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| **TEXAS CTE LESSON PLAN**  [www.txcte.org](http://www.txcte.org) | |
| **Lesson Identification and TEKS Addressed** | |
| **Career Cluster** | Human Services |
| **Course Name** | Practicum in Human Services |
| **Lesson/Unit Title** | Mathematical Applications in Human Services |
| **TEKS Student Expectations** | **130.280. Knowledge and Skills.**  (4) The student uses business tools or procedures to create human services information and facilitate client interactions. The student is expected to:  (A) evaluate numerical information and perform complex calculations accurately; and  (B) use appropriate electronic resources to access current information. |
| **Basic Direct Teach Lesson**  (Includes Special Education Modifications/Accommodations and  one English Language Proficiency Standards (ELPS) Strategy) | |
| **Instructional Objectives** | **Students will:**   * Investigate mathematical applications in human services * Evaluate numerical information * Summarize the application of current technology to manage numerical information |
| **Rationale** | Mathematics is the language of science and engineering. We use it on a daily basis, from paying for a purchase to earning income at a workplace. In preparation for careers in the field of Human Services, this lesson will provide an excellent opportunity to better understand the use and application of mathematics in the workplace. |
| **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)* | The terms and definitions to be used with this lesson will be generated by the students. Terms that may be addressed include:  **Calculations:**  **Budgetary:**  **Electronic resources:**  **Numeracy:**  **Probability:**  **Solution:**  **Technology:** |
| **Materials/Specialized Equipment Needed** | **Equipment:**   * Computer with projector for PowerPoint presentation * Computers with internet access (be sure to follow district guidelines)   **Materials:**   * Cardstock * Container   **Supplies:**   * Adding machine * Calculator * Calculator rolls * Cash register * Budget planner software * Business finance software * Play money (may be purchased at a dollar store)   **Other appropriate lessons**   * Show me the money! Budgeting and forecasting revenues hotel management * Managing your paycheck practicum in culinary arts * Measurements matter! Food science * Copies of handouts   **PowerPoint:**   * Mathematical Applications in Human Services   **Technology:**   * Free iPad App:   + SAPCRM Sales V2.1 The mobile app for iPhone and iPad equips sales professionals with the tools needed to increase revenue, accelerate buying decisions and maximize productivity.<https://itunes.apple.com/us/app/sap-crm-sales-v2.1/id572519422?mt=8> * TedxTalk:   + How algorithms shape our world – Kevin Slavin Kevin Slavin argues that we’re living in a world designed for — and increasingly controlled by — algorithms. In this riveting talk from TEDGlobal, he shows how these complex computer programs determine espionage tactics, stock prices, movie scripts, and architecture. Slavin also warns that we are writing code we can’t understand with implications we can’t control. [http://ed.ted.com/lessons/kevin-slavin-how-algorithms-shape-our-world](http://texasfccla.org)   **YouTube:**   * We Use Math – Introduction Meet professionals from a number of exciting fields who use mathematics in their jobs every day.<https://youtu.be/aYIv4jggQJc>   **Graphic Organizer:**   * I Want to Know – Note-taking   **Handouts:**   * Anticipation Guide – Mathematical Applications in Human Services * Anticipation Guide (Key) – Mathematical Applications in Human Services * Career and Mathematical Application Investigation Project * Example of Wordle * Human Services Career Cards * Rubric for Oral Presentation |
| **Anticipatory Set**  (May include pre-assessment for prior knowledge) | Prior to class:  Display as many of the lesson-related supplies (see Materials or Specialized Equipment Needed) that you have available on a table. Terms related to the lesson can also be part of the display.  Script:  Look at the items on the table. How would you use the items for mathematical applications in Human Services?  Allow time for class discussion.   * Distribute the Anticipation Guide – Mathematical Applications in Human Services handout prior to viewing the PowerPoint. Prior to the start of this lesson, the students will read each statement and place a check mark by each statement they THINK is true. After they have answered each statement, students are to put the handout away for later use during Lesson Closure. |
| **Direct Instruction \*** | Note to teacher: Prior to beginning this lesson, please review, preview, and select the appropriate multimedia for your classes.  Introduce lesson objectives, terms, and definitions.  Distribute the I Want to Know – Note-taking handout. Teacher will determine the notes to be recorded by students. Inform students that they will be expected to take notes and participate in discussions while viewing the slide presentation.  NOTE TO TEACHER: The purpose of this lesson is to provide students with a model for investigating mathematical applications in the field of Human Services. The sole purpose of the slide presentation is to assist them in developing the type of questions they would like answered. Learning will be completely student led.  Introduce slide presentation Mathematical Applications in Human Services and lead brainstorming as slides are viewed. Presentation Notes for Mathematical Applications in Human Services have been provided to assist with dialog during the presentation. Allow time for student questions and discussion.  Video included in the slide presentation:   * We Use Math – Introduction Meet professionals from a number of exciting fields who use mathematics in their jobs every day.<https://youtu.be/aYIv4jggQJc>   *Individual Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but not limited to:*   * checking for understanding * providing assistance with note-taking * providing a peer to read materials * providing a copy of slide presentation with highlighted words and definitions |
