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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** | Using Math and Science for Quality Food |
| **TEKS Student Expectations** | **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:**   * Identify quality standards in the foodservice industry * Calculate baker’s percentage using ingredient weights from standardized recipes * Inventory food items in storage areas |
| **Rationale** | Math and science in the foodservice industry?! To be able to provide quality food consistently, establishments must use math and science in their baking and cooking to keep customers returning and reduce food costs. Let’s find out how math and science can help do this and how it will enhance your career skills. |
| **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)* | **Baker’s percentage:** Each ingredient in a formula is expressed as a percentage of the flour weight and the flour weight is always expressed as 100%  **Cold storage:** The state of being kept in a cold place for later use  **Dry storage:** The storage of products which do not require a climate controlled environment and generally have a long shelf life  **Formula:** A special type of recipe that is used in baking  **Inventory:** The act or process of making a complete list of the things that are in a place  **Quality control:** A system that ensures that everything will meet the foodservice establishment’s standards  **Standardized recipe:** Written procedures to prepare a known quantity and quality of a certain food |
| **Materials/Specialized Equipment Needed** | **Equipment:**   * Computer with projector for PowerPoint presentation * Computers with Internet access (be sure to follow school district guidelines)   **Materials:**   * Calculators   **Supplies:**   * Baker’s scale * Canned food (various) * Cold foods * Condiments * Flour * Produce * Seasonings   **PowerPoint:**   * Math + Science = Quality Food * Presentation Notes – Math + Science = Quality Food   **Technology:**   * Free iPad App: * Infographic:   + The Baker’s Percentage Cheat Card  In baker’s percentage calculations, all ingredients are presented in comparison to the weight of the flour in the dough. [Https://bread-magazine.com/bakers-percentage/](https://bread-magazine.com/bakers-percentage/) * TED Talk:   + The chemistry of cookies – Stephanie Warren  You stick cookie dough into an oven, and magically, you get a plate of warm, gooey cookies. Except it’s not magic; it’s science. Stephanie Warren explains via basic chemistry principles how the dough spreads out, at what temperature we can kill salmonella, and why that intoxicating smell wafting from your oven indicates that the cookies are ready for eating. [Http://ed.ted.com/lessons/the-chemistry-of-cookies-stephanie-warren](http://ed.ted.com/lessons/the-chemistry-of-cookies-stephanie-warren)   **Handouts:**   * Anticipation Guide: Math + Science = Quality Food * Anticipation Guide: Math + Science = Quality Food (Key) * Calculating Baker’s Percentages * Calculating Baker’s Percentages (Key) * Inventory Quality Control – Cold Storage * Inventory Quality Control – Dry Storage * Inventory Quality Control – Miscellaneous * Measuring Success with Standardized Recipes * Recipe Standardization Process   **Graphic Organizers:**   * Science of Baking * Science of Baking (Key) |
| **Anticipatory Set**  (May include pre-assessment for prior knowledge) | Before class begins:  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.  Distribute the handout Anticipatory Guide: Math + Science = Quality Food to the students and instruct them to place a check mark by the statements they THINK are true.  After the lesson, this handout will be revisited in the Lesson Closure section to check for knowledge of the lesson. |
| **Direct Instruction \*** | Introduce lesson objectives, terms, and definitions.  Select and distribute a handout or graphic organizer from the Instructional Strategies drop down menu in Classroom Essentials or instruct students to take notes in their journal books or on their own paper.  Introduce the PowerPoint (-) Math + Science = Quality Food. Students will be expected to take notes while viewing the slide presentation. Allow time for classroom discussion.  View the YouTube video:   * Baker’s Percentage This measuring system is commonly used when a formula contains flour.<https://youtu.be/xJqe5_g22kU>   *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*   * check for understanding * provide a copy of slide presentation |
| **Guided Practice \*** | Distribute the calculators and the handout Calculating Baker’s Percentages.  Explain the formula for the baker’s percentage. Instruct the students to calculate the percentages for the five standardized recipe ingredients. Students may complete the last template with a recipe of their choice.  Option: Groups of three or four students may show their calculations on a board or projector.  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*   * reduce assignment * provide extended time for assignment |
| **Independent Practice/Laboratory Experience/Differentiated Activities \*** | Divide the class into subgroups of four.  Read the following script:  Management at the restaurant you at are employed has assigned you to a team to take inventory of the food items as a cost-control measure. Your team will take inventory of six food storage areas: cold – freezer and refrigerator, dry-canned and produce and miscellaneous – condiments, seasonings, and snacks.  Distribute the handouts Inventory Quality Control – Cold Storage, Inventory Quality Control – Dry Storage, Inventory Quality Control – Miscellaneous.  Instruct the groups to list and count of the food items in the culinary lab. If the price of an item is not known, they may use the Internet to locate a price.  Discuss the FIFO – first in, first out of foods and relate it to the quality of food production.  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*   * peer tutor * reduce written assignment |
| **Lesson Closure** | Review terms, definitions, and objectives.  Re-distribute the handout Anticipation Guide: Math + Science = Quality Food from the Anticipatory Set.   * Allow students to re-read each statement and place a check mark by the statements they KNOW are true. They should also provide information that PROVES other statements are not true. |
| **Summative/End of Lesson Assessment \*** | Students may write a one-page reflection on the importance of quality standards in the foodservice industry.  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*   * providing guided participation * oral response for written assessment |
