Sustainable Jersey for Schools

Education for Sustainability UNIT Questionnaire

Complete this form to provide information about the unit that you are submitting for points under the Education for Sustainbility (EfS) Integrated Unit action. **Be sure to fully answer Question 7 if the unit was delivered remotely and is to be considered for Digital Schools Star recognition.**

1. List the name, position, grade level, and discipline of the educators and staff members involved with developing and delivering the unit.

This Unit for Third Grade, Environmental Changes, was created by Project Lead the Way and is included in their curriculum for Third Grade. It was adapted to meet the Sustainability Standards by the STEM teachers, Lisa Roesch and Kelly Stone at the George L Catrambone School under the guidance of principal Jessica Alonzo and out Science Supervisor Jena Valdivieso to teacher virtually during the current 2020-21 school year. Both teachers are K-5 STEM teachers and see all third-grade students weekly fpr 35 minutes. This unit was taught over the course of 13 weeks of school and reached 151 third grade students. Students will be evaluated at the end of the unit with a summative assessment which is included in the documentation. In addition, formative assessments are taken throughout the unit in the form of activities, observations, exit slips, work samples, and other suck activities and stored digitally across platforms like, but not limited to google classroom, seesaw, nearpod and jamboards.

2. The unit must have taught about and assessed for at least **one** of the **enduring understandings** of education for sustainability listed below. Check off the enduring understanding(s) that the unit addressed:

__X__ **A Healthy and Sustainable Future Is Possible**
We can learn how to live well within the means of nature. This viewpoint inspires and motivates people to act.

____ **We Are All In This Together**
We are interdependent on each other and on the natural systems.

____ **Healthy Systems Have Limits**
Rather than exceeding or ignoring the limits, tap the power of limits. Constraints drive creativity.

__X__ **Recognize and Protect The Commons**
The Commons are the creations of nature and society that we inherit jointly and freely, and hold in trust for future generations. We all depend on them and we are all responsible for them.

____ **Reconcile Individual Rights with Collective Responsibilities**
Responsible and ethical participation and leadership are required in order to make the changes we need to make. We must reconcile the conflicts that exist between our individual rights and our responsibilities as citizens.

____ **Diversity Makes Our Lives Possible**
Diversity is required to support rich complex systems (like us), to build strength and to develop resilience in living systems. Biological diversity, cultural, gender, political and intergenerational diversity all serve this purpose.

____ **Create Change at The Source Not the Symptom**
Distinguish problems from symptoms. Identify the most upstream problem within your sphere of influence.

__X__ **Think Far into the Future (1,000 Years)**
Envision the kind of future we want and start working towards it. We should not sacrifice our children's future to meet our needs.

____ **Read the Feedback**
We need to pay attention to the results of our behavior on the systems upon which we depend. If we keep our eyes on the feedback, we can adjust our thinking and behavior before we cross detrimental thresholds.

____ **It All Begins With a Change In Thinking**
Thinking drives behavior and behavior causes results. As Einstein had observed, the significant problems we face cannot be solved with the same level of thinking we used to create them. Think systems, cycles and out of the box.

__X__ **Live By The Natural Laws**
We must operate within the natural laws and principles rather than attempt to overcome them. It is nonnegotiable.

____ **We Are All Responsible**
Everything we do and everything we don't do make a difference.

3. Describe the process for integrating sustainability enduring understandings checked off above into the unit plan.

In this module, students learn about Earth's habitats and how these habitats support life. Students examine fossils and investigate what fossils reveal about how organisms and habitats adapt and change over time. Students identify factors that cause environmental changes and simulate the effect the environmental changes have on living things. After students establish an understanding of environmental change and possible consequences to habitats and organisms, they take a deeper look at specific examples of environmental changes in their own habitat. Students use the design process to explore one problem caused by environmental change and develop an action plan to reduce or stop future damage.

4. Provide samples of exemplary student work that meet and/or exceed expectations from the summative assessment and the accompanying performance criteria. (*Either provide a link to the sample work on a shared drive or website, paste a picture of the sample into this document, or upload the sample as a separate file on the action submission page.*)

Exemplary work samples are included within the documentation.

5. **Provide copies and explanation of assessment tools.** (*Either provide a link to the assessment tools on a shared drive or website, paste a picture of the tool into this document, or upload the tool as a separate file on the action submission page.*)

Assessment Samples are included within the documentation.

6. Teacher reflections on the unit's effectiveness: How did the attributes of education for sustainability that you selected add value to this unit?

The third-grade module Environmental Changes is packed with lessons ranging from habitats around the world to local habitats, the earth long ago to present day, and the smallest forms of life to the vast biodiversity of life on Earth. The unit aligns with the NGSS for third graders and offers multiple opportunities for project-based learning and activities. These projects are encouraging much discussion about the living world and how to maintain the balance. Protecting plants and animals is topics that repeat throughout discussion and learning activities. They polar bear simulation encouraged understanding of climate change and how scarcity of home, food, protection and space is decreasing and the stress the polar bears feel. These rich activities allow students to see and understand the impact humans have on the world and it is most often negative. They struggled to come up with solutions to help the environment and reduce or stop future damage. This led to much discussion about how they could work together to create a change.

7. **For Remote Digital Units Only**: To apply points for a remotely delivered unit towards *Digital Schools Star* recognition, answer the questions below to describe how your unit was adapted to be most effective for a remote digital or hybrid learning environment:
   a. Describe the timing and sequence of the synchronous and asynchronous elements of the unit and how they are coordinated. (*For example: Did students have opportunities to review learning materials – such as videos, documents, webpages – on-demand on their own time to enhance live class discussions?*)

All learning, lessons, and activities were delivered in a hybrid settings with some students in school and the majority of students at home. During this time we had weeks where all students were on home based learning. All material was presented and discussed each week virtually through synchronous and asynchronous elements. Each week students met virtually to discuss and learn about the environmental changes topics and activities. Assignments were posted on virtual platforms for students to engage in during class an on their own time if necessary. Those students who are not able to engage in virtual meets each week are provided with videos, lesson activities, literature, and other materials electronically through platforms like google classroom, class dojo, and nearpod. Multiple platforms were used to allow students to build comfort and ability through multiple learning experiences and reach all learners and their families. This unique way of presenting allowed families tyo get involved in lessons and participate in

the learning process. Students played games that doubled as quizzes and completed assignments demonstrating what they learned through drawings, projects, and problem solving in a virtual atmosphere. While students had the ability to demonstrate and add to their tech savviness, teacher grew in their pedagogy ad ability to present and teaching a diverse engaging, and unique ways.

