



# A World In Motion<sup>®</sup>

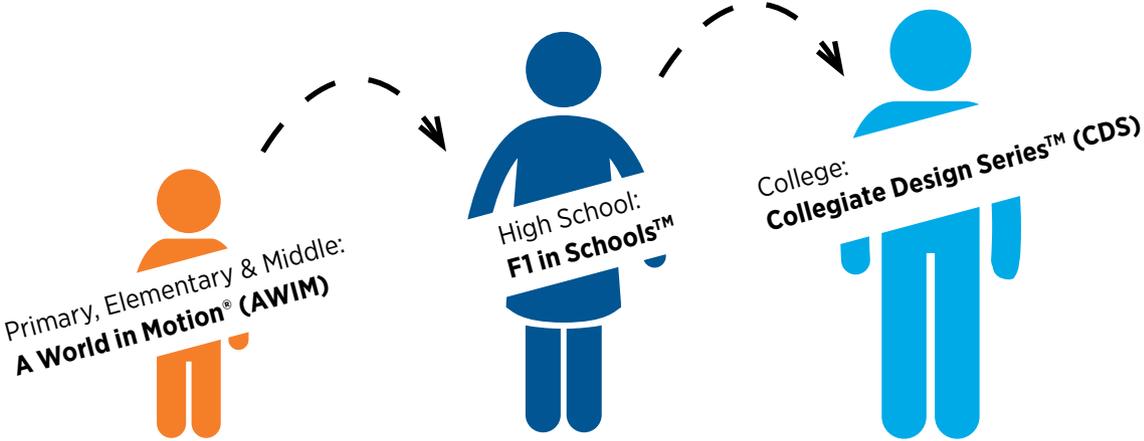
## Our K-8 STEM Education Solution

We're bringing science, technology, engineering and math (STEM) to life in the classroom.

[awim.org](http://awim.org)



# OUR TOTAL STEM SOLUTION





The SAE Foundation's mission is to fund, develop and deliver these educational programs that provide hands-on, project-based, collaborative learning experiences through integrated STEM Education.

## ABOUT A WORLD IN MOTION® (AWIM)

Since 1990, the AWIM program has expanded from a single collection of teacher lesson plans into a series of age-appropriate "Challenges:"

- Each Challenge incorporates a problem-solving process taught at many engineering schools across the country and utilized by engineering design teams working in the field
- The "Engineering Design Experience" provides a problem-solving context in which students design a product or devise a solution to a problem
- Students are grouped into Engineering Design Teams and presented with a marketing/production/design problem from a fictitious company
- Teams examine the goal, identify the intended product audience, establish what information to gather and synthesize and plan how to design, develop, test and present a prototype of their design solution

### A POSITIVE IMPACT ON STUDENTS AND TEACHERS

The SAE Foundation contracted the Goodman Research Group, Inc. to conduct an independent five year longitudinal study that measured the effects on students' science and mathematics literacy through AWIM. Findings include:

- Participation in just one AWIM Challenge is enough to start students on a path of knowledge and interest in engineering
- Both teachers' repeated use and increased familiarity with the program plus the presence of a volunteer adds to the value of the AWIM program experience
- The AWIM curriculum benefits every type of student learner—long term.

*Read the complete results at [awim.sae.org](http://awim.sae.org).*

# WHAT MAKES THE AWIM PROGRAM WORK?

## PEDAGOGICALLY SOUND

Students develop broad—and critical—skillsets: One of the most important is the ‘engineering design’ skillset, which includes setting goals, building knowledge, designing, building, and presenting the information.

**Plus:**

- **Critical Thinking**
- **Communication**
- **Project Management**
- **Inquiry and Analysis**
- **Teamwork and Collaboration**



## TEACHER DEVELOPMENT

We provide professional development and support to teachers in the classroom through AWIM program teacher training, which is proven to:

- Increase their comfort with physical science concepts
- Help those who are teaching subjects like science and math that are not within their certification or specialization
- Encourage them to develop their teaching practices and style to deliver integrated STEM education.

## VOLUNTEER PARTICIPATION

Industry volunteers provide students with first-hand impressions and information about careers in their chosen profession. They also serve as an in-classroom resource for teachers. To date, more than 30,000 engineers, scientists, and technology professionals have volunteered in partnership with the AWIM program.

### AWIM AWARDS AND ACCOLADES

- National Science Board (NSB) Public Service Award
- CMC Excellence in Engineering Education Collaboration Award
- National Society of Black Engineers (NSBE) Golden Torch Corporate/Education Partnership Award
- InnoVision Technology Community Service Award

Read more at [awim.sae.org/news](http://awim.sae.org/news).

# PRIMARY SCHOOL CHALLENGES

GRADES K-3

## NEW: MAKING MUSIC CHALLENGE

Students explore sound and vibrations, learn how the eardrum works, and explore the concepts of pitch, longitudinal, and transverse waves. They collect information and engineer a musical instrument according to specific criteria. The book component, *Sleep Soundly at Beaver's Inn*, brings the concepts to life for the students through a fictional story about animals and sounds within nature.