| **Guided Practice \*** | Prior to activity:  Note to teacher: Print the teacher resource, Human Services Career Cards on card stock and cut apart so that one student from each group draws a card for the project. Place cards in a container.  After viewing slide presentation, divide the class into subgroups of three or four.  Using the teacher resource, Human Services Career Cards, have one student from each group draw a card from a container. The selected card will determine the career the students will focus on during the project. Blank cards are available for other careers.  Scenario: During a field trip, you and your classmates attend a community job fair event. Many Human Services-related occupational careers are represented at the job fair. Upon returning to the classroom, your teacher assigns a group project to determine mathematical applications in Human Services.  Distribute the handout Career and Mathematical Application Investigation Project. As a group, students will create and present a 5 to 7-minute oral presentation to the class, using at least one prop. The presentation must include information about why and how mathematics is used and applied within the career they selected. The conclusion will include a demonstration of at least one way in which mathematics is used in their Human Services career.  Distribute and review Rubric for Oral Presentation prior to the start of the assignment so that students are aware of assessment procedures.  Keep students focused and on task. Provide assistance if needed.  Based on student findings, as a class, determine terms and definitions for lesson word wall. A word cloud program such as one below may be created with the selected terms and definitions. View the teacher resource Example of Wordle for ideas.   * Wordle  Generates word clouds<http://www.wordle.net/>   *Individual Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but not limited to:*   * checking for understanding * providing a peer to read materials * providing oral responses |
| **Independent Practice/Laboratory Experience/Differentiated Activities \*** | Students will continue working on project introduced in Guided Practice.  Monitor and guide students as they work independently researching and collecting information for their projects. Student presentations will occur when projects have been completed.  *Individual Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but not limited to:*   * checking for understanding * shortened, simplified instructions * providing oral responses |
| **Lesson Closure** | Review objectives, terms, and definitions.  Re-distribute the graphic organizer Anticipation Guide for Mathematical Applications in Human Services used in the Anticipatory Set and allow students to revisit each statement. Students are to respond to the statements again in the after (right hand) column by placing a check mark by the statements they now know to be true on the right-side column. (Key) Anticipation Guide for Mathematical Applications in Human Services has been provided for your use. As a class, compare the two sets of answers.   * Allow for questions and class discussion. * Check for understanding. |
| **Summative/End of Lesson Assessment \*** | Projects will be assessed the appropriate rubric.  *Individual Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but not limited to:*   * checking for understanding * shortened assignment * providing extra time * providing oral responses |
| **References/Resources/**  **Teacher Preparation** | **Images:**   * Photos obtained through a license with Shutterstock.com®.   **Websites:**   * Barrett Rose and Lee, Inc. The Essential Skill of Numeracy<http://www.barrettrose.com/the-essential-skill-of-numeracy/> * Mathematical Association of America Research Sampler 6: Examining how mathematics is used in the workplace<http://www.maa.org/programs/faculty-and-departments/curriculum-department-guidelines-recommendations/teaching-and-learning/examining-how-mathematics-is-used-in-the-workplace> * Math for Careers  How you use Math at work.<http://www.khake.com/page56.html> * Why Must I Learn Math? Mathematics is no longer just a subject taken by the elite. Now it has rightfully become a staple in our educational systems even though it is not appreciated by many people until it is needed.<http://www.mathguide.com/issues/whymath.html#8>   **YouTube:**   * We Use Math – Introduction Meet professionals from a number of exciting fields who use mathematics in their jobs every day.<https://youtu.be/aYIv4jggQJc> |
| **Additional Required Components** | |
| **English Language Proficiency Standards (ELPS) Strategies** | * Word wall * Draw visual representation of term on word wall * Add terms and definitions to personal dictionary * Check for understanding * Students repeat instructions |
| **College and Career Readiness Connection[[1]](#footnote-1)** |  |
| **Recommended Strategies** | |