b. Describe the interactive elements to engage students in the unit and to give them the opportunity to demonstrate their learning. (*For example: Did students have break out rooms for peer to peer discussions? Were chats enabled? Were digital whiteboards shared or other collaborative spaces used?)*

Throughout the module, students participated in lessons that included multiple ways and opportunities to demonstrate their learning. Sessions were offered in zoom weekly, during which students completed assignments through the google classroom using tools like google docs, google slides, and google draw. Students heard virtually read books, sometimes by the author of the story. Digital white boards were used to present and for class discussions and projects. Chats were enabled to ask and answer questions and for feedback. Students engaged in group discussions through platforms like google jamboards. Using the seesaw platform, students were able to participate in and submit assignments practicing what they learned through drawing, typing, writing and recordings. They videoed themselves completing projects, sent digital pictures of their work and showed many unique and exciting ways to demonstrate their understanding of topics and materials presented in addition to speaking and participating during class. The addition of the digital tools made it possible for students not only to participate after class hours and at times conducive to their schedules, but offered our relucted learners the opportunity to participate in a safe, sheltered, and comfortable environment from their own homes. In addition, they were also able to work with the support of their families.

c. Describe the methods and tools used to assess student performance.

With the young age of our students, a large portion of our formative assessment was taken through observation and participation in synchronous and asynchronous activities. Their classwork was submitted and reviewed through Google Classroom and Seesaw for teachers to review and provide written and recorded feedback. Students were assessed through these activities, videos, recordings, photos, work samples, class participation in live sessions and submitted work. Students are assessed through the completion of projects in multiples ways using a rubric that is attached. Their summative assessment was provided virtually for students to complete through a word doc. They were able to add pictures, drawings, recordings, or videos to answer and complete questions. It was also shared in multiple ways so as to reach and offer the broadest range of acceptable ways to complete the assignment.

For the Summative Assessment we were able to complete it through a Google Form Assignment in google classroom as well as providing a paper copy to those who needed to access the assessment that way. All data was collected through grading tools like Flubaroo and available to help with the unit planning for next year. During the unit students presented learned information from problem solving in group projects through appl like google slides and Google jamboards.

Established Standards/ Goals/Practices	Desired Results *(Stage 1)*		
For full details, see the Connections to Standards page in the Teacher Guide. ***Next Generation Science Standards*** *Science and Engineering Practices* • Asking Questions and Defining Problems • Planning and Carrying Out Investigations • Analyzing and Interpreting Data • Constructing Explanations and Designing Solutions • Engaging in Argument from Evidence • Obtaining, Evaluating, and Communicating Information	***Transfers**: Students will be able to independently use their learning to…* • T1: Evaluate a problem in a new and novel situation. • T2: Apply a step-by-step design process to solve a problem. • T3: Understand the impact of environmental changes to organisms and their habitats. ***Essential Questions**: Students will keep considering…* • EQ1: How does an animal's habitat affect its survival? • EQ2: How do environmental changes affect organisms? • EQ3: How can a step-by-step process help you design or improve a solution to a problem?		
	Meaning	*Acquisition*	
	Understandings *Understandings are long-term takeaways that go beyond factual knowledge into broader and more conceptual comprehensions.* ***"Students will understand that..."***	***Learning Objectives*** *Objectives articulate what students need to be able to do. (The learning objectives will become targets of assessment.)* ***"Students will be able to..."***	***Knowledge and Skills*** *Knowledge and skills include the essential facts and basic concepts that a student should know and be able to do to perform the competency.* ***"It is expected that students will..."***
	U1: Science and Engineering Practices Scientists and engineers use standard practices to explain the world or solve problems.	O1.1: Follow a step-by-step method to solve a problem.	KS1.1.1: Define a simple design problem reflecting a need or a want. KS1.1.2: Brainstorm possible solutions to the problem. KS1.1.3: Evaluate a solution through observations and/or measurements and consider what revisions to the initial solution are needed.

Format guided by: Wiggins, G., & McTighe, J. (2011). *The understanding by design guide to creating high-quality units*. Alexandria, VA: ASCD

Established Standards/ Goals/Practices	Meaning	Acquisition	
	Understandings	**Learning Objectives**	**Knowledge and Skills**
Disciplinary Core Ideas • Ecosystem Dynamics, Functioning, and Resilience • Evidence of Common Ancestry and Diversity • Adaptation • Biodiversity and Humans • Engineering Design *Crosscutting Concepts* • Cause and Effect • Scale, Proportion, and Quantity • Systems and System Models *Connections* • Engineering, Technology, and Applications of Science • Nature of Science		O1.2: Use scientific reasoning to ask questions, make observations, and investigate ideas to acquire knowledge and solve problems.	KS1.2.1: Ask and identify questions to gain knowledge or solve problems.
			KS1.2.2: Make observations to draw conclusions of phenomena.
			KS1.2.3: Analyze data to look for patterns or to test whether data are consistent with an initial prediction.
	U2: Habitats A habitat is the resources and conditions that promote survival in a certain area.	O2: Analyze how the needs of organisms are met within a habitat.	KS2.1: Explore eight major habitats found on Earth.
			KS2.2: Compare and contrast the major habitats.
			KS2.3: Identify the basic needs of organisms.
			KS2.4: Explain how the basic needs are met within a specific habitat.
			KS2.5: Develop a basic understanding of habitats and organisms from long ago.
			KS2.6: Identify the habitat of a fossilized organism.
	U3: Environmental Change An environmental change is a change to the surroundings caused by human activity or natural event.	O3: Analyze the effect that environmental changes have on organisms and their habitats.	KS3.1: Identify examples of environmental changes.
			KS3.2: Explain how the environmental change impacts an organism's habitat.
			KS3.3: Evaluate the effect of invasive species on a specific habitat.

