Middle-level CTE Learning Experience Title: Measuring Tree Age Educator: Zak Messenger-Harris M-O BOCES Length of Lesson: 8 days (40 minute periods) Grade Level: 6-8	CTE Area: Trade and Technical Education CTE Theme: Sustainability CTE Content: Measurement in the Trade and Technical Fields Date Created: March 28, 2019

PLANNING	
Curriculum Goal	Students take a walking trip around the school property to identify trees that they consider to be old. Students determine the ages of the trees without cutting them by using the diameter at breast height (DBH) measurement and an online tree age calculator. Students promote the maintenance of trees for community aesthetics, health, and economy.
Essential Question(s)	What knowledge and skills are necessary to evaluate the long-term effects of personal practices on the environment and to demonstrate introductory understanding of how to use and conserve resources to meet human needs while minimizing harm to the environment? What knowledge and skills are necessary to demonstrate introductory understanding of systems of measurement and the ways accurate measurements assist trade and technical workers in the successful completion of their work?
National Standards	Common Career Technical Core Standards https://www.careertech.org/career-ready-practices Career Ready Practices 1. Act as a responsible and contributing citizen and employee 2. Apply appropriate and academic and technical skills 3. Attend to personal health and financial well-being 5. Consider environmental, social, and economic impacts of decisions 6. Demonstrate creativity and innovation 8. Utilize critical thinking to make sense of problems and persevere in solving them 9. Model integrity, ethical leadership, and effective management 11. Use technology to enhance productivity 12. Work productively in teams while using cultural global competence USDOE Employability Skills http://cte.ed.gov/employability skills/ Applied Knowledge: Applied Academic Skills, Critical Thinking Skills The thoughtful integration of academic knowledge and technical skills put to practical use Effective Relationships: Interpersonal Skills, Personal Qualities The skills that enable individuals to interact effectively with clients, coworkers, and supervisors Workplace Skills: Resource Management, Information Use, Communication Skills, Systems Thinking, Technology Use The skills employees need to successfully perform work tasks

NYS Standards	New York State Career Development and Occupational Studies (CDOS) Standards Intermediate Level http://www.p12.nysed.gov/cte/ Standard 1: Career Development Students will be knowledgeable about the world of work, explore career options, and relate personal skills, aptitudes, and abilities to future career decisions Standard 2: Integrated Learning Students will demonstrate how academic knowledge and skills are applied in the workplace and other settings Standard 3a: Universal Foundation Skills Students will demonstrate mastery of the foundation skills and competencies essential for success in the workplace
Learning Objectives	Sustainability 1. Resources Students will a) Define "sustainability" as it applies to resource use b) Explain how sustainability can be a factor in decision making c) Define and give example of renewable and non-renewable resources d) Explain factors to consider when evaluating environmental implications of decisions e) Investigate practices that promote stewardship of environmental resources f) Research the personal, environmental, and financial costs and benefits of sustainability-conscious decisions to individuals, families, schools, workplaces and communities g) Practice making decisions that show consideration for sustainability of resources in a variety of classroom applications Measurement in the Trade and Technical Fields 1. Measurement Tools Students will a) Select the appropriate tool for the measurement task, such as a tape measure for length and a scale for weight b) Describe benefits and challenges of using particular measurement tools for specific measuring applications c) Explain the purpose and importance of calibration d) Show how measurements made with common tools relate to one another e) Identify types of measuring tools typically used to accomplish work in specific trade areas 8. Measuring Physical Shapes Students will a) Describe the relationship between 3-dimensional shapes and 2-dimensional shapes b) Identify measurements that apply to 3-dimensional shapes c) Apply knowledge of the relationship between 3-dimensional and 2-dimensional shapes and measurement

