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| **TEXAS CTE LESSON PLAN**  [www.txcte.org](http://www.txcte.org) | |
| **Lesson Identification and TEKS Addressed** | |
| **Career Cluster** | Hospitality and Tourism |
| **Course Name** | Culinary Arts |
| **Lesson/Unit Title** | Food Measurement Matters |
| **TEKS Student Expectation** | **130.254. (c) Knowledge and Skills**  (2) The student applies advanced reading, writing, mathematics, and science skills for the food service industry. The student is expected to:  (C) calculate numerical concepts such as percentages and estimations in practical situations, including weight and measures;  (D) understand scientific principles used in culinary arts;  (E) read and comprehend standardized recipes;  (F) write and convert standardized recipes. |
| **Basic Direct Teach Lesson**  (Includes Special Education Modifications/Accommodations and  one English Language Proficiency Standards (ELPS) Strategy) | |
| **Instructional Objectives** | **Students will:**   * Understand how to make accurate and precise laboratory measurements * Calculate temperatures for the Celsius and Fahrenheit temperature scales * Convert U.S. to metric measures using formulas * Demonstrate techniques for measuring length, mass, time, and volume |
| **Rationale** | Food scientists use the metric system in the laboratories and the United States has been using metric units for a long time in food products. Today, we will practice how to convert the English system to the metric system and demonstrate how to measure length, mass, and volume. Let’s learn how these skills may lead to a career! |
| **Duration of Lesson** | Three 45-minute class periods |
| **Word Wall/Key Vocabulary**  *(ELPS c1a, c, f; c2b; c3a, b, d; c4c; c5b) PDAS II (5)* | **Accuracy:** How close a single measurement comes to the actual or true value of the quantity of measurement  **Mass:** A measure of the quantity of matter  **Measurement:** A collection of quantitative data made by comparing a quantity with a standard unit  **Meniscus:** The curved upper surface of a liquid in a tube  **Metric System:** A decimal system of measurement  **Precision:** How close several measurements are to the same value  **Prefixes:** Used to indicate what multiple or fraction of the base unit is used in a given situation  **Temperature:** A measure of heat intensity  **Volume:** The amount of space that a substance or object occupies, or that is enclosed within a container  Note: Many other terms on the slide presentation can be identified. Encourage students to include the definition in the assignment. |
| **Materials/Specialized Equipment Needed** | **Equipment:**   * Computer with projector for multimedia presentation * Computers with internet access (be sure to follow district guidelines) * Light projector (Elmo)   **Supplies:**  Measuring equipment:   * Balances (4)   + Electronic   + Triple-beam * Centimeter ruler (2) * Measuring tape * Meter stick * Milliliter cylinder (2) * Milliliter ruler * Kilometer measure * Biscuit * Cookie sheet * Flour (any amount) * Ground beef (any amount) * Milk, any amount * Muffin * Orange * Salad plate * Soda (any amount) * Sugar (any amount) * Table * Tablecloth, rectangle   **PowerPoint:**   * Measurement Matters   **Technology:**   * Free iPad App:   + Metric to U. S. Imperial Converter  Converts between the most common Metric units and U. S. Imperial units<https://itunes.apple.com/us/app/metric-to-us-imperial-converter/id412489703?mt=8> * Infographics:   + Kitchen Cheat Sheet   The Handy Reference Guide for Anyone Who Loves to Cook<http://dailyinfographic.com/kitchen-cheat-sheet-infographic> * TED Talks: * TEDxMelbourne – Pat Naughtin – Saving Millions with the Metric System  Pat Naughtin presents the history of the metric system and then highlights how the different ways which the way we measure things can cost billions of dollars and even endanger our health. Pat is a world expert on metrication and presents from his incredible experience as a boiler making, through piano building and solar energy, to weaving and wool classing.<http://tedxtalks.ted.com/video/TEDxMelbourne-Pat-Naughtin-Savi>   **Graphic Organizer:**   * Measurement Abbreviations * Measurement Abbreviations (Key) * Measurement Abbreviations Squared and Cubed * Measurement Abbreviations Squared and Cubed (Key)   **Handouts:**   * Abbreviations, Volume, and Weight Equivalents * Length, Mass, and Volume Conversions Calculations * Length, Mass, and Volume Conversions Calculations (Key) * Measurement Equivalents * Measurement Matters Lab Instructions * Measurement Matters Lab Worksheet * Measurement Stations * Note-Taking: Measurement Matters! * Temperature Conversions Calculations * Temperature Conversions Calculations (Key) |
| **Anticipatory Set**  (May include pre-assessment for prior knowledge) | Before class begins:  Become familiar with the video from the Department of Family and Consumer Sciences, Baylor University – Janelle Walter, PhD.:   * The Importance of Accurate Measurements in Food Science Experiments  This video presents basic measurement procedures for dry and liquid ingredients when using volume measurements.<http://youtu.be/_yVkp61NPIA> Display as many items from the Materials or Specialized Equipment Needed tab as you have available on a table in front of the room so that students may view as they enter.   Divide the class into the lab groups.  Distribute the graphic organizer Measurement Abbreviations to each group and instruct the groups to complete the sheet with the abbreviations for each word.  Abbreviations in long scientific writing are useful and save space in lengthy recipes/formulations.  Review the answers and explain to the class that they will be using these abbreviations in their labs. |