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Established Standards/ Goals/Practices	Meaning	Acquisition	
	Understandings	***Learning Objectives***	***Knowledge and Skills***
Common Core English Language Arts • Reading: Informational Text • Writing • Speaking and Listening			KS3.4: Identify ways to reduce or remediate the effects of an environmental change.
			KS3.5: Apply knowledge of an environmental change to create an action plan that reduces or remediates the impact in the future.
Common Core Mathematics • Mathematical Practices	**U4: Mathematical Thinking** Mathematical thinkers apply complex thinking and reasoning strategies where thinking is intentional and reflected upon.	O4: Apply mathematical thinking to solve problems.	KS4.1: Make sense of problems and persevere in solving them. [CCSS.MATH.PRACTICE.MP1]
			KS4.2: Reason abstractly and quantitatively. [CCSS.MATH.PRACTICE.MP2]
			KS4.3: Model with mathematics. [CCSS.MATH.PRACTICE.MP4]
			KS4.4: Use appropriate tools strategically. [CCSS.MATH.PRACTICE.MP5]
	U5: Collaboration Professionals function effectively and efficiently on multidisciplinary teams to be successful.	O5: Collaborate effectively on a diverse and multidisciplinary team.	KS5.1: Generate ideas as a team.
			KS5.2: Value the contributions of each team member.
			KS5.3: Demonstrate collaboration through effective communication.

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Established Standards/ Goals/Practices	Meaning	Acquisition	
	Understandings	***Learning Objectives***	***Knowledge and Skills***
	U6: Communication Professionals communicate effectively with a variety of audiences using multiple modalities to be successful.	O6: Communicate effectively for specific purposes and settings.	KS6.1: Document work in an organized notebook.
			KS6.2: Explain findings and justify evidence-based conclusions with others.
			KS6.3: Present data and information accurately and effectively.
	U7: Ethics Professionals conduct themselves so as to maximize benefits for society and minimize harm.	O7: Practice ethical behavior in all settings.	KS7.1: Engage in and maintain positive interactions and relationships with other children and adults.

Evidence *(Stage 2)*		
Activity, Project, Problem (APB)	Show evidence of the student's ability to…	Assessment opportunities include…
Introduction Story *The Missing Animals*		• ***Interpreting*** essential concepts through formative assessment. • Discussion

Activity 1 What Is a Habitat?	LO2
	LO5
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment.
		  • PLTW Launch Log
		  • Discussion
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion.

Learning Plan *(Stage 3)*	
APB Description	Knowledge and Skills
Introduction Story The challenge to create an action plan to address an environmental change is introduced to the students.	
Activity 1 Students are introduced to habitats through a read aloud. They continue to develop their understanding of habitats as they explore eight major habitats on Earth.	KS2.1 KS6.1 KS2.2 KS6.3 KS2.3 KS7.1 KS2.4 KS5.1 KS5.2 KS5.3

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Evidence *(Stage 2)*		
Activity, Project, Problem (APB)	Show evidence of the student's ability to…	Assessment opportunities include…

Activity 2 Long Ago	LO1.2
	LO2
	LO3
	LO5
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment.
		  • PLTW Launch Log
		  • Discussion
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion.

Activity 3 Environmental Change	LO1.2
	LO2
	LO3
	LO4
	LO5
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment.
		  • PLTW Launch Log
		  • Discussion
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion.

Project Invasive Species	LO2
	LO3
	LO4
	LO5
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment.
		  • PLTW Launch Log
		  • Discussion
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion.

Learning Plan *(Stage 3)*	
APB Description	Knowledge and Skills
Activity 2 Students learn about habitats and organisms from long ago by categorizing fossils. They consider how organisms adapt over time.	KS1.2.2 KS6.1 KS1.2.3 KS6.2 KS2.5 KS7.1 KS2.6 KS5.1 KS5.2 KS5.3
Activity 3 Students are introduced to environmental change. They explore how some changes occur rapidly while others occur over time.	KS1.2.2 KS4.2 KS1.2.3 KS4.3 KS2.3 KS5.3 KS2.4 KS6.1 KS3.1 KS6.2 KS3.2 KS7.1
Project Students investigate invasive species, learning that invasive species thrive in a new habitat in which their needs are met. These invasive species have negative consequences for the habitat and other organisms that live there.	KS2.3 KS5.1 KS2.4 KS5.2 KS3.1 KS5.3 KS3.2 KS6.1 KS3.3 KS6.2 KS4.3 KS6.3 KS7.1

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Evidence *(Stage 2)*		
Activity, Project, Problem (APB)	Show evidence of the student's ability to...	Assessment opportunities include...

Problem Take Action	LO1.1
	LO1.2
	LO2
	LO3
	LO4
	LO5
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment.
		  • PLTW Launch Log
		  • Discussion
		  • With guidance, demonstrate an understanding of the design process
		• ***Interpreting*** essential concepts through summative assessment.
		  • Design an action plan to reduce or stop future damage caused by an environmental change
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion.

Learning Plan *(Stage 3)*	
APB Description	Knowledge and Skills
Problem Students follow the design process to design an action plan to reduce or stop future damage from a problem caused by an environmental change. The action plan identifies the cause of the change and identifies steps to take to reduce or remediate the impact in the future. Students create a digital product to explain and communicate their plan.	KS1.1.1 KS4.1 KS1.1.2 KS4.2 KS1.1.3 KS4.3 KS1.2.1 KS4.4 KS1.2.2 KS5.1 KS1.2.3 KS5.2 KS2.3 KS5.3 KS2.4 KS6.1 KS3.1 KS6.2 KS3.2 KS6.3 KS3.4 KS7.1 KS3.5

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Connections to Standards

PLTW programs are designed to empower students to thrive in an evolving world. As a part of this process, we take connections to standards into account when developing and updating our curriculum. The PLTW Launch modules address standards from the following:

- Next Generation Science Standards (NGSS)
- Common Core State Standards (CCSS) in English/Language Arts (ELA) and Mathematics

This document lists the standards identified from each of these sources that apply to the Environmental Change module.

