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| **TEXAS CTE LESSON PLAN**  [www.txcte.org](http://www.txcte.org) | |
| **Lesson Identification and TEKS Addressed** | |
| **Career Cluster** | Transportation, Distribution & Logistics |
| **Course Name** | Distribution and Logistics |
| **Lesson/Unit Title** | Introduction to GPS GIS |
| **TEKS Student Expectations** | **130.462. (c) Knowledge and Skills**  (5) The student demonstrates appropriate personal and  communication skills. The student is expected to:  (E) comprehend technical reading materials common to the  distribution and logistics industries  (8) The student uses information technology tools to access,  manage, and create information. The student is expected to:  (D) use and explain the benefits of Geographic Information  Systems (GIS) and Global Positioning Systems (GPS)  hardware and applications |
| **Basic Direct Teach Lesson**  (Includes Special Education Modifications/Accommodations and  one English Language Proficiency Standards (ELPS) Strategy) | |
| **Instructional Objectives** | **Students will…**   * Explain the difference between GPS and GIS. * Calculate different points using trilateration. * Effectively use a GPS device. * Effectively use GIS. |
| **Rationale** | In this lesson, students will identify and describe the uses and applications of GPS and GIS in TDL. |
| **Duration of Lesson** | 4 – 5 45-minute class periods |
| **Word Wall/Key Vocabulary**  *(ELPS c1a, c, f; c2b; c3a, b, d; c4c; c5b) PDAS II (5)* | * **Almanac:** An annual calendar containing important dates and statistical information such as astronomical data and tide tables. * **GIS:** Geographic information system, a system for storing and manipulating geographical information on computer. * **GPS:** Global Positioning System is a constellation of 27 Earth-orbiting satellites. * **Pseudo-Random Code:** The identifying signature signal transmitted by each GPS satellite and mirrored by the GPS receiver to separate and retrieve the signal from background noise. * **Radio Waves:** An electromagnetic wave of a frequency between about 104 and 1011 or 1012 Hz, as used for long-distance communication. * **Trilateration:** a method for determining the intersections of three sphere surfaces given the centers and radii of the three spheres |
| **Materials/Specialized Equipment Needed** | Worksheets and documents available at link below:  <http://www.transportationcareers.org/?page_id=481>   * RAP Sheet for How GPS Receivers Work document * How GPS Receivers Work document * GPS Trilateration Activity document * Map of US document * GIS.com Worksheet document * Grading rubric for Introduction to GIS / GPS |
| **Anticipatory Set**  (May include pre-assessment for prior knowledge) | Pose the following questions:   * What is GPS? * What are some uses of GPS? * What is Trilateration, and how is it used in GPS calculations? * How can GIS be applied around us? |
| **Direct Instruction \*** | Go over the Reading Assignment Planning (RAP) sheet entitled "RAP Sheet for How GPS Receivers Work" with the students. Note the different terms and any words they may not be familiar with. Give time to read the "How GPS Receivers Work" document. Students may want to take notes from the reading. Ask students to define the following terms from the reading:   * Radio Signals * Pseudo-Random Code * Constellation * Atomic Clock * Quartz Clock * Proportionally   Show the YouTube video: Case of the Technical Knockout - How GPS Work. It can be found at <http://www.youtube.com/watch?v=3zRlbboMvb0>  Hand out "GPS Trilateration Activity" and the "Map of the US" documents. Students will then use a compass, ruler, and the documents provided to find the locations using 2-D trilateration techniques described in the reading and video.  Once finished, Hand out the "GIS.com Worksheet." The students will use an internet enabled computer and the www.gis.com website to answer the questions.  Optional: If you have access to a couple GPS devices, have the students participate in a Geocaching activity. You will have to go out to hide different items and record their locations before sending the students out to find them. For more information on geocaching, use <http://www.geocaching.com/guide>  as a guide. This optional activity is dependent on the availability of GPS devices. Some planning and preparation time is necessary for this activity.  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  NONE |
| **Guided Practice \*** | **Students will…**   * Work together in teams/groups to explain the following:   + What GPS is.   + Some uses of GPS.   + What Trilateration is and how it is used in GPS calculations.   *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  NONE |
| **Independent Practice/Laboratory Experience/Differentiated Activities \*** | **Students will…**   * Journal and reflect on what they learned throughout this unit. Students’ journaling will describe how GPS and GIS can be used in different Transportation, Distribution, and Logistics career fields.   *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  NONE |
| **Lesson Closure** | **Students will…**   * Participate in a class discussion/review of GPS uses in different Transportation, Distribution, and Logistics career fields.   *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  NONE |
| **Summative/End of Lesson Assessment \*** | **Students will…**   * Use the Scoring Guide/Rubric to self-evaluate performance.   Please note: This lesson can be adjusted by the teacher as to length or depth of content. The Scoring Guide/Rubric can be used by both students and teachers to score student performance. The rubric may be adapted for content and teacher preferences.  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  NONE |
| **References/Resources/**  **Teacher Preparation** | * <http://howstuffworks.com> * <http://www.esri.com/what-is-gis> |
| **Additional Required Components** | |
| **English Language Proficiency Standards (ELPS) Strategies** |  |
| **College and Career Readiness Connection[[1]](#footnote-1)** | ELA II B  Mathematics X B 3  Social Studies I A 1, 1 F 1 |
| **Recommended Strategies** | |
| **Reading Strategies** |  |
| **Quotes** |  |
| **Multimedia/Visual Strategy**  **Presentation Slides + One Additional Technology Connection** |  |
| **Graphic Organizers/Handout** |  |
| **Writing Strategies**  **Journal Entries + 1 Additional Writing Strategy** |  |
| **Communication**  **90 Second Speech Topics** |  |
| **Other Essential Lesson Components** | |
| **Enrichment Activity**  (e.g., homework assignment) |  |
| **Family/Community Connection** |  |
| **CTSO connection(s)** | DECA, SkillsUSATexas |
| **Service Learning Projects** |  |
| **Lesson Notes** |  |

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)