



★ BENEFITS AND VALUES OF TREES ★

Advances in the science of urban forestry allow us to assign monetary values to a wide range of benefits that trees in urban areas provide. As trees grow, these values rise – the only part of the built environment of our cities that does so!

Goal & Objectives

Goal: Students will determine the benefits of trees and calculate their value.

Objectives: Students will

1. Use technology to calculate the value of their trail trees.
2. Analyze a wide range of benefits that trees provide.
3. Evaluate which trail tree(s) offers the most benefits and dollar value.
4. Develop a plan to maintain and improve the value of trees on their Tree Trail.
5. Evaluate their *Benefits and Value of Trees* experience.

Content Area TEKS/STAAR

Language Arts: 5.19 (E) summarize and paraphrase texts in ways that maintain meaning and logical order within a text and across texts.

Mathematics: 5.5 (A) describe the relationship between sets of data in graphic organizers such as lists, tables, charts, and diagrams.

5.11 (B) solve problems involving elapsed time.

Science: 5.2 (D) analyze and interpret information to construct reasonable explanations from direct (observable) and indirect (inferred) evidence.

5.2 (F) communicate valid conclusions in written and verbal forms.

5.9 (A) observe the way organisms live and survive in their ecosystem by interacting with the living and non-living elements.

Social Studies: 5.24 (B) analyze information by sequencing, categorizing, identifying cause and effect relationships, comparing, contrasting, finding the main idea, summarizing, making generalizations and predictions, and drawing inferences and conclusions.

Technology Applications: b (3) (D) acquire information appropriate to specific tasks.

b (6) (C) navigate systems and applications accessing peripherals both locally and remotely.

Materials

- Tablet(s) or computer(s) with internet access
- Projector and screen
- Whiteboard or chart paper and markers
- Card stock paper for each tree trail group
- Manila, writing or chart paper and markers for students
- Tree Trails Portfolio, Learning Log/Journal

Time & Resources

Preparation Time: 2 hours

Instructional Time: 2 sessions, 45 minutes each

- Tree Scavenger Hunt handout
- Annual Benefits Breakdown resource handout
- National Tree Benefit Calculator
<http://treebenefits.com/calculator/>
- Tree People - tree benefits
<http://www.treepeople.org/benefits-trees>



I. Engage/Excite

- A. Large Group Discussion: Let students know that they will be learning about the benefits and values of trees. They will start by going on a Tree Scavenger Hunt.
- B. Small Group Activity: Divide the class into four groups and give them the list of items (that are in three levels of difficulty) to find the item or a picture of it. Give each team approximately 10 minutes to find the items. Suggest the teams assign different members to find different levels of difficulty and appoint a score keeper. Points are earned on three levels of difficulty as follows:
 1. Easy Items: each team earns one point for finding the item and two for describing what part of the tree the item comes from.
 2. Difficult Items: two points for finding and three points for naming where it is from.
 3. Expert Items: three points for finding and four for naming where it is from.
- C. Large Group Discussion: Students report their findings and scores. The items and scores are checked and a winner is declared.
- D. (Optional) Individual Activity: Have students take the *Benefits and Values of Trees* pretest.

Teacher Tip: Explain that the test is only to make sure the learning activities are appropriate and not something they already know. The pretest will help them know more about what they will be learning.

To administer the tests by paper, copy from the teacher lesson module. To administer the test electronically, recreate the test in an online survey program. Free programs allow the creator to see results from a class set.

II. Explore

- A. Large Group Discussion: Take the students outside to visit their Tree Trail. Ask students how we benefit from these trees. Ask students to record their findings in their learning logs or on chart paper. When the benefit comes from a specific part of the tree, ask students to indicate this in their notes. When the students return, have them share their findings.
- B. Large Group Discussion continued: Lead the students to conclude that each tree contributes benefits to us and as the tree grows and stays healthy it will provide even more benefits and increase in value. Compare a tree's growth and maturity to the students. For example, just as the students grow and stay healthy, they are enabled to contribute and be more beneficial to their family, friends and community. In addition, as they grow they can do more to earn money and become more valuable monetarily too.

