



$$\left| \frac{1}{N} \sum_{n=1}^N \gamma\left(\frac{u}{n}\right) - \frac{1}{2\pi} \int_0^{2\pi} \gamma(t) dt \right| \leq \frac{\epsilon}{3}$$

HOU-España

BIENVENIDO A LA BUSQUEDA DEL CONOCIMIENTO
Welcome to the search of knowledge

THE MATHEMATICS OF THE SOLAR SYSTEM

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THE SOLAR SYSTEM AS A MATH-LAB IS A SET OF e-EXERCISES DEVELOPED BY THE UCM/AEGORA TEAM TO USE SPACE/ASTRONOMY TO MOTIVATE TEENAGERS STUDY AND UNDERSTANDING OF MATHS & PHYSICS

e-TOOL: THE SOLAR SYSTEM AS A MATHLAB (2005)

e-EXERCISES: THE MOON AS A MATHLAB (2008)

e-TOOL: THE STELLAR TRAVELLER (2012)

JAVA BASED FREE-WARE

SOME MAKE USE OF THE EU-HOU E-TOOL FOR IMAGE PROCESSING SALSAJ

SOME MAKE USE OF GEOGEBRA



THE TOOLS CAN BE USED IN MANY DIFFERENT ENVIRONMENTS TO AID THE INTRODUCTION OF INQUIRE BASED SCIENTIFIC EDUCATION

TWO SCENARIO WILL BE DESCRIBED IN THIS SHORT PRESENTATION:

- SPACE TRAVEL TO NEARBY PLANETARY SYSTEMS AND HEURISTICS
- MEASURING THE AGE OF THE MOON AND BASIC STATISTICS

.... GOING ON LINE



Scenario 1: Space travel. Learning about distances and properties of extrasolar planetary systems

This scenario is defined to be used together with the e-tool “The Stellar Traveller” developed by AEGORA/UCM.

Students are taught about the Solar System and the existence of extrasolar planetary systems at School however they are not familiarized with them. Astrography, the location of objects in the Space, is barely introduced. Textbook teaching of the subject is limited and there is an overwhelming media activity that drives to misconceptions in the absence of true scientific knowledge.

This scenario aims to make students learn astrography, the basic reference planes and the location of planets in Space. Also to learn about the properties of the stars illuminating extrasolar planetary systems and the properties of the planets. The scenario makes us of the e-tool “The Solar System as a MathLab” to display the location of the planetary systems in Space, the properties of the stars and to measure the distance to and between planetary systems.

.... **GOING ON LINE**



Scenario 2: Space travel. Learning to guess possibilities in the uncountable

This scenario is defined to be used together with the e-tool "The Stellar Traveller" developed by AEGORA.

Students are taught about statistics, combinatory and probability in the Math courses in High Schools.

This tool aims at introducing them into the concept of NP-hard problems and heuristics through Space travel. Instead of enumerating all possible permutations to find the optimal path to visit up to 10 planets, students are introduced in the world of heuristics aided by the tool The Solar System as a MathLab .

.... GOING ON LINE



Scenario 3: wiki-HOU. Learning the about statistics and the Moon

This scenario is defined to be used together with the e-exercise “Calcular la edad de la superficie lunar” within the wiki-HOU developed by AEGORA/UCM and making also use of imaging processing Software, especially developed for education by the European Union HOU consortium SalsaJ.

Students are taught statistics and learn how to use it in very simple environments where the role of statistics as knowledge generator is not clear. In this scenario students learnt that at early phases in the Solar System history meteors/comets impacts were very frequent to the point that the degree of craterization of a planetary body surface is a measure of its youth. They apply this knowledge to the study of the Age of the Moon surface

.... GOING ON LINE