Next Generation Science Standards

Performance Expectations

- 3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
- 3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
- 3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
- 3-ESS2-2. Obtain and combine information to describe climates in different regions of the world.
- 3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Science and Engineering Practices

- Asking Questions and Defining Problems. Asking questions and defining problems in 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships.
- Planning and Carrying Out Investigations. Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations and design solutions.
- Analyzing and Interpreting Data. Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting

multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

- Constructing Explanations and Designing Solutions. Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.
- Engaging in Argument from Evidence. Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed worlds.
- Obtaining, Evaluating, and Communicating Information. Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.

Disciplinary Core Ideas

- LS2.C Ecosystem Dynamics, Functioning, and Resilience. When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.
- LS4.A Evidence of Common Ancestry and Diversity. Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (*Note: moved from K-2.*)
- LS4.A Evidence of Common Ancestry and Diversity. Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments.
- LS4.C Adaptation: For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.
- LS4.D Biodiversity and Humans. Populations live in a variety of habitats, and change in those habitats affects the organisms living there.
- ESS2.D Weather and Climate. Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.
- ETS1.A Defining and Delimiting Engineering Problems. Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.
- ETS1.B Developing Possible Solutions. Research on a problem should be carried out before beginning to design a solution. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.

Crosscutting Concepts

- Patterns. Patterns of change can be used to make predictions.
- Cause and Effect. Cause and effect relationships are routinely identified and used to explain change.
- Scale, Proportion, and Quantity. Observable phenomena exist from very short to very long time periods.
- Systems and System Models. A system can be described in terms of its components and their interactions.

Connection to Engineering, Technology, and Applications of Science

- Interdependence of Engineering, Technology, and Science on Society and the Natural World. Knowledge of relevant scientific concepts and research findings is important in engineering.

Connection to Nature of Science

- Scientific Knowledge Assumes an Order and Consistency in Natural Systems. Science assumes consistent patterns in natural systems.

Common Core State Standards ELA and Mathematics

English Language Arts

- CCSS.ELA-LITERACY.RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- CCSS.ELA-LITERACY.RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.
- CCSS.ELA-LITERACY.RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
- CCSS.ELA-LITERACY.RI.3.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a Grade 3 topic or subject area.
- CCSS.ELA-LITERACY.W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- CCSS.ELA-LITERACY.W.3.7 Conduct short research projects that build knowledge about a topic.
- CCSS.ELA-LITERACY.W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

- CCSS.ELA-LITERACY.SL.3.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on Grade 3 topics and texts, building on others' ideas and expressing their own clearly.
- CCSS.ELA-LITERACY.SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

Mathematics

- CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
- CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
- CCSS.MATH.PRACTICE.MP4 Model with mathematics.
- CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.

Sources

National Governors Association Center for Best Practices, & Council of Chief State School Officers. (2010). *Common Core State Standards.* Washington, DC: National Governors Association Center for Best Practices, Council of Chief State School Officers.

NGSS Lead States. (2013). *Next Generation Science Standards: For states by states.* Washington, DC: The National Academies Press.

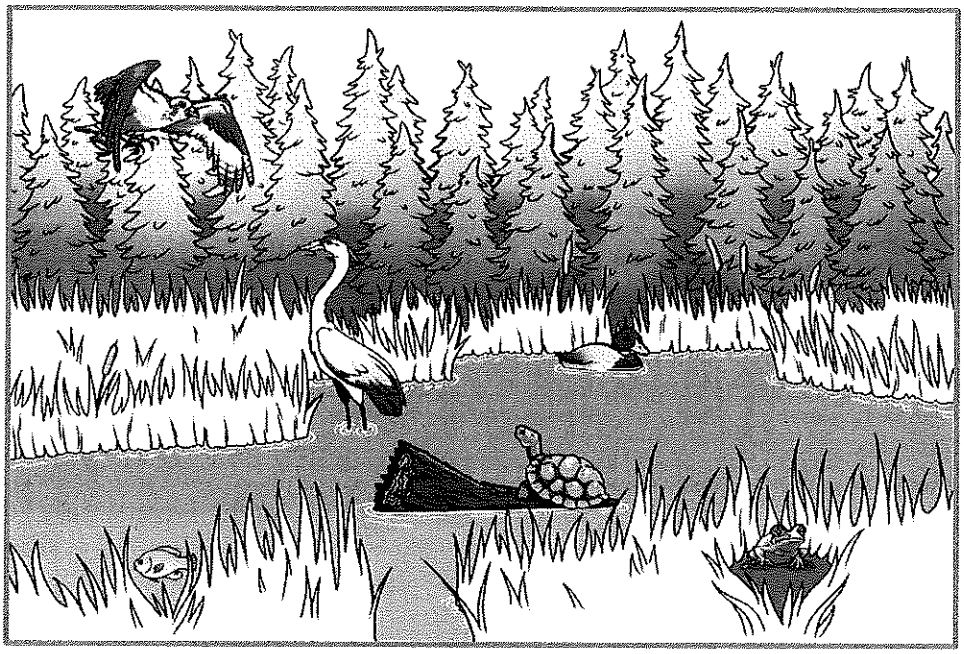
Environmental Changes: *End-of-Module Summative Assessment*