	skills to construction of physical shape d) 9. Measurement in Trade and Technical Career Pathways Students will f) Explain the roles, functions, and importance of measuring skills to successful work in trade career areas g) Assess personal skills for performing measuring tasks required for success in specific trade areas h) Evaluate personal suitability for work in specific trade careers		
Vocabulary	Academic: Pi, Inches, Feet, Diameter, Radius, Circumference Aesthetic	Content: DBH, Stick Method, Conifer, Deciduous, Town Planning Board, Pollution, Ecosystem	
Materials and Resources	Tree-filled area for nature walk, computer, videos, teacher-prepared note-taking forms, tape measures Circle Worksheet Builder: http://www.math-aids.com/Geometry/Circles/Circle_Area_Circumference.html Identifying Tree by Leaf: https://www.arborday.org/trees/whattree/ Instruments for Measuring Tree Diameter https://openoregon.pressbooks.pub/forestmeasurements/chapter/3-3-instruments-for-measuring-tree-diameter/ Tree Age Calculator 1: http://www.tree-guide.com/tree-age-calculator Tree Age Calculator 2: https://goodcalculators.com/tree-age-calculator/ Tree Growth Rate by Species: https://www.arborday.org/trees/treeGuide/growth.cfm What are Trees Worth Article: https://bcc-cuny.digication.com/yn159/What_is_a_Tree_Worth_by_Jill_Jones		
INSTRUCTION	What will the teacher do?	What will the students do?	How much time for each activity?
Pre-assessment	Teacher will provide a homework worksheet for the night before this learning experience begins: 3 circle diagrams and 2 similar right triangles. Students label circumference, diameter, radius, and write a statement about what they know about the triangles Circle Worksheet Builder: http://www.math-aids.com/Geometry/Circles/Circle_	Students complete the homework: 3 circle diagrams and 2 similar right triangles. Students label circumference, diameter, radius, and write a statement about what they know about the triangles	20 min

	Area_Circumference.html		
Do-now/Hook	Day 1- Teacher asks students to arrange themselves from shortest to tallest. Teacher provides students with tools to measure their heights. Teacher runs a class discussion: How could you measure the height of a tree without climbing? Teacher prepares a class graphic of student ideas.	Day 1- Students arrange themselves from shortest to tallest. Students measure their heights. The class identifies the student(s) who are (or are closest to) 5 ft. tall. Students suggest ways that one could measure the height of a tree without climbing? As students suggest ideas, the teacher prepares a class graphic.	40 min total 20 min 20 min
Procedure for Instruction/ Learning Activities	Day 2- Teacher plans a walk through the school grounds, nature trail, or local park. The walk should bring students in contact with trees of different size, age, and species. Teacher will print and post the student's photos, next to the corresponding student's leaf, prior to class tomorrow. Day 3- Teacher shares link to Arbor Day Association Leaf Identification website: Identifying Tree by Leaf: https://www.arborday.org/trees/whattree/ Teacher provides direct instruction on the Stick Method for tree height estimation. Teacher demonstrates how to apply	Day 2- Students go on the walk, with the goal of identifying the tree they think is oldest. Students photograph the tree, base to top, with the 5 foot person standing next to it. Students should take a leaf from the tree. Students mark their trees with surveyor's tape, so they can locate it again. Upon return to the classroom, students will hang up their individual leaves and label them with their names. Day 3- Students identify the species of the tree using the leaf identification website. Students use the Stick Method to determine the	40 min total 35 min 5 min 40 min 10min 25 min

	the Stick Method to the photographs from the tree walk. Teacher checks students' estimates Tree Growth Rate by Species: https://www.arborday.org/trees/treeGuide/growth.cfm Day 4- Teacher takes students back outdoors to the trees they have marked with surveyor's tape. Teacher demonstrates how students will measure the breast height circumference (DBH), in inches, using a tape measure. Instruments for Measuring Tree Diameter https://openoregon.pressbooks.pub/forestmeasurements/chapter/3-3-instruments-for-measuring-tree-diameter/ Day 5- Teacher provides students with a link for Tree Age Calculator by species: Teacher demonstrates use of the calculator. Tree Age Calculator 1: http://www.tree-guide.com/tree-age-calculator Tree Age Calculator 2: https://goodcalculators.com/tree-age-calculator/	height of the tree Students post the name of the tree and the tree's height next to their leaf and photo Day 4- Students go back to the tree they have marked with surveyor's tape. Students measure the breast height circumference of their trees, in inches, using a tape measure. Students post the circumference of their trees next to their leaf and photo Day 5- Students calculate the age of their trees and post the age next to their leaf.	5 min 40 min 35 min 5min 40min total 10 min

	Teacher asks: How does the age of the tree compare to the height of the tree? Which tree in our group was the oldest? youngest? Which tree in our group was tallest?	Students compare their results for age and height of tree: How does the age of the tree compare to the height of the tree? Which tree in our group was the oldest? youngest? Which tree in our group was tallest?	20 min
	Exit ticket: Make a summary statement about what we have learned about the relationship of tree age and height.	Students complete exit ticket	10 min
	Day 6- Teacher shares excerpts from "What is a Tree Worth? by Jill Jones https://bcc-cuny.digication.com/yn159/What_is_a_Tree_Worth_by_Jill_Jones	Day 6- Students completed a guided notetaking, focusing on the value of live trees to the community (sustainability theme). Students use the age of their tree, and the value of a tree for a year, to determine the value of their tree to the community. Share their results with the class.	40 min total 25min 15 min
	Day 7 and 8- Teacher provides a scenario about a community decision to replace a wooded lot with a paved parking lot. Students write a persuasive essay to the Town Planning Board promoting the contributions of the live trees to the aesthetics, health, and economy	Day 7 and 8- Students listen to the scenario provided by the teacher. Using the tree measuring and aging experience and the notes from the previous class, students write a persuasive essay to the Town Planning Board promoting the contributions of the live trees to the aesthetics, health, and economy. Students post their essays next to their leaf. The class takes a gallery walk so students can review each other's essays.	40 min total for 2 days 55 min 20 min