| **Direct Instruction \*** | Introduce lesson objectives, terms, and definitions.  Distribute the handout Note-Taking: Measurement Matters so that students may take notes during the slide presentation.  Introduce the PowerPoint® Measurement Matters and begin the discussion about how important measuring accurately in the lab is.  View the YouTube video:   * US Switch to Metric System?  The Federal Eye’ Ed O’Keefe answers a reader’s question about U.S. efforts to switch to the metric system.<http://youtu.be/xXK-QJ_9SLs>   *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*   * provide students with a copy of the slide presentation * assign student a partner for note-taking assistance |
| **Guided Practice \*** | Display the PDF files Abbreviations, Volume and Weight Equivalents and Measurement Equivalents on a light projector.  Review the files with the abbreviations and equivalents with your students.  Distribute the handouts Length, Math and Volume Conversion Calculations and Temperature Conversions Calculations and explain to the students how important it is to be able to convert the U.S. Measurement System to the Metric System.  Allow your students to complete the handouts.  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*   * shorter assignment length * work with a partner |
| **Independent Practice/Laboratory Experience/Differentiated Activities \*** | Before class begins:  Read the handout Measuring Matters Lab Instructions to set up the measuring stations.  Print the handout Measurement Stations on cardstock and separate. Place each card by each corresponding station so that students will know what item to measure.  Distribute the handout Measuring Matters Lab Worksheet to students assist them in identifying the measuring equipment.  Instruct the students that they should visit each measuring station to measure the item available and record their results.  Remind students that measuring accurately and precisely is important in lab experiments.  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*   * pair student with a partner * reduce assignment |
| **Lesson Closure** | Review lesson objectives, terms, and definitions.  Re-visit the graphic organizer Measurement Abbreviations from the Anticipatory set.  Place the graphic organizer Measurement Abbreviations Squared and Cubed on a light projector and ask the students if they can abbreviate the measurements that are squared and cubed.  Work the assignment together as a class.   * Ask students to list reasons it is beneficial to know both the English measurement system, as well as the metric measurement system. Hold a class discussion and ask students to share their thoughts. |
| **Summative/End of Lesson Assessment \*** | Divide the class into subgroups of four.  Assign groups to *Invent the Quiz* and assess the class.  Instruct students to write 10 higher-order questions related to the lesson with a key. To accomplish this, they may use a technology program, such as:   * Kahoot!® A game based classroom response system<https://www.getkahoot.com/> * Socrative® Teachers can engage and assess their students with educational activities on tablets, laptops, and smartphones.<http://www.socrative.com/>   Note to teacher: The calculations handouts may also be used as a post-test to assess the students.  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*   * assistance with question and answer responses * highlight main points |
| **References/Resources/**  **Teacher Preparation** | **Textbook:**   * Mehas, K. Y., & Rodgers, S. L. (2002). *Food science: The biochemistry of food and nutrition.* New York, NY: Glencoe/McGraw-Hill. * Ward, J. D., & Ward, L. T. (2013). *Principles of food science.* Tinley Park, IL: Goodheart-Willcox Company.   **Website:**   * National Food Service Management Institute The University of Mississippi<http://www.nfsmi.org/Default.aspx>   **YouTube:**  U.S. Switch to Metric System?  The Federal Eye’ Ed O’Keefe answers a reader’s question about U.S. efforts to switch to the metric system.<http://youtu.be/xXK-QJ_9SLs> |
| **Additional Required Components** | |
| **English Language Proficiency Standards (ELPS) Strategies** | * Ask students to repeat your instructions back to you to be sure they know what is expected of them before each phase of the lesson * Discuss vocabulary in detail and make sure everyone has a firm grasp on it before moving forward with the lesson * Use graphic organizers and visuals to explain the lesson in detail * Print fill in the blank handouts of the PowerPoint notes for students to follow along with the lesson |
| **College and Career Readiness Connection[[1]](#footnote-1)** |  |
| **Recommended Strategies** | |
| **Reading Strategies** | Current Events: Assign students to read about Anders Celsius. Information can be found in newspaper articles, magazines, journals and online print.  Suggestions:   * About.com History of the Thermometer Anders Celsius invented the centigrade scale and thermometer.<http://inventors.about.com/od/cstartinventors/a/Anders_Celsius.htm> * Energy Quest Anders Celsius 1701-1744<http://www.astro.uu.se/history/Celsius_eng.html>   Encourage students to connect reading to their life experiences or prior knowledge. |
