

CTE CONTENT AREA: Trade and Technical Education

CONTENT MODULE TITLE: Measurement in Trade and Technical Fields

MODULE DESCRIPTION

This module introduces students to systems of measurement and to the importance of understanding, interpreting, and accurately using measurements in trade and technical careers. Students will investigate the measurements and measurement tools commonly used in specific trade and technical fields. Students will have the opportunity to weigh their interest in specific trade and technical careers against their skills, abilities, and aptitudes for taking and using measurements required for successful work in those careers.

GUIDING QUESTION

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?

MODULE CONTENT

Measurement in Trade and Technical Fields

1. Global Systems of Measurement

Students will

- a) Understand the two measuring systems used in the United States: US Customary and metric
- b) Explain how measuring systems are used to measure distance, weight, volume, time, temperature, and physical shapes
- c) Describe how measuring systems relate to each other
- d) Identify types of measurement typically used to accomplish work in specific trade areas

2. 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

3. Measuring Distance

Students will

- a) Identify tools used for measuring distance
- b) Communicate distance measurements in appropriate units for the measurement task
- c) Demonstrate use and care of distance measuring tools

- d) Utilize appropriate distance measuring tools and procedures to accomplish tasks in specific trade areas

4. Measuring Weight

Students will

- a) Identify tools for measuring weight
- b) Communicate weight measurements in appropriate units for the measurement task
- c) Demonstrate use and care of weight measuring tools
- d) Utilize appropriate weight measuring tools and procedures to accomplish tasks in specific trade areas

5. Measuring Volume

Students will

- a) Identify tools for measuring volume
- b) Communicate volume measurements in appropriate units for the measurement task
- c) Demonstrate use and care of volume measuring tools
- d) Utilize appropriate volume measuring tools and procedures to accomplish tasks in specific trade areas

6. Measuring Time

Students will

- a) Identify tools for measuring time
- b) Communicate time measurements in appropriate units for the measurement task
- c) Demonstrate use and care of time measuring tools
- d) Utilize appropriate time measuring tools and procedures to accomplish tasks in specific trade areas

7. Measuring Temperature

Students will

- a) Identify tools for measuring temperature
- b) Communicate temperature measurements in appropriate units for the measurement task
- c) Demonstrate use and care of temperature measuring tools
- d) Utilize appropriate temperature measuring tools and procedures to accomplish tasks 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

9. Measurement in Trade and Technical Career Pathways

Students will

- a) Explain the roles, functions, and importance of measuring skills to successful work in trade career areas
- b) Assess personal skills for performing measuring tasks required for success in specific

- trade areas
- c) Evaluate personal suitability for work in specific trade careers

ILLUSTRATIVE ACTIVITIES by Theme Module

Career and Community Connections

Measurement Relay

Divide students into teams. Place a variety of measuring tools throughout the classroom. Develop two sets of cards for each team with enough cards for each team member to have at least one turn. On each card in the first set, write a measuring task; on each card in the second set, write the name of a trade or technical career. The relay begins with one member from each team selecting a measuring task card. They must find the appropriate measuring tool and find an appropriate career card to complete their turn and tag the next team member. The first team to complete the relay is the class winner. Discuss how different types of measurements and measuring tools are typically used in specific trade and technical careers.

Communication and Interpersonal Relationships

Measurement Slide Decks

Students are teamed based on their interest in a particular trade or technical area. Student teams create slide decks showing ways a particular type of measurement and a certain set of measuring tools are used in their trade or technical area. Teams present their slide decks to the class and field their classmates' questions. Slide decks can be used later as review resources when students are preparing for projects involving the measurements detailed in the slides.

Financial and Consumer Literacy

Costs of Measurement Mistakes

Students work in pairs to identify the most common measurement tasks required in a specific trade area; pairs share their lists. Students research the financial costs of wasted time and materials when inaccurate measurements are made in completing the tasks on their lists. Students write a reflection on how consumers are impacted when inaccurate measurements result in wasted resources.

Health, Safety, and Wellness

Safety Posters

Students discuss trade and technical work tasks where both the measurement of time and the measurement of temperature must be tracked together to insure worker and clients/customer safety and health. Students develop safety posters showing how accurate measurements of time and temperature work together to protect worker and client/customer well-being in specific trade and technical workplace.

Problem Solving and Innovation

Measure, Mark, and Cut (Kerf)

Students work in pairs to measure, mark, and cut a 2"x 4" board to a designated length, checking their partner's accuracy at each step. Partners measure the completed cuts. Partners discover that the board cuts are consistently too short. Students research the concept of Kerf to answer the question of why the board cuts are consistently off. Partners decide how to modify their measure, mark, cut approach to create accurate cuts and then test their plans.

Sustainability

Measuring Tree Age

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 research the value of the trees at various stages of harvest, such as planted trees, boards firewood, or pulp. Students decide what they would do with the trees and write justifications for their decisions.

STANDARDS ADDRESSED

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.

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
4. Communicate clearly and effectively and with reason
6. Demonstrate creativity and innovation
8. Utilize critical thinking to make sense of problems and persevere in solving them
10. Plan education and career paths aligned to personal goals
11. Use technology to enhance productivity

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

RESOURCES

New York State Department of Labor

New York State Career Zone

<https://www.careerzone.ny.gov>

Career Zone is a no-cost online career exploration and planning tool developed by the New York State Department of Labor. It offers career and education information on thousands of careers, as well as, self-assessment and career planning tools. Career Zone is appropriate for users from middle school through adult.

United States Department of Labor

CareerOneStop

<https://www.careeronestop.org>

CareerOneStop is the career, training, and job search website for the U.S. Department of Labor. The website serves job seekers, businesses, students, and career advisors with a variety of free online tools, information, and resources.

Association of Career and Technical Education

Career Planning Guide

https://www.acteonline.org/wp-content/uploads/2018/02/ACTE_CC_Paper_FINAL.pdf

Research has identified middle school as a time when students can benefit the most from career exploration, a process of building self-awareness, learning about potential careers, and developing a plan for reaching future goals.

AdvanceCTE

Middle Level Career Interest Inventory

<https://cte.careertech.org/sites/default/files/StudentInterestSurvey-English.pdf>

AdvanceCTE provides a Career Interest Inventory worksheet to use with students in helping them identify the potential matches to the sixteen career clusters available to them.

Association of CTE Administrators (ACTEA)

CTE Strong Videos

<http://www.ctestrong.com>

Edge Factor has created a series of inspirational videos related to career and education that provide students with a very contemporary perspective on CTE options. Career Cluster videos provide a new look at the many career options that

students have in high school and beyond.

New York State Trade and Technical Teachers' Association (NYSTTTA)

<https://www.nysttta.org/>

NYSTTTA provides statewide opportunities for collaboration and focused professional development on curriculum, project ideas, assessment strategies, technical assessments, and student management.

Career and Technical Education Technical Assistance Center of New York (CTE TAC)

<http://nyctecenter.org/>

The Career and Technical Education Technical Assistance Center (CTE TAC) operates under a state contract to assist the New York State Education Department (NYSED) in carrying out its mission of improving the quality, access, and delivery of career and technical education through research-based methods and strategies resulting in broader CTE opportunities for all students.