Gains in the Education of Mathematics and Science (GEMS)

Aviation and Missile Research, Development, and Engineering Center (AMRDEC)

Highlights

Basic Eligibility Requirements

- U.S. Citizen
- Student in 8th to 12th Grades

Goal

To broaden students' interest in science, engineering, and mathematics

Length of Program

One week during the summer, typically in June or July

Curriculum

Designed to develop critical thought processes and to conduct experiments illustrating basic scientific principles

Leadership

- AMRDEC GEMS Program Administrator
- GEMS Certified Teacher
- Near-Peer Mentors (College Students)

Apply – where?

http://www.usaeop.com/programs/GEMS/

Apply – when?

Applications for the GEMS program at Redstone Arsenal are accepted beginning in January. Typically, the deadline for submitting an application is in April.

Teams develop Rube Goldberg machines

GEMS is part of the Army Educational Outreach Program (AEOP) which consists of Army-sponsored research, education, competitions, internships, and practical experiences designed to engage and guide students and teachers.

For more information regarding GEMS and other AEOP programs, including on-line applications and program deadlines, visit the website at www.usaeop.com/aeop.htm.

GEMS summer programs are conducted at Redstone Arsenal, Alabama, and within the Washington, D.C., area. For more information regarding the GEMS summer programs at Redstone Arsenal, contact Dr. Steven P. D. Smith at steven.smith1@us.army.mil.

Working as a team on the hovercraft

GEMS

Gains in the Education of Mathematics and Science

AMRDEC

STRENGTH THROUGH TECHNOLOGY

Aviation and Missile Research, Development, and Engineering Center (AMRDEC)

Redstone Arsenal, Alabama

Gains in the Education of Mathematics and Science (GEMS)

Aviation and Missile Research, Development, and Engineering Center (AMRDEC)

The Aviation and Missile Research, Development, and Engineering Center's (AMRDEC's) Gains in the Education of Mathematics and Science (GEMS) is a summer program for students in 8th to 12th grades who will spend one week, typically in June or July, developing critical thought processes and conducting experiments illustrating basic scientific principles. The goal of the GEMS program is to broaden the interest in science, engineering, and mathematics. GEMS is led by a certified high school teacher and three college students, who are referred to in the program as "Near-Peer Mentors."

Building a Rube Goldberg machine

Curricula may change from year-to-year due to the varying expertise and interests of the three college students (Near-Peer Mentors). In the past, there have been modules on robotics, rockets, optics, electronics, thermodynamics, and aerodynamics. An effort is made to balance the GEMS curricula between individual learning and team challenges.

Constructing a bridge to sustain a payload

After a student has completed an initial GEMS program, referred to as GEMS-1, a subsequent GEMS-2 program is available. GEMS-2 students explore science, engineering, and mathematics in greater depth and detail. GEMS participants have gone on to additional programs at Redstone Arsenal including the Science and Engineering Apprentice Program (SEAP), Student Temporary Employment Program (STEP), and co-op positions.

Riding a hovercraft built by Teams

In the past, GEMS-1 students at AMRDEC explored the principles of robotics and thermodynamics through experiments with robotics, rockets, steam engines, and non-Newtonian fluids. Electronic concepts were investigated via the development of solar- and hydrogen-powered cars, crystal radios, and "McGiver" household batteries. GEMS-1 students also delved into optics and acoustics by building telescopes, microscopes, spectrometers, and music boxes. In the past, GEMS-2 students researched aerodynamics and mechanics by building hovercrafts, wind tunnels, model airplanes, planetariums, and Rube Goldberg machines. GEMS-2 students also built trebuchets and ballistae (ancient military engines) to hurl large objects (e.g., grapefruit). Team challenges focused on egg drops and egg throws, building newspaper and balsa wood bridges, the measurement of gravity, and the construction of origami polyhedrons.

Demonstrating a ballista the Team built