Criteria	Basic A student who has reached the *highest achievement* of the Basic level should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Science and Engineering Practices O1.1 – Follow a step-by-step method to solve a problem.	With support, student follows some steps of the design process as they design, create, and evaluate an action plan.	With support, student follows all steps of the design process as they design, create, and evaluate an action plan.	Student independently follows the design process as they design, create, and evaluate an action plan.
Environmental Change O3 – Analyze the effect that environmental changes have on organisms and their habitats.	With support, student applies knowledge of an environmental change to create an action plan that reduces or remediates the impact in the future.	Student applies knowledge of an environmental change to create an action plan that reduces or remediates the impact in the future. With support, student explains how effective the action plan would be in reducing or remediating the environmental change.	Student applies knowledge of an environmental change to create an action plan that reduces or remediates the impact in the future. Student independently explains how effective the action plan would be in reducing or remediating the environmental change.
Collaboration O5 – Collaborate effectively on a diverse and multidisciplinary team.	Student participates the majority of the time and shares ideas with others. Student demonstrates flexibility in thinking and behavior some of the time.	Student fully participates and shares their ideas with their group, valuing the contribution of team members. Student demonstrates flexibility in thinking and behavior most of the time.	Student fully participates and shares their ideas with their group, valuing the contributions of team members. Student models and encourages others to demonstrate flexibility in thinking and behavior.
Communication O6 – Communicate effectively for specific purposes and settings.	With support, student accurately describes findings from the Problem. Student attempts to use the Launch Log to communicate their thinking.	Student accurately and effectively describes findings from the Problem. Student uses the Launch Log to communicate their thinking.	Student justifies findings from the Problem with evidence-based conclusions. Student uses the Launch Log to communicate their thinking.
Ethics O7 – Practice ethical behavior in all settings.	With support, student engages in positive interactions and relationships with other children some of the time.	With support, student engages in and maintains positive interactions and relationships with other children. Student is kind and respectful when they disagree.	Student independently engages in and maintains positive interactions and relationships with other children. Student is kind and respectful when they disagree.

Environmental Changes
Check for Understanding

1. How does an animal's habitat affect its survival?

Use this image to answer questions 2 and 3.



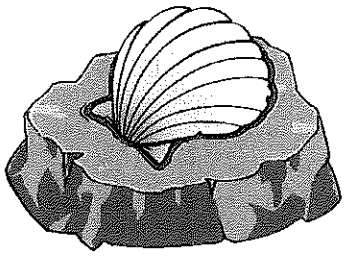
2. The image shows many organisms that live in a wetland habitat. How does this habitat meet the basic needs of **one** of these organisms?

3. If the water becomes polluted, how would this impact the wetland habitat?

4. European starlings are a type of small bird. They were brought to America from Europe in 1890. Starlings fly in large swarms, up to 3,000 birds at a time. They are aggressive; they steal other birds' nests, and they gang up on bigger animals, like cows, to steal their food. They can adapt to both cold and hot climates.

   Based on this information, what do you think happened when European starlings were introduced into new habitats in America?

5. Look at this fossil. What habitat do you think this animal lived in? Circle the answer below.



desert	tundra	ocean
grassland	temperate forest	rain forest

6. Why do you think that animal lived in that habitat? Support your answer with evidence.

_____

_____

_____

_____

_____

Take a photo of the habitat around you that you drew here.

Give an explanation of your

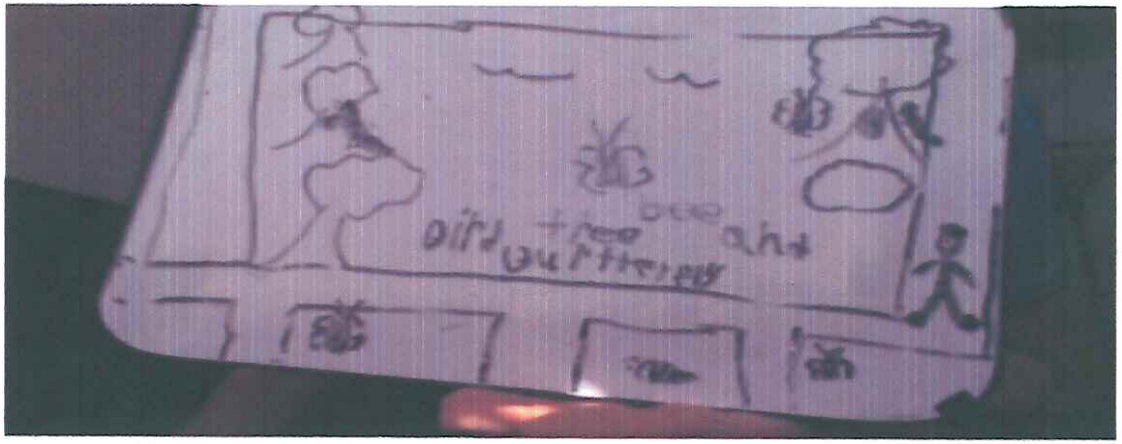
Take a photo of the habitat around you that you drew here.

Give an explanation of your habitat here:

Trees help you breath and they give you food like aples and oragn and leafs and they wash leafs and then they call it salled.

Take a photo of the habitat around you that you drew here.

Take a photo of the habitat around you that you drew here.



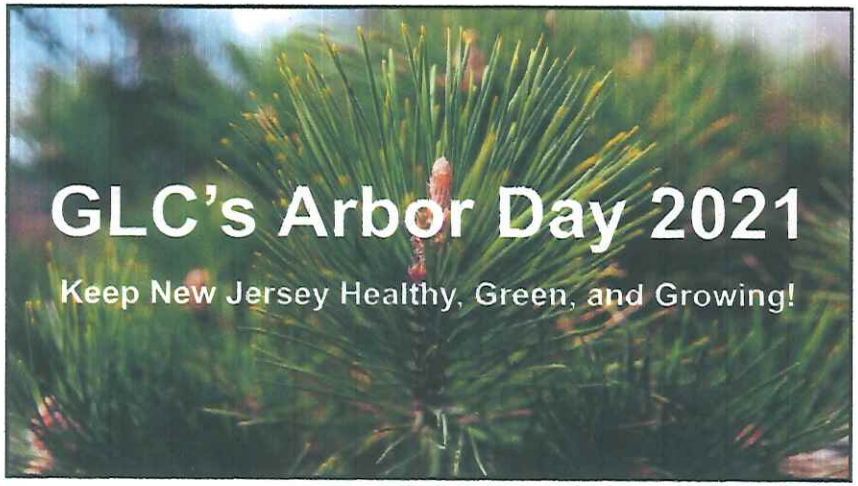
Give an explanation of your habitat here: there is a bee a trees a bird a squirl a butterfly a bush and a men from leonardo

Take a photo of the habitat around you that you drew here.

Give an explanation of your habitat here: so if you see in the bottom of the picture you see my neighbor cute flowers .