| **Quotes** | It doesn’t make a difference what the temperature in a room is, it is always room temperature. **-Stephen Wright**  Measurement is the first step that leads to control and eventually to improvement. If you can’t measure something, you can’t understand it. If you can’t understand it, you can’t control it. If you can’t control it, you can’t improve it. **- H. James Harrington**  Give them an inch and they take a mile. **-Unknown** |
| **Writing Strategies**  **Journal Entries + 1 Additional Writing Strategy** | **Journal Entries:**   * Measuring accurately in recipes is important because … * Converting U.S. measures to metric is important because … * The advantages of the using the metric system versus the English system are …   **Writing Strategy:**  RAFT writing strategy is designed to demonstrate student understanding of material in a creative and relevant way.   * Role – food scientist * Audience – research assistant * Format – memo * Topic – metric abbreviation   + The memo is to remind the research assistant to use the metric abbreviations in the units of measure |
| **Communication**  **90 Second Speech Topics** | * Three reasons that measuring accurately in recipes is important are … * The reasons the metric system has not been widely used in the United States are … |
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| **Enrichment Activity**  (e.g., homework assignment) | Use reliable internet sources to research Anders Celsius. Explore his life and the obstacles he faced when introducing his Celsius temperature system.  **Infographic:**  Infographics are graphic visual representations of information, data or knowledge intended to present complex information quickly and clearly.  The infographic below is related to this lesson. Allow students to view the image on a projector and lead a discussion concerning the information provided.   * Kitchen Cheat Sheet   The Handy Reference Guide for Anyone Who Loves to Cook<http://dailyinfographic.com/kitchen-cheat-sheet-infographic>   **TED Talk:**  TEDx is a program of local, self-organized events that bring people together to share a TED-like experience. At a TEDx event, TEDTalks video and live speakers combine to spark deep discussion and connection in a small group. These local, self-organized events are branded TEDx, where x = independently organized TED event.  The video below is related to this lesson. Allow students to view the video and lead a discussion concerning the TED Talk.  TEDxMelbourne – Pat Naughtin – Saving Millions with the Metric System  Pat Naughtin presents the history of the metric system and then highlights how the different ways which the way we measure things can cost billions of dollars and even endanger our health. Pat is a world expert on metrication and presents from his incredible experience as a boiler making, through piano building and solar energy, to weaving and wool classing.<http://tedxtalks.ted.com/video/TEDxMelbourne-Pat-Naughtin-Savi> |
| **Family/Community Connection** | Work with a local elementary school to implement metric measurements in their field day celebrations.  Example: Egg Drop Competition – Partners try to toss an egg back and forth without it breaking. Start standing 1 meter apart, move to 2m, 3m, 4m, and so on, until the egg drops. Once the egg drops, have students measure the exact distance between the target (receiver) and the broken egg. This will tell us how much farther the thrower needed to throw the egg to continue. |
| **CTSO connection(s)** | **Family, Career and Community Leaders of America (FCCLA)**  <http://texasfccla.org>   * Culinary Arts A team event – recognizes participants enrolled in occupational culinary arts/food service training programs for their ability to work as members of a team to produce a quality meal using industrial culinary arts/food service techniques and equipment.   **SkillsUSA**  <http://skillsusa.org/>   * Culinary Arts The competition will encompass both hot and cold food preparation and presentation. Contestants will demonstrate their knowledge and skills through the production of a four-course menu in a full day competition. The contestants will be rated on their organization, knife skills, cooking techniques, creative presentation, sanitation food safety techniques, and above all, the quality and flavor of their prepared items. The high school competitors will work from one menu with standardized recipes. The college/postsecondary students will work from a market basket format and write their own menu and recipes the night before the competition. |
| **Service Learning Projects** | Service learning is a way for youth to gain knowledge and develop skills while meeting real community needs. After identifying and examining local issues, students agree on a plan, take action, and evaluate results. For more information on service learning projects visit: <http://www.ysa.org/>  Possible Idea:  Students may work with elementary students in the after-school program teaching them about the metric system and how to convert from the English system. |

1. Visit the Texas College and Career Readiness Standards at <http://www.thecb.state.tx.us/collegereadiness/CRS.pdf>, Texas Higher Education Coordinating Board (THECB), 2009. [↑](#footnote-ref-1)