III. Explain

- A. Large Group Discussion: Write "Growth ► Benefits ► Value" on a chart or whiteboard. Use a Graphic Organizer to illustrate how each word affects the next word.



III. Explain continued



- B. Small Group Activity: Move students into small groups to encourage participation by all students. Give each group a sheet of paper or chart paper and have them label it Growth. Have each group brainstorm what growth means to them. Ask them to include how Growth relates to Benefits.
- C. Large Group Discussion: Ask each group to share their lists/charts with the class. Place each group's list under the Growth box of the chart. Before continuing the activity about Benefits, review the forestry definitions of Benefits and Value: benefits are a list of items and value is a dollar calculation. (Optional: Use a Compare and Contrast graphic organizer to further explain the definition of benefits and value.)
- D. Small Group Activity: Repeat the small group activity for the Benefits Box. Give each group a sheet of paper or chart paper and have them label it Benefits. Have each group brainstorm what benefits trees and forests provide for us. Remind students that they may name some of the items they found in the Scavenger Hunt. Encourage them to think about other types of benefits such as lumber, wildlife habitat, recreation or air quality. Ask them to include how Benefits relate to Value.
- E. Large Group Discussion: Ask each group to share their lists/charts with the class. Place each groups list under the Benefits Box.
- F. Small Group Activity: Repeat the small group activity for the Value Box. Give each group a sheet of paper or chart paper and have them label it Value. Remind students to include how trees contribute economic value.
- G. Large Group Discussion: When all groups have shared all three concepts, ask students to check to see if they have included other ideas they have learned about essential life-support systems for our neighborhood, community and world. Add additional information to each term as deemed appropriate.

Teacher Tip: Forests provide a wide range of ecosystem services. In addition to providing food, fuel and fiber, forests clean the air, filter water supplies, control floods and erosion, sustain biodiversity, genetic resources, and provide opportunities for recreation, education, and cultural enrichment. Many other social and economic benefits exist, find more at the Tree People website.

IV. Extend/Elaborate

- A. Large Group Discussion: Explain that the purpose of this module is to learn about the benefits trees have for us and learn about the value of trees.
- B. Small Group Activity: Ask the students to move into their Tree Trail groups and retrieve their Tree



IV. Extend/Elaborate continued

Trails Data Sheet. Then they should follow on their tablet/laptop as projected. Project the class Tree Trail. Review the Annual Benefits box on the left side of the screen.

Teacher Tip: When you open the Tree Trails application, you will see the benefits for all trails on the map. To see the value for a specific trail, search for that trail, then select the green trail line. You should now see the name of that trail under the words "Annual Benefits." The values shown are for the entire trail. To see the value of a specific tree, select that tree. You should now see the name of the tree under the words "Annual Benefits" and the values for that tree listed.

- C. Large Group Discussion: Lead a discussion about the value of their trees. Ask students to notice the breakdown of the annual benefits: stormwater intercepted, air quality, carbon dioxide, energy savings, and property value. Have students refer to the Annual Benefits Breakdown resource handout to find the definition of the term and to learn about how their tree benefits their school and its landscape.

Teacher Tip: As students review each category, take time to discuss these benefits and what they mean. Refer to the Annual Benefits Breakdown reference handout for information.

- D. Large Group Discussion continued: Next, ask students to determine which benefit has the most dollar value as indicated by the list. Have students determine which tree or trees provide the most dollar value and which are predicted to have the most after growing. Ask each group to write the name of their tree and its overall dollar value and the value predicted as the tree grows on card stock paper and hold it up to report this.

Teacher Tip: To predict future benefits after growing, students will change the measurements for their trees. Select an individual tree, change the measurements, save, then select that tree again to see the benefits displayed. Record the new dollar values. Be sure to go back to each tree and change the measurements back to the original ones recorded on the Data Sheet.