Give an explanation of your habitat here:This is a chicken that can handle any weather.It's habitat is being in warm places and eating things that are soft.


adidas



What is Arbor Day?

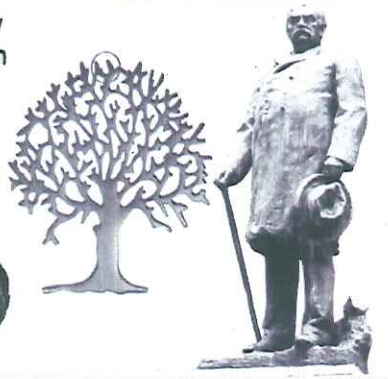
Arbor Day is an annual holiday or observance that celebrates the role of trees in our lives. Tree planting and care is promoted on Arbor Day. It is celebrated around the world.

It was first observed as an official holiday in 1872, in Nebraska, but tree planting festivals are as old as civilization. The tree has appeared throughout history and literature as the symbol of life.

More than one million trees were planted in Nebraska on the first Arbor Day and J. Sterling Morton became known as the "Founder of Arbor Day."

"...all the people strive on Arbor Day to plant many, many trees, both forest and fruit. May the day and the observance thereof be cherished in every household, and in its name and fruits become as a shower of blessing to the long lines of generations who shall succeed us."

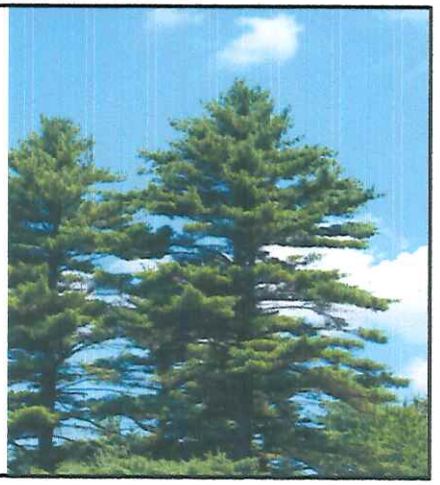
J. Sterling Morton
Founder of Arbor Day
in his own words



Plant a Tree!

Eastern White Pine

(*Pinus strobus*)



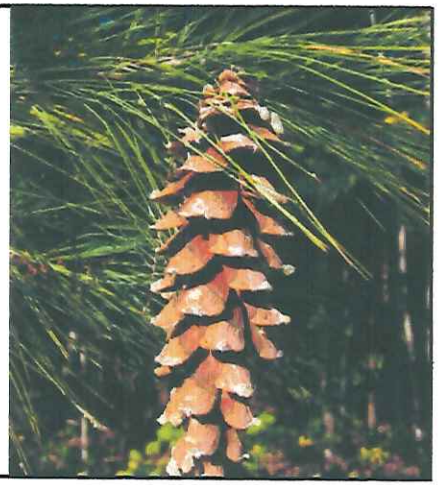
What Type of Tree is It?

- Evergreen
- Keeps its foliage year-round
- What do we call the "leaves" of a pine tree?

How Big Does it Get?

Height: 50 feet - 80 feet (15 m - 24 m)

Spread: 20 feet - 40 feet (6 m - 12 m)



Plant your tree in a spot with lots of room and don't forget to water it!

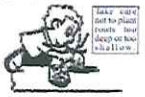
How to Plant a Tree Seedling

1. **LOOK** for a good location for your tree. Remember its adult size.

2. **MOISTEN ROOTS** Dry roots die.

3. **DIG** a hole two to three times larger than the roots when spread apart.

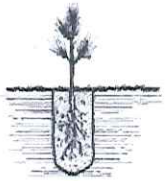
4. **PLACE** the tree in the hole at the proper depth and add loose soil gently.



5. **ADD** more soil and pack down with hands. Use water to firm the soil if necessary.

6. **MULCH** around the tree with wood chips.

7. **WATER** the tree regularly, but not too often or roots may rot.

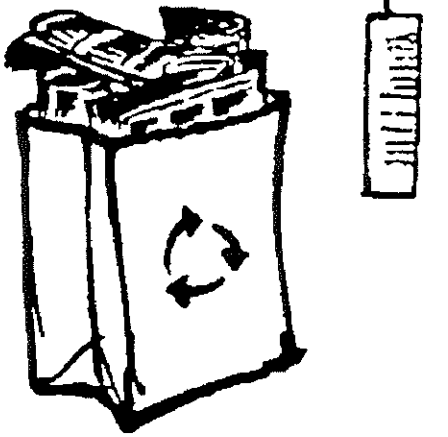


A properly planted tree seedling

Sending Each student home with a seedling

What you'll need:

- Newspaper
- Spray Bottle
- Sandwich bags
- Rubber bands



Open up the seedling bundle. Carefully wrap the roots of each seedling in a piece of newspaper moistened with the spray bottle. Place a plastic sandwich bag over the bottom. Secure with a rubber band. Give each student the "How to plant a tree seedling" instructions. Explain how it is important to plant their tree as soon as they get home.

NJ State Tree Nursery
370 East Veterans Highway
Jackson, NJ 08527

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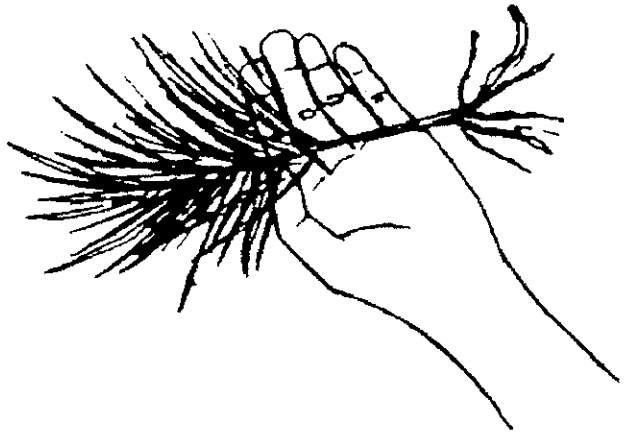
Care for your Third Grade Trees



REMINDER:

Keep seedling packets cool 32-45°F

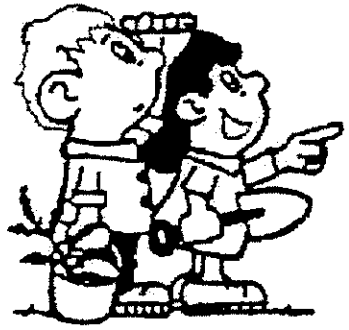
Do not store them in a hot trunk or in the sun

Keep the seedlings moist

Plant as soon as possible!

