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| Woodland S.T.E.A.M. Lesson Plan Template | |
| Grade Level: 4th | Time Frame: |
| Focus Standards  Math: MCC4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.  MCC4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. (Abbreviated)  MCC4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, & problems that require expressing measurements...  MCC4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.  Science: S4P3.a. Identify simple machines and explain their uses (lever, pulley, wedge, inclined plane, screw, wheel and axle).  S4P3.b. Using different size objects, observe how force affects speed and motion.  S4P3.c. Explain what happens to the speed or direction of an object when a greater force than the initial one is applied.  S4P3.d. Demonstrate the effect of gravitational force on the motion of an object.  ELA - Reading: ELACC4L3: Use knowledge of language and its conventions when writing, speaking, reading, or listening.  ELAGSE4RI3: Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.  ELAGSE4RI4: Determine the meaning of general academic language and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.  ELAGSE4RI7: Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.  ELAGSE4RI8: Explain how an author uses reasons and evidence to support particular points in a text.  ELAGSE4RI9: Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.  ELA – Writing:  ELAGSE4W2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly  ELAGSE4W2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.  ELAGSE4W1: Write opinion pieces on topics or texts, supporting a point of view with reasons  ELAGSE4W1b. Provide reasons that are supported by facts and details.  ELAGSE4W3: Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.  Social Studies: SS4G1b. Locate major man-made features; include New York City, NY; Boston, MA; Philadelphia, PA; and the Erie Canal.  SS4E1a. Describe opportunity costs and their relationship to decision-making across time (such as decisions to send expeditions to North and South America).  SS4E2 The student will identify the elements of a personal budget and explain why personal spending and saving decisions are important.  Art:  VA4MC.2a Uses a sketchbook for planning and self-reflection.  VA4MC.2c. Self-monitors by asking questions before, during and after art productions to reflect upon and guide the artistic process.  VA4PR.1.b. Makes design decisions as the result of conscious, thoughtful planning and choices. | |
| Learning Target  Students will understand the concepts of friction, force, motion and simple machines. Students will apply learned concepts to the final project/product (putt –putt course). | Key Vocabulary Terms  force, pull, motion, gravity, speed, position, direction, pull, mass, simple machines, lever, pulley, inclined plane, wheel and axle, wedge, screw, acceleration, friction |
| Technology Needed   * Interactive board * iPads * Excel * Desktops/Laptops | Supplies Needed   * Ron’s Ramp * Forces and Motions Activity Tub * Simple Machines Activity Tub * Graph Paper * Golf Putters * Hazards (water, sand, tile and turf) * “Science Studies Weekly: Exploration – Physical Science” * Classroom readers: “Simple Machines: Simple and Compound” and “Force and Motion” * straws |
| Teaching the Target  Introducing the Problem/Challenge:  Driving Question: How can we as engineers, scientists, mathematicians, techies and artists design and build a mobile putt -putt course to explore gravity, force, motion and simple machines?   |  |  | | --- | --- | | Criteria | Constraints | | To Design a putt –putt golf course that has an area greater than 15 square feet but less than 33 square feet, regulation cup size (108mm (4.25 inches and a depth of at least 100mm (3.94 inches)), three force and motions hazards that the average person can play. | Your budget must not exceed $50.00 |   Day 1:   * Introduce the driving question * PPT with golf course images * Students will imagine and sketch in science journals their ideal golf course with an unlimited budget.   Day 2 – 7 \*Use Rubric daily through stations.   * Review the driving question. * Break into Stations   + Station (Independent Reading): Students will read weekly newspapers on simple machines and use note-taking strategies learned in humanities class. Students will reflect on how knowledge gained will assist their golf course design.   + Station 2 (Independent Reading): Students will read nonfiction texts to understand what simple machines are and how they work. Students will use notetaking strategies learned from humanities classes to write an informational piece on what simple machines are and how they work and how this information is useful in   + Station 3( Engineering): SW complete the engineering design template and consider possible constraints. Students will also use this time to revise their original design based on where they are with their current research.   + Station 4 (BrainPop): Students will use technology to research information on simple machines in order to address the essential question of what are simple machines and how do they work. This research serves as a small cog in the overarching big idea question of designing and building a golf course in order to explore force and motion.   + Station 5(Ron's Ramp): SW use this task to use their understanding of measurement and decimal fractions to gain precise measurements in metric units. They will explore incline and friction in this station to assist them in their golf course design.   + Station 6 (writing): How were math and science integrated in station 5? What connections did they see to other units in math and science? How does the integration of math and science assist them in their golf course design. (Early finishers will get the k'nex cogs to explore simple machines to consider including a variety of simple machines in their design.)   + Station 7 (K’nex): Students will apply knowledge of simple machines and explore simple machines further by using K’nex to create a variety of simple machines. Students will apply note-taking strategies learned from reading teachers in order to take notes in their journal for research.   \*Students will redesign for the last 10 minutes of stations based on new acquired knowledge. Students will use pencil (1st day) for initial design and a different colored pencil for each redesign. Students will make a key to show each design color. Students will adjust dream/ basic designs based on research gained from research.  Day 8: Writing/ Science Students will apply knowledge gained from research to write an informational writing piece on simple machines. Students will target the big ideas of identifying simple machines, explain how they are used in real life and how this knowledge will help them design and build a golf course.  Science – Students will go on a gallery walk and observe each other’s drawings. Students will compare and contrast others’ designs to their own to find like-minded designs. Students will form groups of 3-5 with like-minded people. Once groups have formed, they will brainstorm possible strategies by combining ideas from each person’s designs.  Station 1 (Perimeter/ Area): Students will use square tiles to brainstorm possible designs that fit within the constraints of the area. Once a possible layout has been created, students will record layouts onto grid paper and calculate area (should already know because they used square tiles) and perimeter. Students should create several possible strategies (2-3).  Station 1 (Perimeter/ Area to scale): Students will take scaled perimeter/ area layouts and then test them out with painter’s tape to test out validity of the course design. Students will then mark where they would like their “hazards” to belong and create a final scaled design of their golf course.  Station 2 (Angle measurement): students will use a putter to hit a ball and then measure the angle to determine where additional barriers will exist. Students will collect data and do several runs in order to get a mean degree.  Station 3(weekly readers):  Station 4 (Graphing Data Collection): Students will use online graphing tool to plot data points to analyze and then improve structure.  Station 5 (Research) – Students will interview a golf expert as part of their research. 6  Station 6 (Elapsed time): students will play on a mock course to determine a schedule for students to take turns playing. Students will use a clock to measure elapsed time of how long it takes a student to play on one course. Students will track data and use excel in order to calculate the mean and median.  Station 7 (Journal): What connections can you make with geometry (shapes and angles) to designing and building a golf course.  Station 8 (Angle and measuring): AT which angle will the ball travel up the ramp?  Station 9 (building): Students will take their designs and start constructing a golf course   * + Hazards (water, sand, tile and turf) \*State what you are doing in each station     - Water     - Sand     - Turf * Share designs * Introduce budget   + Show materials   + Share template   Humanities – Research Workshops  Station 1 – Students will use link or QR code to log into BlendSpace. Students will follow directions on graphic organizer to complete tasks and record findings.  Station 2 – Students will read “Science Studies Weekly: Physical Science – Exploration” and select a constructed response question to answer. Early finishers will work on Simple Machines Mini Lab activity in SSW.  Station 3 – Students will read “Simple Machines: Simple and Compound.” Next, students will explore the room to search for examples of simple machines with their golf groups. Graphic organizers will be provided for students to record findings. Group members will discuss and record evidence to prove how they know that the objects are the simple machines they have identified them as.  Station 4– Students will use Simple Machines bulletin board to review types and examples of simple machines. Golf groups will select at least one simple machine to add to their course design. Golf groups will add sketch to blueprint.  Station 5 – Students will read Lesson 3 in “Forces and Motion.” Complete writing prompt. Early finishers may share stories with group members. | |
| Assessment: PBL rubric/ students will first self-assess | |
| Career Connection: | |