and appearance. Discuss that you may or may not be able to determine if milk or another product contains bacteria just by sight and smell.

Review the meaning of pasteurization and the myths associated with it including:

- Pasteurizing milk DOES NOT cause lactose intolerance and allergic reactions. Both raw milk and pasteurized milk can cause allergic reactions in people sensitive to milk proteins.
- Pasteurization DOES NOT reduce milk's nutritional value.
- Pasteurization DOES NOT mean that it is safe to leave milk out of the refrigerator for extended time, particularly after it has been opened.

Review the responsibilities of farmers including:

- Making sure animals are healthy before they bring them to the farm.
- Keeping animal stalls and barns as clean and as well-ventilated as possible.
- Feeding animals safe food and water.

What else must farmers do to maintain a clean and safe environment?

Expansion
Have students read Upton Sinclair's novel "The Jungle" to explore food contamination and factory worker conditions and/or a Seattle Times article about a recent case of food contamination. How are the conditions described in "The Jungle" still relevant today? What can we learn from recent food contamination cases?

Sources
extension.psu.edu/food/safety/educators/food-safety-lessons-for-middle-school-students/food-safety-on-the-farm/FSLssn5-2-10-05.pdf/view

awic.nal.usda.gov/farm-animals

http://www.fda.gov/Food/ResourcesForYou/consumers/ucm079516.htm

LESSON 2
Take Eggstra Good Care of Your Eggs

Objective
Debate the benefits of large and small chicken farming. Observe how bacteria can contaminate an egg.

Materials
One egg for each student, water to rinse the eggs, vinegar (about 1/2 cup per student), one cup large enough to submerge an egg per student, paper towels and plastic wrap.

Lesson Steps
Begin by asking students if they have ever eaten raw eggs. If they answer no, point out that eggnog and chocolate chip cookie dough contain raw eggs. Do they think it is dangerous to eat these products? Why or why not?

Discuss the differences between large and small chicken farming. Begin by pointing out that larger chicken farms may crowd the animals into cages with grated floors so that the waste is removed efficiently. Even though the chickens stay cleaner this way, they may be stressed by overcrowding, lack of sunlight and strict diets. On smaller farms, chickens may experience less stress, but the animals may live in dirtier environments, increasing chances that their meat will become contaminated with bacteria and that they will produce fewer eggs.

Divide students into two groups for a debate. One group will advocate for large chicken farms, and the other will advocate for small chicken farms. Before the debate, have students research the conditions and arguments for both sides by using The Seattle Times or other resources. The teacher or a student moderator can conclude the debate with a determination as to which size farm holds the most benefits, such as increased production or overall animal wellbeing.

Unlike cow milk, chicken eggs have a built-in protection of a shell and both inner and outer shell membranes. These layers help to protect the yolk from bacteria including E. coli. However, bacteria can still penetrate the protective layers if the eggs are kept in a humid or damp area. The bacteria that contaminates eggs contains acid, like the acid found in vinegar. Conduct the following demonstration to illustrate how eggs can become contaminated by vinegar.

1. When eggs are at room temperature, rinse the eggs with water and dry with a paper towel.
2. Have each student pour enough vinegar into a clean cup so that the egg can be submerged. Carefully place the egg into the vinegar with a spoon. Rest the spoon on top of the egg to keep it under the vinegar and cover the cup with plastic wrap. Watch to see if bubbles form on the eggshell. Bubbles means the vinegar is beginning to work to weaken the eggshell and create bacteria.
3. Leave the egg in the vinegar overnight. The next class period remove the egg and carefully rinse it in water. Tap on it gently to check the hardness of the shell. The acid will have left the shell soft and weak.
4. Discuss how easily bacteria can contaminate eggs or other farm products.

Expansion
Have students research other farm products which can become contaminated. In pairs or groups have students create pamphlets or posters about safe handling instructions for farmers, factory workers, grocery store employees or families. Share these tips with the class.

