CASSVILLE R-IV SCHOOL DISTRICT
CURRICULUM IMPLEMENTATION GUIDE

EVALUATION PROFILE
UNIT PLAN OVERVIEW

Unit: 3. Motion and Design

Learner Objectives

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Properties and Principles of Force and Motion;the motion of an item is described by its change in position relative to another object or point.

Lesson 1: Designing Vehicles; Getting Started
Students set up their science notebooks.
Students record and share their ideas and questions about motion and design.
Students design and build a vehicle to meet certain requirements.

Lesson 2: Using Drawings to Record and Build
Students make a record of the vehicles they built in Lesson1.
Students build a vehicle by following a two-view technical drawing.
Students identify details that are important in technical drawings and compare their own drawings with a technical drawing.
Students read to learn more about the challenges of technological design.

Lesson 3: Pulling a Vehicle; Looking at Force
Students set up a system to pull their vehicles.
Students compare and discuss how the motion of their vehicles changes when more or less weight on a string is used to pull them.
Students record their observations in writing.
Students draw conclusions about the effect of differently weighted strings on the motion of their string-pulled vehicles.

Lesson 4: Testing the Motion of Vehicles Carrying a Load
Students add blocks to their vehicles to investigate the effects of a load on motion.
Students measure the time it takes for a loaded vehicle to move a given distance.
Students discuss and graph their results and observations.

Lesson 5: Designing Vehicles to Meet Requirements
Students design vehicles and systems to pull the vehicles to meet time requirements.
Students use and apply previously collected data to design their systems.
Students read to learn more about a specialized vehicle, the Lunar Rover.

Lesson 6: Evaluating Vehicle Design; Looking at Rubber Band Energy
Students attempt to move their vehicles using rubber band energy.
Students evaluate the design of their standard-vehicles for rubber band energy.
Students discuss the results of their evaluations.

Lesson 7: Testing the Effects of Rubber Band Energy
Students predict and investigate how variations in rubber band energy affect the distance their vehicles travel.
Students record their results.
Students share results and identify patterns.
Students discuss the relationship between the number of turns of the rubber band around the axle and the distance their axle-driven vehicles travel.

Lesson 8: Evaluating Vehicle Design: Looking a Friction
Students brainstorm what they know and what they want to know about friction.
Students evaluate specific design features that reduce or increase friction on vehicles propelled by a rubber band.
Students share their observations of vehicle design features and the role of friction in vehicular motion.

Lesson 9: Designing and Building a Vehicle with a Sail
Students brainstorm how a sail might affect the motion of their axle-driven vehicles.
Students adapt their vehicles to hold a cardboard sail.
Students make initial observations about the influence of the sail on the vehicles' motion and discuss these observations.
Students reflect on their work by completing a self-assessment.

Lesson 10: Testing the Effects of Air Resistance on a Vehicle's Motion
Students test how air resistance influences a vehicle's motion.
Students discuss and compare results.
Students relate their observations to real-world objects designed to minimize air resistance.

Lesson 11: Building a Propeller-Driven Vehicle
Students brainstorm what they know about propeller-driven vehicles.
Students discuss design features they think are needed for propeller-driven vehicles.
Students build propeller-driven vehicles from a technical drawing.
Students discuss their initial observations.

Lesson 12: Analyzing the Motion and Design of a Propeller-Driven Vehicle
Students analyze the features of propeler-driven vehicles.

Students discuss the motion and design of their propeller-driven vehicles and compare these features with those of vehicles built previously.
Students propose design changes for their propeller-driven vehicles that will not affect performance.

Lesson 13: Looking at Cost
Students determine the cost of their propeller-driven vehicle.
Students modify their vehicles to reduce cost.
Students evaluate the strength and performance of their modified vehicles.
Students discuss trade-offs involving vehicle cost, performance, and appearance.

Lesson 14: Planning Our Final Design Challenge
Students review roles appropriate for working in cooperative teams.
Team members independently record and collectively brainstorm possible solutions to a challenge, then select one solution to carry out.
Teams present their plans to the class for feedback and refinement.
Through a reading selection, students learn more about engineering as an interest and career.

Lesson 15: Refining our Design
Students implement their plans from Lesson 14 by building, testing, and evaulating their vehicles and the systems for moving them.
Students determine the cost of their designs.

Lesson 16: Presenting Our Final Design Challenge
Teams present their solutions to a design challenge.
Students evaluate each team's solution for meeting the design requirements.
Students think about their own lives and how they can apply their knowledge of technological design to the world around them.
Students make a final record of their designs.

Presented to students on (date) _____ _____ _____ _____ _____