| **Reading Strategies** | Current Events Assign students to read about the importance of mathematical applications at the workplace. Information can be found in newspaper articles, magazines, journals, and online print. Suggestions:   * Centers for Disease Control and Prevention Understanding Literacy and Numeracy<http://www.cdc.gov/healthliteracy/learn/understandingliteracy.html> * Literacy, Numeracy, and Problem Solving in Technology Rich Environments Among U.S. Adults: Results from the Program for the International Assessment of Adult Competencies 2012<http://nces.ed.gov/pubs2014/2014008.pdf> * Survey of Adult Skills in the United States<http://www.oecd.org/site/piaac/Country%20note%20-%20United%20States.pdf>   **Reading Strategies**   * Allow students to utilize Word Attack Strategies with this or any other topic related article. * Prior to reading, allow students to skim the passage or text, circling words that are unfamiliar to them. Once these words are decoded (glossary, dictionary, dictionary.com, classroom discussion), students will have a better understanding of the pronunciation and meaning of the unfamiliar word(s), facilitating comprehension. |
| **Quotes** | Without mathematics, there’s nothing you can do. Everything around you are mathematics. Everything around you are numbers. **-Shakuntala Devi**  Mathematics is the most beautiful and most powerful creation of the human spirit. **-Stefan Banach**  Mathematics as an expression of the human mind reflects the active will, the contemplative reason, and the desire for aesthetic perfection. Its basic elements are logic and intuition, analysis and construction, generality, and individuality. **-Richard Courant**  For the things of this world cannot be made known without a knowledge of mathematics. **-Roger Bacon** |
| **Writing Strategies**  **Journal Entries + 1 Additional Writing Strategy** | **Journal Entries:**   * Mathematical applications in the field of Human Services can include … * Mathematics at the workplace is … * I can improve my math skills by …   **Writing Strategy:**   * RAFT (Role/Audience/Format/Topic) writing strategy:   + Role: Business owner   + Audience: Employee   + Format: Memo   + Topic: Application of mathematical skills at the workplace |
| **Communication**  **90 Second Speech Topics** | * Mathematical applications in the field of Consumer Services can include … * Mathematical applications in the field of Early Childhood Development and Services can include … * Mathematical applications in the field of Counseling and Mental Health Services can include … * Mathematical applications in the field of Family and Community Services can include … * Mathematical applications in the field of Personal Care Services can include … |
| **Other Essential Lesson Components** | |
| **Enrichment Activity**  (e.g., homework assignment) | * Visit the human resources department in a human services company and go through a short training program conducted for employees regarding business tools used on the job. * Read the article on ecommerce trends and write down predictions for the next year. What facts can you base the predictions on? Have students write a one-page paper on how ecommerce is used in the area of Human Services they are focused on. [http://mashable.com/2012/07/10/ecommerce-trends/](http://www.oecd.org/site/piaac/Country%20note%20-%20United%20States.pdf)   **Human Services – Practicum in Human Services Multiple Choice Math Assessment Problem**  Question 1. Ryan and Sheila are preparing to get married. Sheila has a car payment of $297.00 per month, which is 9% of her monthly income. After they are married, Sheila knows that her car payment will only be 5% of their combined monthly income. How much money does Ryan make per month? a. $2,640.00 b. $3,300.00 c. $5,940.00 d. $8,600.00  Answer: A  **TED Talks:**  TEDx is a program of local, self-organized events that bring people together to share a TED-like experience. At a TEDx event, TEDTalks videos 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.   * How algorithms shape our world – Kevin Slavin Kevin Slavin argues that we’re living in a world designed for — and increasingly controlled by — algorithms. In this riveting talk from TEDGlobal, he shows how these complex computer programs determine espionage tactics, stock prices, movie scripts, and architecture. Slavin also warns that we are writing code we can’t understand with implications we can’t control.<http://ed.ted.com/lessons/kevin-slavin-how-algorithms-shape-our-world> |
| **Family/Community Connection** | * Visit the human resources department in a human services company and go through a short training program conducted for employees regarding business tools used on the job. * Interview a manager in a government, medical, retail, or personal service business to find out how the Internet, e-commerce, video or teleconferencing and the computers are used in the business to assist customers or patients. What are the benefits, pitfalls of the Internet? Does this speed up service or care? Write a report and share it with class. |
| **CTSO connection(s)** | **Family, Career, and Community Leaders of America (FCCLA)**  [http://texasfccla.org](http://cte.sfasu.edu/wp-content/uploads/2015/04/Mathematical-Applications-in-Human-Services-PPT.pdf)  **Skill Demonstration Event** Consumer Math Challenge, an individual event, is an applied academic math test which allows participants to complete everyday consumer challenges related to Family and Consumer Sciences subject matter, including personal finance and consumer education concepts.  **STAR Events** 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. Prior to competition, participants must prepare a folder, oral presentation, and visuals. On site, participants take an applied math test and respond to a case study. |
| **Service Learning Projects** | Successful service learning project ideas originate from student concerns and needs. Allow students to brainstorm about service projects pertaining to lesson. For additional information on service learning see: <http://www.nylc.org/>   * Possible Idea: Create a brochure or poster with the information you obtained on mathematical applications in Human Services. Present and share the information to a Math class at the high school or middle school. |

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)