INVENT **STEM**

Provided by:
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Information	Program Description
4th-12th Grade	INVENT **STEM** engages students in the engineering design process to solve real-world problems. This program contains six learning modules that utilize the national 4-H curriculum, "The Power of the Wind." After working through the modules, teams of students are challenged to generate a possible solution to a real-world wind energy problem using the INVENT **STEM** process.
Curriculum Format	Each lesson can be presented in 45-60 minutes. Teaching Guide with complete instructions is provided. Teaching Kit with materials needed to present lessons is provided. User may need to provide standard classroom supplies (pencils, scissors, glue). If a lesson requires perishable items (e.g. milk), user is responsible for these purchases.

Lesson	Overview
One: How Can We Think Like an Engineer? How Can We Design a Wind Powered Boat?	Students learn the Engineering Design Process with examples that involve thinking about design issues related to familiar daily life situations. Students use the design process as they construct wind powered boats.
Two: How Do We Study the Wind? How Do We Observe and Measure the Wind?	Students explore, observe and record visible effects of wind and create a tetraflexagon to use for gauging the wind. This is a paper folding activity that introduces the Beaufort Wind Scale and requires students to illustrate the wind scale, read and follow a schematic diagram.
Three: How Can We Design a Better Pinwheel?	Students investigate how different pinwheel designs improve or worsen performance. Students design and construct different pinwheels to determine which type performs best.
Four: How Can We Build a Mini Wind Turbine?	Students design and build a mini turbine using the design process and their knowledge from their pinwheel designs in Module 3. After the turbines are built, students experiment with different blade shapes, materials and designs. Students explore the relationship between turbine solidity, speed of turning and the turning force (torque).

Lesson	Overview
Five: How Can We Use Wind Power to Produce Electricity?	Students use their previously built turbine to design and build a wind turbine that produces electricity using a small motor. Students become familiar with the concepts of RPM, torque, voltage, load, variables, pitch and hypothesis.
Six: How Can We Produce the Most Electricity?	Students learn about wake effect and are challenged to arrange a set of wind turbines to provide the greatest output and minimize the wake effect. This module uses the design challenge “Build a Better Wind Farm.”