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# Environmental Scientist

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**Overview:**

This lesson and activity are designed to give students hands-on experience applying math concepts through the vehicles of land and trees.

**Grade:** 5

**TEKS**

Scientific processes  
5.2(B, E)  
5.4 (A, B)  
Science Concept  
5.5 (A)  
Math  
5.14 (A)

**Literature**

*The Great Kapok Tree*  
*My Map Book*

**Vocabulary**

Acre  
Canopy  
Chain  
Trunk  
Circumference  
Diameter  
Pacing

**Materials**

Measuring Tape  
Discovery Book  
Compass  
String  
Survey Flags  
Thermometer  
Field Guides

## Forestry Math

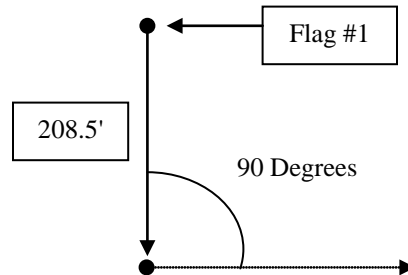
### Classroom Activity

1. Begin this activity by discussing with students the role of a professional forester and how they use math on a daily basis. Record your students' observations on a transparency and save for post activity.
2. Introduce the concept of "acre" to your students. Explore their ideas about the concept of an acre. How big is an acre? (A football field is approximately 1 acre.) Help your students understand the connection between a professional forester and their responsibility to manage acres of land.
3. Explain to your class that an acre is equal to 43,560 square feet. Write the formula for finding area on the overhead projector.

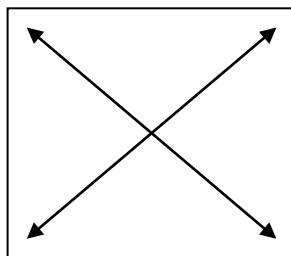
$$L \times W = A$$

4. Ask the class, what two numbers multiplied together give the product of 43,560? Record their answers on the overhead. Draw the shape beside each of the answers.
5. An acre of land can have many different shapes and each is correct as long as the square footage equals 43,560. We can have an acre of land that is 1 x 43,560 or 208.5 x 208.5 feet.

6. Next, explain the class is going outside to measure and mark the corners of an acre. Explain to the class that they will only have one tape measure, string and four flags to mark the corners. Allow students to brainstorm before going outside.
7. For a real cooperative learning experience, give your students the tape measure (25 feet), string (100 feet), 4 survey flag markers and explain that it is their responsibility to measure and mark the 4 corners of an acre. This is a great activity and will have many teachable moments for your students and the class as a whole. **A word of warning: This option is only for classes with good communication and cooperation skills.** Teachers wanting more control over the learning process will want to follow the instructions listed below.
8. Select a large open area on your school grounds. Place one survey flag in the ground and measure 208.5 feet away from this flag. Students will need to calculate as they measure with a 25' measuring tape or estimate using the 100' string. Place another flag in the ground at the 208.5' mark.



9. Next, have your students measure another 208.5 feet. Make sure the angle between the first and second lines are at right angles. Place the third flag in the ground and measure another 208.5 feet. Place the fourth flag in the ground. Is your acre square? A simple square test is to measure diagonally between corners. Equal diagonal measurements means your acre is square.



10. Divide your class into 4 groups and have each group stand at one of the four corners of your acre. Allow your students to observe and visualize the size of 1 acre. Bring the class together in the center of the acre and remind the class that they will measure an acre as part of their field work at the Eastman Nature and Wildlife Habitat Center.
11. While you are outside, have your students complete the "Personal Measurements" page. Several of the activities at the Eastman Nature and Wildlife Habitat Center will require your students to estimate the size and height of trees. Also, professional forest managers use a

unit of measurement call a "chain". One chain is equal to 66 feet. Your students will need to know how many of their personal paces equal one chain.

12. Back in the classroom, review the concepts of diameter, circumference and tree rings with your students. As part of your students' field work, they will measure and record the circumference and diameter of trees at the Eastman Nature and Wildlife Habitat Center.
13. Prior to visiting the Eastman Nature and Wildlife Habitat Center, take your class on a virtual tour of the Eastman nature trail at <http://www.eastman.com/EastmanOutdoors/trail.htm> The trail guide developed by Dr. Eric Taylor will give your students an opportunity to learn about the different trees at the Eastman Nature and Wildlife Habitat Center.
14. Close the classroom "Forestry Math" lesson by discussing with your students the following questions.
  - Why are accurate environmental records important?
  - Why is math important for a professional forest manager?
  - Why is it important to use a standard data collection procedure?
  - How does "recorded" data help us better understand our environment?
  - Why does a professional forest manager measure and record the growth of trees?
  - Why are trees important?