Source
extension.psu.edu/food/safety/educators/food-safety-lessons-for-middle-school-students/food-safety-on-the-farm/FSLssn6-2-10-05.pdf/view

LESSON 1
Design a Roller Coaster

Objective
Describe the forces that propel and slow down a roller coaster. Illustrate these forces by drawing a roller coaster.

Materials
White paper or poster board, colored pens, pencils, or crayons, and a dictionary.

Lesson Steps
Review the following terms with students: acceleration, critical velocity, force, friction, g force, gravity, gravitational constant, kinetic energy, potential energy, speed and velocity. Try reviewing these concepts by playing charades or having the students convey the meaning of the word with a particular action, symbol or image. Ensure that students can distinguish between potential energy which is stored by an object (such as gravitational potential energy stored by a roller coaster) and kinetic energy which is the energy of an object in motion. Students should also be able to distinguish between speed, which is how fast an object moves, and velocity, which is a combination of speed and the direction the object travels.

Ask students about their experiences on the roller coasters at the Washington State Fair. Emphasize that roller coasters aren't propelled by an external source of energy such as a motor, but by gravitational potential energy at the roller coaster's highest point, and then by kinetic energy and the coaster moves down a hill. Have students discuss the following questions in pairs:

- At what height (highest point, medium high, or lowest point of the ride) did the coaster start?
- Why is the starting height relevant?
- Why does a coaster need to start at a high point?
- What would happen if a coaster had a hill later on in the ride that was higher than the first hill?
- How does gravity impact the coaster's speed and velocity?
- What forces slow a coaster down?
- How do different types of friction impact the speed of the coaster?

Students will draw their own roller coaster on a large piece of paper. They should determine and label the mass of the cars, the speeds and the heights in addition to the points at which gravitational potential energy and kinetic energy take effect. When are the cars moving the fastest? When are they moving the slowest? When do the forces of friction occur? When would riders experience positive and negative g's?

Have students share their coaster with the class. Which coasters would they most like to ride? Why?

Expansion
Review the facts of the Extreme Scream ride. How does this differ from the two coasters at the Washington State Fair? On which ride did you or do you expect to experience the most thrills? Why?

Sources
www.teachengineering.org/view_lesson.php?url=collection/duk_/lessons/duk_rollercoaster_music_less/duk_rollercoaster_music_less.xml

vip.vast.org/BOOK/PDFFILES/PART1A.PDF

LESSON 2
Fast Physics!

Objective
Apply algebraic formulas to determine a roller coaster's energy and velocity.

Materials
Calculators, paper and pencils.

Lesson Steps
Complete the chart using facts from the September 19th feature in The Seattle Times and the data determined for your coaster. Which coaster would you most like to ride? Why?

	HEIGHT	MAX SPEED	TRACK LENGTH	NUMBER OF TRAINS
CLASSIC COASTER				
RAINIER RUSH				

Review the definitions for potential and kinetic energy. Tell students that today they will calculate the potential energy, kinetic energy and velocity of coasters at the fair and the coaster they designed in the previous lesson. Review the following equations, the information we already know (height, speed and gravity), the information they will determine (mass) and the information they will calculate (kinetic energy, potential energy and velocity).

Potential Energy = PE PE = mgh
Kinetic Energy = KE KE = (1/2) mv2 squared

Mass = m
Gravity = g Use 9.8 ms2 (meters per second)
Height = h
Velocity = v

Assume that the potential energy turned into kinetic energy as the coaster rolled downhill, so that it is the same number. Use that number and the mass of the coasters to calculate the velocities.

Calculators, paper and pencils.

Lesson Steps
Complete the chart using facts from the September 19th feature in The Seattle Times and the data determined for your coaster. Which coaster would you most like to ride? Why?

	MASS OF A CAR (YOU DECIDE)	POTENTIAL ENERGY	KINETIC ENERGY (SAME AS POTENTIAL ENERGY)	VELOCITY
CLASSIC COASTER				
RAINIER RUSH				
YOUR COASTER				

Expansion
Try the above equations with different numbers, comparing your data to determine which type of coaster will bring the greatest potential and kinetic energy.

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