Differentiation	Students will be grouped by their abilities and interests. Teacher will provide scaffolded support where needed. Students who have physical disabilities will be accommodated for. Students who are meeting all of the expectations will be challenged to go above and beyond.
Closure	Teacher provides a scenario about a community decision to replace a wooded lot with a paved parking lot. Students write a persuasive essay to the Town Planning Board promoting the contributions of the live trees to the aesthetics, health, and economy. Students post their essays next to their leaf. The class takes a gallery walk so students can review each other's essays.
ASSESSMENT	
College, Career, and Life Readiness Skills	See Below Developed using Middle-level Life/ Career Rubrics available at https://nyctecenter.org/middle-level-life-career-rubric-database

Performance Measure	Exemplary	Proficient	Developing	Beginning
Acts Responsibly in the Interests of Others	Contributes extensively to a community organization or event; thoughtfully reflects on the importance of own actions within the community.	Contributes to a community organization or event and reflects on the importance of personal involvement within the community.	Participates in, but does not contribute to, a community organization or event and attempts to reflect on personal involvement within the community.	Does not contribute to a community organization or event or reflect on the importance of involvement within the community.
Uses Technology to Locate and Evaluate Information	Effectively and consistently uses multiple technology tools to collect, organize, evaluate, and/or communicate information.	Uses technology effectively as a tool to collect, organize, evaluate, and/or communicate information.	Uses popular technology tools to collect and/or communicate information.	Attempts to use technology to collect and/or communicate information are ineffective.
Writes Clearly	Consistently writes clearly, uses correct grammar, and understands the intended audience of documents that are produced.	Writes clearly, generally using correct grammar, and understands the intended audience of the document produced.	Produces a document that is mostly well written but, sometimes uses incorrect grammar; shows general understanding of the intended audience.	Produces a document that is unclear, uses incorrect grammar, and shows a misunderstanding of the intended audience.
Balances Short- and Long-term Goals	Consistently balances short-term and long-term goals	Balances short-term and long-term goals.	Succeeds sometimes in balancing short-term and long-term goals.	Attempts to balance short-term or long-term goals, but without much success.
Interprets Information and Draws Conclusions	Is able to look at complex information and successfully draw conclusions and apply them to consumer situations.	Is able to look at information and successfully draw conclusions in consumer situations.	Looks at information and sometimes draws conclusions in consumer situations.	Looks at information but rarely draws a conclusion in consumer situations.

Manages Personal Finances	Consistently manages budgeting habits within resources, uses personal financial tools and services effectively.	Manages budgeting habits within resources, uses personal financial tools and services effectively.	Is conscious of personal budgeting but occasionally exceeds resources.	Spends personal resources carelessly.
Analyzes Critical Information	Thoroughly evaluates the reliability of the source and the information researched using internal and external validation.	Thoroughly evaluates information researched using internal and external validation.	Evaluates information researched but not thoroughly.	Does not evaluate information.
Uses System Thinking	Recognizes and manipulates parts of a system to come together to accomplish tasks.	Recognizes how the parts of a system work together to accomplish tasks.	Identifies the parts of a system but cannot explain how they work together.	Is able to identify only some system parts and loses sight of how they work together.
Contributes to Well-being of Community	Is a strong advocate for the community and always acts in a manner that benefits the community.	Understands responsibility of the individual to the community and acts in a manner that benefits the community.	Usually considers the well-being of the community even if occasionally acts in self-interest.	Favors self-interest over the well-being of the community.
Demonstrates Understanding of the System and Environment Influencing the Organization	Consistently acknowledges the economic, political, and social relationships that impact multiple levels of an organization and uses this knowledge in interactions within the group (e.g., local, national, international).	Acknowledges the economic, political, and social relationships that impact multiple levels of an organization (e.g., local, national, international).	Acknowledges some social relationships that impact multiple levels of an organization.	Does not acknowledge social relationships that impact multiple levels of an organization.
Sees Consequences of Actions	Consistently considers the implications and consequences of actions.	Considers the implications and consequences of actions.	Occasionally acts in ways that fail to anticipate consequences.	Acts impulsively and fails to consider consequences of actions.