Teacher Tip: Another website for reviewing benefits and calculating values is the National Tree Benefit Calculator. You will enter the tree species, diameter, and land-use type where the tree is located. On the Overall Benefits tab, you can review the value at the tree's current size and for future growth.

- E. (Optional) Small Group Activity: Have each group find a Champion or Famous Tree and compare the values of the benefits to their tree.
- F. (Optional) Small Group Activity: Using the data provided by the list, develop a chart listing each tree and each benefit, including the overall benefit totals. Project the data chart and ask each group to provide the benefit information about their tree. After the chart is complete, move the students into five small groups and assign each to a different benefit. Ask the small groups to evaluate the benefits of each tree to determine which tree provides the most value in each category and report their findings to the class.
- G. Large Group Closure: Return to the "Growth ► Benefits ► Value" Chart and have students contribute additional information they have acquired.



V. Evaluate

- A. Small Group Activity: Ask each group to calculate the dollar increase in the value of their tree as its growth increases. (Use the predicted growth value already calculated and subtract from the current overall benefits.)
- B. Small Group Activity: Divide the class into three groups. Each group will develop a part of the plan to increase the value of their trail tree. Give each group about 10 minutes to work. Group One will write about Now (what we are doing) Group Two will write about Need (what we need to do) and Group Three will write about Future Care (what we will do in the future). Remind the students of the events in a tree's life that can affect its growth. Ask each group to present their plan and ask the other groups to critique the plan. When all groups have concluded, post the plans in the classroom.
- C. (Optional) Have the students submit their plan to Increase Trail Trees Value for consideration to post on the school's website.

VI. Extra Mileage/Attention

Extra Mileage: Provide small groups with chart paper or manila paper and markers. Ask them to draw a picture of a home without landscaping. Have the groups exchange drawings and ask each group to add trees to the drawing. Lead a discussion about how the value of the home increases with trees and what benefits the trees may provide for the value of the home.

Extra Attention: Have students work in small groups with an "expert" peer. Have students think of their home and decide which tree would provide for the most needs at their home.

(Optional) Have these students draw the tree at their home and put in their Learning Log.

Tree Trails curriculum was developed by Texas A&M Forest Service in cooperation with Texas Urban Forestry Council and was supported by a grant from the USDA Forest Service.

Student Assessment / Pretest and Posttest

Benefits and Values of Trees

Directions: Answer the following questions by rating your response 1-5, with 5 being the highest.

Key: 1 = Not Sure 2 = Poor 3 = OK 4 = Good 5 = Great

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|----|--|---|---|---|---|---|
| 1. | I can tell how my trail tree benefits our school. | 1 | 2 | 3 | 4 | 5 |
| 2. | I can name five benefits trees provide. | 1 | 2 | 3 | 4 | 5 |
| 3. | I can determine the dollar value a tree would add to a property. | 1 | 2 | 3 | 4 | 5 |
| 4. | I know the difference between benefits and value. | 1 | 2 | 3 | 4 | 5 |
| 5. | I can name a tree part and a benefit it provides. | 1 | 2 | 3 | 4 | 5 |
| 6. | I know how to determine my trail tree's value. | 1 | 2 | 3 | 4 | 5 |
| 7. | I can use the Tree Trail website to calculate the value of trees at home or a friend's home. | 1 | 2 | 3 | 4 | 5 |
| 8. | I can help my family learn more about the benefits and value of trees. | 1 | 2 | 3 | 4 | 5 |
| 9. | I am interested in knowing how I can maintain and improve the value of our Trail Trees. | 1 | 2 | 3 | 4 | 5 |

Comments:



Annual Benefits Breakdown

Stormwater Intercepted

Trees reduce stormwater runoff and help regulate stream flows. Water runoff from surfaces like roadways and parking lots wash chemicals like oil or gasoline into streams, wetlands, rivers and oceans. These chemicals may harm drinking water, aquatic life and the ecosystem.

Find an interactive poster at <http://www.arborday.org/trees/stormwater.cfm>

Air Quality

Trees improve air quality. Leaves absorb air pollution that causes asthma, coughing and other health issues. Leaves also help remove dust and other matter from the air, then rain washes it to the ground.

