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| **Class:** Agricultural Mechanics | **Date:**   |
| **Unit:** SAE Safety | **Lesson Title:** ATV/UTV Obstacle Course Design  |
| **Content Standard Alignment:*** **CS.03.04.01.b.** Analyse and demonstrate adherence to protective equipment requirements when using various AFNR tools and equipment.
* **C3.06.04.02.c.** Evaluate and select appropriate tools and equipment to complete AFNR tasks.
* **PST.01.02.02.c.** Devise and document processes to safely implement and evaluate the safe use of AFNR related tools, machinery and equipment.
* **PST.01.02.03.b.** Select, maintain and demonstrate the proper use of tools, machines and equipment used in different AFNR related mechanical systems.
* **PST.02.02.02.b.** Apply safety principles and applicable regulations to operate equipment, machinery and power units used in AFNR power, structural and technical systems.
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| **Lesson Objectives/Instructional Outcomes:** 1. **Given adequate instruction and resources, students will construct a mini obstacle course to simulate safe operating procedures and working limits of ATVs/UTVs.**
2. **Students will demonstrate safe power tool/equipment use.**
3. **Students will further develop an understanding of centre of gravity and stability for** ATVs/UTVs**.**
4. **Students will be able to apply lesson to their SAE’s and work to enhance safety procedures and reduce injury.**
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| **Relationship to Unit Structure:** Connect the previous lessons of building a mini tilt-table and the angles, stability and centre of gravity demonstrations. Also reiterate the relationship of these lessons to safety in the workplace, farm or SAE project. |
| **Instructional Materials/Resources:** Note – some of these are optional and will vary depending upon available resources.* Mini-tilt table
* PPE for tools/equipment
* Model ATV/UTV
* Natural Obstacles: Small twigs, Rock/Gravel/Sand,
* Construction Material: Oriented Strand Board, Scrap dimensional Lumber,
* Assorted Fasteners: Twine, Hinges, Screws
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| **Methods and Instructional Strategies** |
| **Anticipated Student Misconceptions:** ATVs/UTVs can operate on any kind of terrain/slope safely.  |
| **Concept Prerequisites:** 1. Basic construction design skills.
2. General understanding of weight distribution and centre of gravity.
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| **Introduction-****Anticipatory Set:** | Pose the following question to students and allow them 2-3 minutes to compose a written answer:What makes a good obstacle course?  |
| **Instructional Activities:**Includes questioning techniques, grouping strategies, and pedagogical approaches. | Students will work in randomly assigned groups of 4-5 to complete the activity. Before they break off into groups, demonstrate a control test of the tilt table and have students record results. Split into groups after this. Using the accompanying worksheet, ATV/UTV Mini Obstacle Course Design Challenge, groups of students will work together to create three adjustable obstacles that simulate a lateral tilt (cross slope), longitudinal tilt (hill climb), and freeform tilt (student design). Allow them free reign to use whatever materials are available to construct their obstacles. Obstacles must remain true to the relative scale of the ATV/UTV models.  |
| **Wrap Up-****Synthesis/Closure:** | Use the last 5-7 minutes of the class to discuss what students discovered about stability and centres of gravity in ATVs/UTVs. Some questions to ask: (1) What was the most challenging obstacle and why, (2) If possible, how could the operator in the scenario use his/her weight to alter the centre of gravity to overcome the obstacle? Have students share any interesting results they found. Finally, if time, relate back to SAE and farm safety and ask for examples of how they can implement what they learned into their SAE and work. |
| **Differentiation According to Student Needs:**Encourage students to create their own obstacle course designs that align with the activity workshop.  |
| **Assessment (Formative and Summative):** Once groups have completed their designs (modify to only two designs if constrained by time), they will switch with another group and attempt to complete their obstacle course. After attempting another group’s course, the original group will provide a verbal critique of the design and vice versa. Each group will then provide a justification of their design. Each group should discuss tilt angles, levels of difficulty, and operator corrections.  |

**ATV/UTV Mini Obstacle Course Design Challenge**

**Purpose:** Construct a mini obstacle course to simulate safe operating procedures and working limits of ATVs/UTVs.

**Materials: S**ome of these are optional and will vary depending upon available resources.

* + - Mini-tilt table
		- PPE for tools/equipment
		- Model ATV/UTV
		- Natural Obstacles: Small twigs, Rock/Gravel/Sand,
		- Construction Material: Oriented Strand Board, Scrap dimensional Lumber,
		- Assorted Fasteners: Twine, Hinges, Screws

**Directions:** In groups of 4-5, work together to conceptualize, draw, and create three adjustable obstacles that simulate a lateral tilt (cross slope), longitudinal tilt (hill climb), and freeform tilt (student design). Your group has free reign to use whatever compostable materials are available to construct your obstacles (i.e. – wood working scrap). Obstacles must remain true to the relative scale of the ATV/UTV models. Using the following prompts to help guide your group through this process.

**Background:** Answer the following questions before proceeding to the obstacle design partition of this assignment.

1. What is the scale of the ATV/UTV you will be using?
2. What does this mean?
3. Using the identified scale, indicate the following dimensions (be sure to include units) of a full-scale model of your ATV/UTV:
	1. Width (outside of tires):
	2. Length (from front to back):
	3. Height (from ground to highest point):

**Obstacle #1:** Obstacle one is to simulate a lateral tilt (cross slope). Use the following space to create a rough drawing of your obstacle. Your drawing must include actual dimensions. Your obstacle needs to be adjustable. Use hinges and twine where needed.

**Obstacle #2:** Obstacle two is to simulate a longitudinal tilt (hill climb). Use the following space to create a rough drawing of your obstacle. Your drawing must include actual dimensions. Your obstacle needs to be adjustable. Use hinges and twine where needed.

**Obstacle #3:** Your group is free to design whatever obstacle desired for obstacle three. Use the following space to create a rough drawing of your obstacle. Your drawing must include actual dimensions. Your obstacle **does not need** to be adjustable for obstacle three.

**Reflection:** On your own, answer the following questions regarding the activity:

1. What was the most challenging aspect of constructing these obstacles?
2. Which obstacle proved the most challenging for the ATV/UTV to overcome and why?
3. What was the most impactful thing you learned from this activity?

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| **ATV/UTV Mini Obstacle Course Design Challenge****Grading Rubric**  |
|  | Unacceptable (0 – 10) | Acceptable(11-20 | Exceptional (21-25) | Score(Out of 25) |
| Teamwork | Group did not work well as a team.\_\_\_\_\_\_ Points | Group performed at a basic, yet acceptable level. Involved each individual.\_\_\_\_\_\_ Points | Group worked exceptionally well as a team. Each individual contributed key components.\_\_\_\_\_\_ Points |  |
| Functionality  | Project did not meet the basic functionality requirements as specified in directions. \_\_\_\_\_\_ Points | Project met the basic functionality requirements as specified in directions. \_\_\_\_\_\_ Points | Project exceeded the basic functionality requirements as specified in directions. \_\_\_\_\_\_ Points |  |
| Creativity | Project met the basic project requirements but did not introduce any creative aspects.\_\_\_\_\_\_ Points | Project incorporated some creative aspects that added to difficulty.\_\_\_\_\_\_ Points | Project incorporated numerous creative aspects that added to difficulty.\_\_\_\_\_\_ Points |  |
| Overall Quality | Overall quality of project design and functionality did not meet basic requirements. \_\_\_\_\_\_ Points | Overall quality of project design and functionality met basic requirements. \_\_\_\_\_\_ Points | Overall quality of project design and functionality exceeded basic requirements. \_\_\_\_\_\_ Points |  |
| Total |  |