## ROLLING THINGS CHALLENGE

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## PINBALL DESIGNERS CHALLENGE

Students are introduced to the concept of improving a design through experimentation and data analysis by building a pinball game and the story of *Malarkey & the Big Trap*. They test the launch ramp to explore how launch position affects the behavior of the pinball, make their games more challenging by adding targets, walls, and bumpers. The challenge culminates as students present designs that are optimized to produce consistent results.

## ENGINEERING INSPIRED BY NATURE

Students investigate methods in which seeds are dispersed in nature through the story *Once Upon a Time in the Woods*. The story leads the students to further explore seeds dispersed by the wind. They use the designs of nature to develop paper helicopters and parachutes and perform variable testing to improve performance. The challenge concludes with students presenting designs to enter into a flight challenge.

## STRAW ROCKETS CHALLENGE

Students investigate Dr. Robert Goddard's early trials and tribulations to create the first liquid fueled rocket engine through the age-appropriate biography, *The Rocket Age Takes Off*. They begin to uncover the work necessary to optimize a design and use a design process to build and perform variable testing on straw rockets. The challenge culminates as students compete to see which design team has created the most accurate and long-flying rocket.



# ELEMENTARY SCHOOL CHALLENGES

GRADES 4-6



## SKIMMER CHALLENGE

Students construct paper sailboats to test the effects of different sail shapes, sizes and construction methods to build knowledge through collecting research data. Students then use data as they continue to explore the *Engineering Design Experience* to design and test models encountering the physical phenomena of friction, forces, and the effect of surface area along the way. The challenge culminates as engineering design teams design and build a Skimmer that meets specific design criteria and present their final designs.

## JETTOY CHALLENGE

Students build balloon-powered toy cars to test performance for distance traveled, weight carried, accurate performance and speed while building knowledge through collecting research data. Students then use data as they continue to explore the *Engineering Design Experience* to design and test physical models exploring jet propulsion, friction and air resistance along the way. The challenge culminates as engineering design teams design and build a JetToy car that meets specific design criteria and present their final designs.

## GRAVITY CRUISER CHALLENGE

Students construct Gravity Cruisers to test how wheel and axle diameter and the amount of lever-arm weight effects on speed and distance the vehicle travels as they build knowledge through collecting research data. Students then use data as they continue to explore the *Engineering Design Experience* to design and test physical models as they explore the rich levels critical thinking and using an experimental method to test hypotheses to solve an engineering problem. The challenge culminates as engineering design teams design and build a Gravity Cruiser that meets specific design criteria and present their final designs.

# MIDDLE SCHOOL CHALLENGES

GRADES 6-8

## GRAVITY CRUISER CHALLENGE

Students construct Gravity Cruisers to test how wheel and axle diameter and the amount of lever-arm weight effects on speed and distance the vehicle travels as they build knowledge through collecting research data.

Students then use data as they continue to explore the Engineering Design Experience to design and test physical models as they explore the rich levels critical thinking and using an experimental method to test hypotheses to solve an engineering problem. The challenge culminates as engineering design teams design and build a Gravity Cruiser that meets specific design criteria and present their final designs.

## MOTORIZED TOY CAR CHALLENGE

Students develop new designs for electric gear driven toys and test how gear ratios affect the speed and torque of a vehicle as they build knowledge through collecting research data.

Students use this data and survey data they collect through market research as they explore the Engineering Design Experience to design and test physical models based on customer needs. Students write proposals, draw sketches, and work with models to develop a design plan. The challenge culminates as engineering design teams design and build a Motorized Toy Car that meets specific design criteria and customer needs and present their final designs.



## GLIDER CHALLENGE

Students explore the relationship between force and motion and the effects of weight and lift on a glider as they build knowledge through collecting research data. Students use this data along with survey data they collect through market research as they explore the Engineering Design

Experience to design and test physical models based on design criteria and customer needs. Students write proposals, draw sketches and work with models to develop a design plan. Engineering design teams design and build a Glider that meet specific design criteria and customer needs and develop a class manuscript containing glider designs. The challenge culminates as the class holds a book-signing event where they present their final Glider designs.

## FUEL CELL CHALLENGE

Students construct a standard model Fuel Cell vehicle to test hydrogen production and energy consumption using a PEM (Proton Exchange Membrane) fuel cell as they build knowledge through collecting research data. Students then use data as they continue to explore the Engineering Design Experience to design and test physical models as they explore elements of electrical current, Green Design and the transformation of energy. The challenge culminates as engineering design teams design and build a Fuel Cell vehicle that meets specific design criteria and present their final designs.



# A World In Motion

## OUR K-8 STEM EDUCATION SOLUTION

- More than 72,000 curriculum/challenge kits have been provided
- Over 4.5 million students
- Over 30,000 volunteers
- Interdisciplinary in nature: built into all of the AWIM program activities, this type of learning helps students make meaningful connections among disciplines
- The AWIM staff has a combined total of more than 60 years of elementary and high school teaching experience, curriculum evaluation, and program creation and implementation
- All AWIM Program activities correlate with the Next Generation Science standards and the Common Core standards

We're working to solve the stem crisis and building the next generation of engineers and scientists.

Join us on this mission. Find out more today at:

[www.awim.org](http://www.awim.org); [awim@sae.org](mailto:awim@sae.org); 1-800-457-2946