Carbon Dioxide

Trees help reduce atmospheric carbon. They absorb carbon dioxide during photosynthesis. Trees store carbon dioxide in their roots, trunks and leaves while they grow.

Energy Savings

Trees alter climate and conserve energy use. Trees help buildings use less energy. In summer, trees shading east and west walls keep buildings cooler. In winter, allowing the sun to shine on the southern side of a building can warm inside spaces. Trees slow down winds around buildings and help decrease heat loss.

Find an animated model showing trees around a house at

1. http://texastreeplanting.tamu.edu/energy_efficiency.html
2. <http://www.arborday.org/globalwarming/summerShade.cfm>

Property Value

Trees in front of homes increase property value. Research has verified this by showing that homebuyers are willing to pay more for properties with more trees.

Resources:

National Tree Benefit Calculator

<http://treebenefits.com/calculator/>

USDA Forest Service Center for Urban Forest Research

<http://www.fs.fed.us/psw/programs/uesd/uep/>

Arbor Day Foundation

<http://arborday.org/trees/index-benefits.cfm>

International Society of Arboriculture Consumer Information Program

<http://treesaregood.org/>



Every year,
1 large tree



Retains
1000 gallons
of rainwater



Absorbs the carbon
dioxide of a car driven
500 miles



Generates
260 pounds
of oxygen



Saves \$32 in
summertime air
conditioning



Provides a home for
1-3 species of
wildlife



Tree Scavenger Hunt

Group _____

Try to find as many items on this list as you can. You may either find the item or a picture of it. You will have 10 minutes for the scavenger hunt. Items are divided into three levels of difficulty. Keep a tally because each level is worth a different amount.

If you can name what part of the tree the item comes from or what part is used in the product, you will get bonus points!

Easy Items: Find it = 1 point; What part of the tree does it come from = 2 points

- Chair _____
- Toilet tissue _____
- Apple _____
- Pecan _____
- Paper money _____
- Envelope _____
- Mulch _____

Easy Score _____

Difficult Items: Find it = 2 points; What part of the tree does it come from = 3 points

- Molasses (syrup) _____
- Toothbrush handle _____
- Cork _____
- Birdhouse _____
- Food packaging _____
- Chocolate _____
- Charcoal _____

Difficult Score _____

Expert Items: Find it = 3 points; What part of the tree does it come from = 4 points

- Aspirin _____
- Cinnamon _____
- Rayon cloth _____
- Hairspray _____
- Nail polish _____
- Ice cream _____
- Eyeglass frames _____

Expert Score _____

Total Score _____



Tree Scavenger Hunt

Answer Sheet

Easy Items: Find it = 1 point; What part of the tree it comes from = 2 points

Chair - solid wood (trunks and limbs)

Toilet tissue - pulp

Apple - fruit

Pecan - nut

Paper money - pulp

Envelope- pulp

Mulch - bark or the whole tree

Difficult Items: Find it = 2 points; What part of the tree it comes from = 3 points

Molasses (syrup) - sap

Toothbrush handle - pulp

Cork - bark (mostly from cork oak tree)

Birdhouse - solid wood (trunks and limbs)

Food packaging - pulp

Chocolate - nut (from cacao tree)

Charcoal - wood

Expert Items: Find it = 3 points; What part of the tree it comes from = 4 points

Aspirin - bark (of willow tree)

Cinnamon - bark (of laurel tree)

Rayon cloth - wood fibers

Hairspray - contains wood resin

Nail polish - contains chemicals (leftover from making paper, makes polish glossy)

Ice cream - contains cellulose (makes it smooth and thick)

Eyeglass frames - Cellulose (dissolved and forms a shape)

Wood is made of tiny fibers (cellulose) and the natural glue (lignin) that holds them together. When wood is turned into pulp, heat and chemicals dissolve the lignin and release the cellulose fibers.

Sap is the watery solution that circulates through the tree.

Resin is a clear or translucent substance that oozes from trees and other plants.