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# In the Field

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## Forestry Math

1. Prior to leaving your school make sure you have the following items.
  - Discovery Books
  - Ziploc Baggies (1 gallon size)
  - Pencils (inexpensive mechanical pencils are excellent to use in the field)
  - Compass
  - Thermometer
  - Water
  - First Aid Kit
  - Sack Lunch or light snack
  - Camera
  - Backpack
  - String (50') or measuring tape
2. Before getting on the trail, remind students their observations and data collected will be used back in the classroom to create charts and graphs of their observations.
3. Set your behavior expectations before leaving the parking lot. Explain how students are to behave along the trail and state specifically what behaviors you want to see on the trail. Remind your students the higher their voices are the less likely they will see wildlife along the trail.
4. Teachers a gallon size ziploc baggie makes an excellent container for pencils and Discovery Books during lunch or at the end of the day. Also, baggies make excellent containers for holding interesting insects captured along the trail. Release all insects after viewing.
5. Walk through the gate and follow the trail to the student orientation area. This is a good area to set expectations for the day and give students an overview of the day's activities. Distribute Discovery Books and record weather data observations.
6. If you have enough adult supervision, divide your class into two groups. Have each group go in opposite directions along the trail. This will help reduce the noise level and also give your students an opportunity to share their observations when the class comes back together. This is a good opportunity reinforce the idea that scientists work in different parts of the world and come together at conferences to share data from their research projects. Remember to go slow and listen to your student's observations along the trail.

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# Post Eastman Activities

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## Forestry Math

- Write a narrative about their experiences at the Eastman Nature and Wildlife Habitat Center.
- Have your students select one tree close to your school and have write about their tree throughout the school year.
- Have your students create charts and graphs of the data they collected while at the Eastman Nature and Wildlife Habitat Center. Compare the Eastman data with the data collected at your school. Have your students draw conclusions about their observations.
- Research Forestry careers.
- Invite a professional forester to visit your classroom and discuss the importance of math skills.
- Students create an "Environmental Report" based on their Discovery Book observations.
- Create bar graphs at home or in the Computer Lab. Use the data collected in the field to compare and contrast your school's environmental observations with that of the Eastman Nature and Wildlife Habitat Center's.

# Personal Measurements

Name \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Height \_\_\_\_\_ feet, \_\_\_\_\_ inches.

The length of my forearm, from the tip of little finger to elbow is  
\_\_\_\_\_ feet, \_\_\_\_\_ inches.

My hand span, from thumb to little finger is \_\_\_\_\_ inches.

The length of my index finger is \_\_\_\_\_ inches.

The length of my foot is \_\_\_\_\_ inches.

The length of my pace is \_\_\_\_\_ feet.

One chain is equal to \_\_\_\_\_ paces.

## **To determine your pace.**

1. On a football field or an open playground, create a starting line with lime or flour and measure 50 feet.
2. Make another line at the 50' mark.
3. With both toes on the starting line, have your students walk normally and count the number of paces to the 50' mark. Record the number of steps (paces).
4. Walk back to the starting line and again record the number of paces. Keep pacing until each student walks the distance 10 times. Add and record the total number of paces.
5. Divide the total number of paces by 10. This will give you your average pace per 50'.
6. Next, divide 50 by your average pace per 50'. You now have your personal pace. Record your personal pace.
7. Then have your students estimate 66' (One chain equals 66 feet.) by pacing. Then with a tape measure 66 feet and see how many students accurately estimated one chain.

# Resources

## Publications

*The Great Kapok Tree*

*My Map Book* by Sara Fanelli

*A Tree in the Forest* by Jan Thronhill

*Why Do Leaves Change Color?* Betsy Maestro

*The Tree that Grew to the Moon* by Eugenie Fernandes

## Web Pages

Dragonfly Web Pages

<http://dragonflywebsite.com/gallery/digital.htm>

The Fantastic Forest

<http://magma.nationalgeographic.com/ngexplorer/teachers/>

Ultimate Tree-Ring Web Pages

<http://web.utk.edu/~grissino/>

Texas Parks and Wildlife Education Web Pages

<http://www.tpwd.state.tx.us/learning/>

The Pencil Pages

<http://www.pencils.com/learn>

Tree Coring

[http://cr.middlebury.edu/biology/treeline/educ\\_dialogue/virtual\\_tour/how/treeCoring.htm](http://cr.middlebury.edu/biology/treeline/educ_dialogue/virtual_tour/how/treeCoring.htm)