How to Plant a Tree Seedling

1. LOOK for a good location for your tree. Remember its adult size.

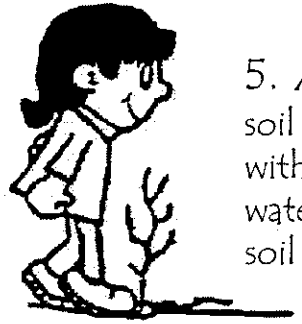


2. MOISTEN ROOTS
Dry roots die.

3. DIG a hole two to three times larger than the roots when spread apart.

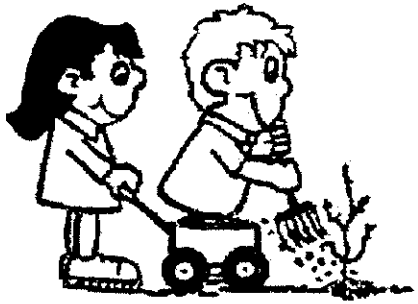
4. PLACE the tree in the hole at the proper depth and add loose soil gently.

Take care not to plant roots too deep or too shallow.

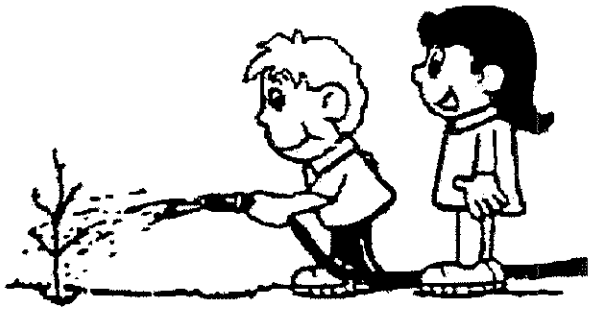


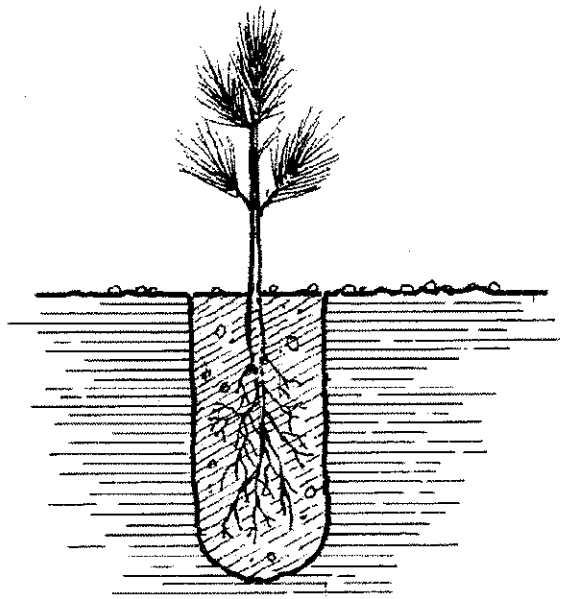
5. ADD more soil and pack down with hands. Use water to firm the soil if necessary.

6. MULCH around the tree with wood chips.



7. WATER the tree regularly, but not too often or roots may rot.





A properly planted tree seedling

Proper Storage and Planting

of

Bareroot Seedlings

Always pick up your seedlings the day they are dropped off. The interval from seedling drop-off to planting should be minimal, ideally two to four days. If possible, transport seedlings in an enclosed vehicle. If you must use the back of a pickup truck or an exposed trailer, cover the seedlings with a tarp to keep them out of direct sun and wind. The optimal short-term storage temperatures are 32 to 45 degrees.

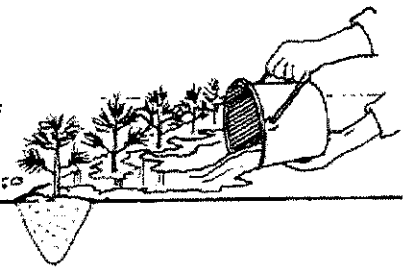
Store seedlings in a cool, humid location in their unopened bundles until they are planted. Root cellars, crawl spaces, basements, and unheated barns work well for short time periods. Never allow seedlings to freeze or expose seedlings to temperatures above 60 degrees. During storage, check bare-root seedlings every two to four days to insure the roots and sphagnum moss packing material remain moist.

Prepare site for planting. Favorable seedling sites have high soil moisture levels; little competing vegetation; and soil with high organic matter, proper Ph, good aeration or texture, and good moisture retention. On most planting sites, water is the greatest limiting factor to survival.

Do not expose seedlings to direct sun and air during handling and preparation for planting. Only take the seedlings that can be planted in one day to the site. Use a hydroscopic root dip on seedlings – do not let seedling sit in dip, and do not shake the dip off roots. Then wrap roots in wet burlap. This will help protect roots from heat and drying.

Plant in early spring for high soil moisture levels and cool temperatures. The ideal temperature range to plant is 33 to 50 degrees. If it is warmer than 60 degrees or becomes windy, it is best to stop planting and wait for conditions to improve. A planting bar works well for digging narrow, deep holes. Each planting hole must be large enough to accommodate the root system in a natural form. Place the seedling in the hole spreading the roots downward and horizontally. Do not bunch roots at the bottom of the hole or fold them so that the roots ends are directed toward the surface (see proper planting diagram.) Incorrect planting depth is another cause of poor seedling survival. The root collar (soil surface line when the seedling was in the nursery beds) must be located at the soil surface when finished. After backfilling the hole with planting bar, check for correct root collar depth.

