CMSE ASTRONOMY WEEK

The vision of the Center for Mathematics and Science Education Astronomy Week is to bring minds-on/hands-on activities and innovative experiences to Mississippi's schools. The curriculum includes four pre-planned lessons, designed to be implemented Monday through Thursday and culminating with an immersive experience in the CMSE's portable Starlab digital planetarium on Friday. These activities and experiences are designed to provide students the opportunity to "try on" the identity of an astronomer. Students will make discoveries similar to those made by famous astronomers of the past, utilize scientific practices, and create viable arguments to support their findings.

Like NASA engineers, students will examine images of planets taken by orbiting space stations, discover how the images are created, build functioning telescopes, and plan a real-world mission to Mars. Like Copernicus and Galileo, students will investigate the phenomenon of retrograde motion, and will explore the vastness of space by building a true-to-scale model of the Solar System. Students will also be introduced to influential scientists like Mae Jemison and José Hernández, through the "Scientist Hall of Fame" daily spotlight. (PowerPoint/PowerPoint Viewer required.)

Lesson 1 – What Can We Learn From Images?

In small groups, students will first examine satellite images of Earth and Mars and record observations. They will then discover how these images are created through an acrylic lens investigation. The kit contains ready-made telescopes that students can work with during class time.

Classroom Requirements/Supplies (not included in kit): *Two sheets of chart paper, markers*

Lesson 2 – Retrograde Motion

Students will study the long-term movement of planets across the night sky using the planetarium simulation program, Stellarium. This free computer software simulates the night sky, and makes it possible for students to observe the movement of Mars against the background of stars over the course of a simulated year. Students will discover the unique phenomenon of retrograde motion. Students will step into the role of Copernicus through making conjectures about their observations; creating a model of the phenomenon like the one first drawn by Copernicus in his book, The Revolution of Heavenly Bodies; and writing a proclamation to the world describing their findings. This lesson is designed to allow students to make the same discovery that Copernicus made and then relay this discovery to the world.

Classroom Requirements: *This lesson requires that software be installed on a classroom computer. This software is free and available at http://stellarium.org/.*

Lesson 3 – The Solar System Walk

Students will use relative sizes and actual distances from the Sun to build a true-to-scale model of our solar system. Using common objects such as a bowling ball, peppercorns, and pins (included in kit) students will pace out the relative distance of each planet from the Sun to make sense of the size of our celestial world and to develop an understanding of the great distances between planets and their relative size to one another.

Classroom Requirements: *This model requires a straight-line path of approximately ½ mile. Students will begin walking at the "Sun" and pace out the planets until they reach Neptune. If this space is not available on campus, alternatively teachers may use an online mapping program to show where parts of the model may be placed beyond school grounds*.

Lesson 4 – Marsbound!

Students will plan a mission to Mars while taking into account the advantages and disadvantages of different capabilities of equipment. Students will use the stand-alone version of the Marsbound! A Mission to the Red Planet lesson developed by the Mars Education Program Jet Propulsion Laboratory at Arizona State University (Watt, 2003). This lesson allows students to set goals for a trip to Mars and use a point system to calculate fuel and resources needed as well as cost. This simulation allows students to experience the real planning process that scientists use when planning a trip to another planet, including random events that help or hinder the expedition. The lesson includes reflection questions that ask students to describe the goals and important points of their mission and to develop an argument to support NASA's space program. This lesson is designed to engage students in active problem solving and to give students the opportunity to experience the role of a scientist in space exploration today.

Classroom Requirements: *None – All materials are included in kit.*

StarLab Portable Planetarium Showing

The final day of the CMSE Astronomy Week will feature a visit from the Digital STARLAB mobile planetarium. Groups of approximately 20-30 students will enter the planetarium and experience an immersive lesson that lasts approximately thirty minutes. While in the planetarium, students will track the position of the sunrise, sunset, and the length of time the Sun is visible during different seasons. The declination of the Sun will also be tracked over the course of a year to form an analemma, and it will be discussed how an analemma can be used to describe the seasons. Students will also view the night sky and look at common constellations and stars. They will learn how to find Polaris and discuss how it is used in navigation. The immersive experience of the planetarium allows students to clearly view celestial events in a controlled and exciting atmosphere. This activity is planned to be the climax of the significant science event of the CMSE Astronomy Week.

Please be sure to read the "CMSE's Astronomy Week Policy & Procedures."

For the best results and everyone's safety, teachers must agree to the policies and procedures, and are encouraged to familiarize themselves with these important facts one week prior and on the morning of the planetarium showing. These important steps will ensure the show is enjoyable for all.