| **References/Resources/**  **Teacher Preparation** | **Images:**   * Shutterstock® images. Photos obtained with subscription.   **Textbooks:**   * *Culinary essentials. (2010).* Woodland Hills, CA: Glencoe/McGraw-Hill. * *Foundations of restaurant management & culinary arts.* (2011). Boston, MA: Prentice Hall.   **Websites:**   * Food Buying Guide Calculator for Child Nutrition Programs<http://fbg.nfsmi.org/Default.aspx> * National Food Service Management Institute Part of the School of Applied Science at The University of Mississippi, is the only federally funded national center dedicated to applied research, education and training, and technical assistance for child nutrition programs. The Institute was established by Congress in the Child Nutrition and WIC Reauthorization Act of 1989. It is funded by a grant administered through the United States Department of Agriculture (USDA), Food and Nutrition Service (FNS). <http://www.nfsmi.org/Default.aspx>   **YouTube:**  Baker’s Percentage This measuring system is commonly used when a formula contains flour.<https://youtu.be/xJqe5_g22kU> |
| **Additional Required Components** | |
| **English Language Proficiency Standards (ELPS) Strategies** | * Word wall * Draw visual representations of terms on word wall * Add terms and definitions to personal dictionary |
| **College and Career Readiness Connection[[1]](#footnote-1)** |  |
| **Recommended Strategies** | |
| **Reading Strategies** | Other articles pertaining to this lesson that students may read include:   * How Is Math Used in Cooking?  Math and the ability to tell time are essentials when it comes to cooking. In fact, all phases of cooking require some math, including meal planning, grocery shopping, food budgeting, baking, measuring ingredients, adjusting recipes, and storing and freezing food. Precision matters when it comes to adding and combining ingredients.<http://www.ehow.com/how-does_4899712_how-math-used-cooking.html> * Math Activities Using Nutrition Labels  The nutrition labels on food packages guide healthy food choices. They also inspire hands-on math activities for the classroom. Using the food labels can demonstrate real-life applications for basic math skills, making them more relevant for students.<http://www.ehow.com/info_7877480_math-activities-using-nutrition-labels.html> * Recipe Standardization Process (see All Lesson Attachments tab)  Using standardized recipes provides many benefits to school foodservice operations.   **Reading Strategy** Encourage students to “visualize” as they read. Many students are visual learners and will benefit from making sketches or diagrams on scrap paper as they read. Providing students with graphic organizers to help them organize their thoughts is also helpful. |
| **Quotes** | Baking makes me focus. On weighing the sugar. On sieving the flour. I find it calming and rewarding because, in fairness, it is sort of magic – you start off with all this disparate stuff, such as butter and eggs, and what you end up with is so totally different. And, delicious. **-Marian Keyes**  The biggest challenge of being a pastry chef is that, unlike other types of chefs, you can’t throw things together at a farmer’s market. When you’re working with baking powder and a formula, you have to be exact. If not, things can go wrong. **-Carla Hall**  Baking is too precise for me. I cook with a pinch of this or that. **-Eva Longoria** |
| **Writing Strategies**  **Journal Entries + 1 Additional Writing Strategy** | **Journal Entries:**   * Measuring flour with a scale is important in baking because … * Serving quality foods in a restaurant will … * Math and science in baking will …   **Writing Strategy:**   * RAFT Writing Strategy:   + Role – restaurant manager   + Audience – culinary chef   + Topic – inventory   + Format – memo   + Write a memo to the chef of a restaurant implementing quality standards for inventory. |
| **Communication**  **90 Second Speech Topics** | * Three things about using math and science in baking are … * Quality foods in restaurants will … |
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| **Enrichment Activity**  (e.g., homework assignment) | If time and budget allows, students may practice the baker’s percentage with ingredients from a standardized recipe and prepare the dish.  **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.   * The Baker’s Percentage Cheat Card In baker’s percentage calculations, all ingredients are presented in comparison to the weight of the flour in the dough.<https://bread-magazine.com/bakers-percentage/>   **TED Talk:**  TED-Ed’s commitment to creating lessons worth sharing is an extension of TED’s mission of spreading great ideas. This allows users to take any useful educational video, not just TED’s, and easily create a customized lesson around the video.  The video below is related to this lesson. Allow students to view the video and lead a discussion concerning the TED Talk.  The chemistry of cookies – Stephanie Warren  You stick cookie dough into an oven, and magically, you get a plate of warm, gooey cookies. Except it’s not magic; it’s science. Stephanie Warren explains via basic chemistry principles how the dough spreads out, at what temperature we can kill salmonella, and why that intoxicating smell wafting from your oven indicates that the cookies are ready for eating.<http://ed.ted.com/lessons/the-chemistry-of-cookies-stephanie-warren> |
| **Family/Community Connection** | Invite the general manager from a restaurant that prepares all the dishes from scratch to speak to the class how math is used in the foodservice industry. |
| **CTSO connection(s)** | **Family, Career and Community Leaders of America**  <http://www.fcclainc.org>   * Applied Math for Culinary Management An individual or team event, recognizes participants who use Family and Consumer Sciences skills to demonstrate the application of mathematical concepts in the culinary arts industry. * Hospitality, Tourism and Recreation An individual or team event, recognizes participants who demonstrate their knowledge of the hospitality, tourism, and recreation industries and ability to translate their knowledge into a hypothetical or real business. Project must relate to culinary, lodging, recreation, tourism, or event coordination.   **SkillsUSA**  <http://skillsusa.org/>   * Commercial Baking Contestants are challenged to meet production and quality standards expected by industry. The contest includes both a written examination and practical exercises. Contestants demonstrate their knowledge and skills through scaling, mixing, preparing and baking six products. The products include breads, rolls, Danish, cookies and pies. The student also must demonstrate their cake decorating skills. The contestant must work efficiently to produce quality products in a job-like setting. |
| **Service Learning Projects** | Successful service learning project ideas originate from student concerns and needs. Allow students to brainstorm about service projects pertaining to this lesson. [www.ysa.org](http://www.ysa.org)  Possible ideas: Students may prepare percentage activities that can be used in elementary to enhance the student’s math skills. |

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)