Fertilizer use on first-year seedlings is generally not recommended. After the first year, small applications of slow release fertilizers with equal parts nitrogen, potassium, and phosphorus will aid plant growth. Follow recommended rates carefully.



Give each seedling one to two gallons of water immediately after planting. Regular irrigation for the first two to three years can increase survival and greatly increase growth rates. Periodic deep watering is better than frequent light watering. Irrigate each plant with one to two gallons of water every one to two weeks during the summer.Gradually reduce irrigation in late summer to allow the seedlings to harden off for winter. Do not water if the ground is frozen.

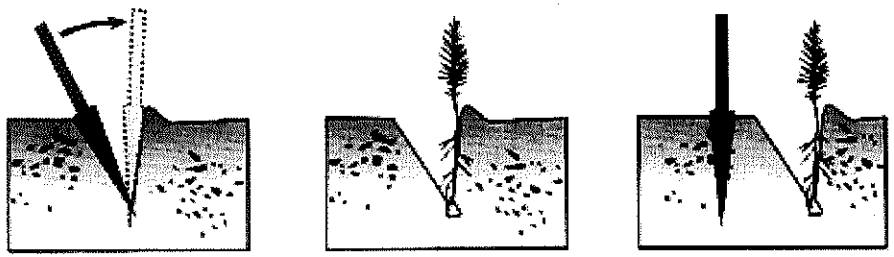
Woven weed fabric is the best mulch for seedlings. It controls all weeds, reduces evaporation from the soil around the roots, and allows water and air to pass through. Other good mulch materials are wood chips; bark chips, straw, and composted sawdust. Mulch should be no deeper than three inches. Grass clippings seem to attract rodents and are not recommended.

Restrict access to seedlings or apply repellents to control deer browse. Rigid net-like tubes are available from many reforestation suppliers. These are effective at discouraging browse of the terminal bud, but require annual maintenance. Repellants have given variable and on consistent results but there are several that appear to be effective with several applications per year. Rodent damage to stems will increase if weeds are not controlled around the base of seedlings. Shallow, clean cultivation around the seedlings will discourage rodents.

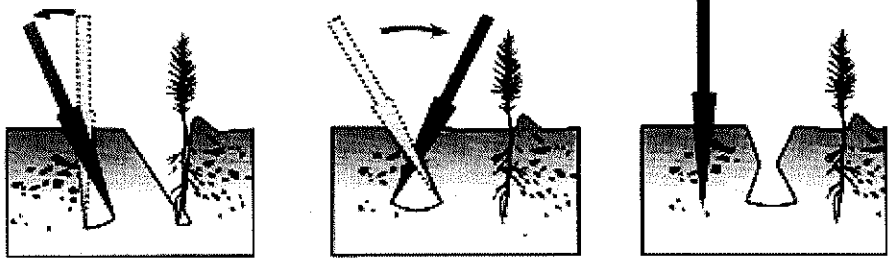
Other general planting tips:

- Select good microsites for the seedlings.
- Plant on the north and east side of downed logs or stumps to shade the seedling, especially on south-facing slopes.
- Avoid areas of dense sod.
- Dig holes the same day you plant so the holes do not dry out.
- Don't put water in the planting holes immediately prior to planting to avoid excessive compaction.
- Remove all weeds and grass from an 18-inch area around each planting hole.
- If using a mechanical tree planter, have someone follow behind to adjust root-collar depth and tamp out air pockets.
- Woven weed fabric is recommended to conserving water around the plant roots and controlling weeds. Studies have shown that weed fabric greatly increases survival and growth rates even over supplemental irrigation.

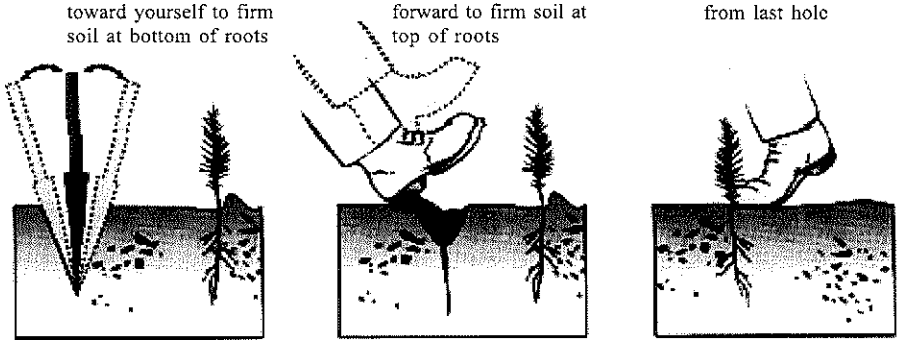
Seedling properly planted with planting bar



1. Insert bar at angle shown and push forward to upright position
2. Remove bar and place seedling at correct depth
3. Insert bar two inches two inches toward yourself from seedling



4. Pull handle of bar toward yourself to firm soil at bottom of roots
5. Push handle of bar forward to firm soil at top of roots
6. Insert bar two inches from last hole



7. Push forward then pull backward to fill hole
8. Fill in last hole by stamping with heel
9. Firm soil around seedling with foot

NJ Tree Nursery
370 East Veterans Hwy
Jackson, NJ
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Nursery Main	(732) 928-0029
Nursery Fax	(732) 928-4925
Interpretive Center	(732) 928-2360
Interpretive Center Fax	(732) 928-8472
Project Learning Tree	(732) 833-9816
Interpretive Programs	(732) 928-0987

Bareroot Seedling Planting and Care

Make your conservation plantings a success by properly preparing the site, and using healthy seedlings. Transplanting is a shock to live plants and care must be taken to protect seedlings for planting. Seedlings planted incorrectly have little chance of survival. The following information will help you plant and care for seedlings and achieve higher survival rates.

Common causes of seedling mortality during handling and planting:

- Seedlings not picked up promptly.
- Improper storage of seedlings, especially exposure to high temperatures or drying.
- Planting when weather conditions are too hot or windy.
- Roots drying during planting.
- Roots j-rooted in the planting hole.
- Seedlings planted to the wrong depth.
- Air pockets left in planting hole or soil over-compacted.
- Planting too late in the spring.

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