

PUMAS (Practical Uses of Math And Science)

My apologies for not attending your Seminar in person, and missing the opportunity to participate directly in group. However, I am grateful for Slivia's suggestion that I at least provide some brief notes describing PUMAS (Practical Uses of Math And Science), our on-line journal of examples, written primarily by scientists and other content experts. PUMAS is aimed at providing pre-college teachers with material to enrich their presentation of math and science at all levels from K through 12.

1. To begin, please feel free to browse the PUMAS web site (<http://pumas.jpl.nasa.gov>), to submit examples, and to volunteer for the pool of PUMAS Reviewers. The examples speak for themselves, and nearly all of them are treasures.
2. PUMAS functions as a professional journal. An Example of a "Practical Use of Math And Science" may be an essay, and anecdote, a neat idea, a problem, a demonstration, or an activity. It may be written in any style that serves the material well. All examples are peer-reviewed by at least one scientist having a relevant background, and at least one teacher at an appropriate grade level. Originality, accuracy, clarity, and grade-appropriateness are the key evaluation criteria. Few submissions are rejected (mainly if they are not original or are technically wrong), but many are returned several times for successive revisions, based on reviewers' suggestions. Once accepted, a PUMAS example is a citable reference that may be put on a resume, and must be credited when used by others.
3. Teachers are eager to have the kind of enrichment material only content experts can provide. But many scientists and engineers are not well-informed about the math skills and thinking abilities of typical fourth-graders, nor are many aware of the specific curriculum material teachers are required to cover.

So all PUMAS examples are keyed to the US National Standards and Benchmarks. Asking contributors to select applicable Benchmarks helps them identify the skills and abilities that can be expected in each grade group, as well as the topics actually covered in the classroom. PUMAS offers several easy-to-use resources aimed at giving contributors the tools they need to target their examples appropriately:

- (1) a one-page Table of Math Skills by Grade Group
(http://pumas.jpl.nasa.gov/benchmarks/math_skills.html)
- (2) a one-page Table of Thinking and Learning Characteristics by Grade Group
(http://pumas.jpl.nasa.gov/benchmarks/TL_char.html)
- (3) the Benchmarks and Standards Utility
(http://pumas.jpl.nasa.gov/benchmarks/SC_std_search.asp)

All are also available through links from the PUMAS Contributors' page.

4. Examples are submitted, reviewed, and distributed on-line, which is the only way we can afford to do it, since PUMAS is a volunteer activity for all participants. We have made an effort to streamline the submission and review processes, and are open to further suggestions. Contributors are asked to submit a brief manuscript (examples are about one-to-three pages long) in any of several standard word

processing formats, along with Topic Keywords, Curriculum Benchmark labels, and basic contact information. Reviewers are selected by the Editor from the pool of volunteers, and are first sent a message asking if they are available to review a particular example, by title and author. If they agree, they are given a password to gain access to the example text and the on-line Review form. Brief guidelines and suggestions are given on the PUMAS Contributors' and Reviewers' pages.

5. Users searching for examples can link directly from the PUMAS Home Page to a list of examples by Title, or can go to a search utility that makes it possible to sort examples according to any of the Example Label information (author, title, Topic Keywords, Benchmark Labels, submission date, etc.). Examples are provided in both PDF and MS Word formats. There is also a "Comments" file associated with each example. Users may submit comments, cross-curricular extensions, or suggestions for classroom use, which are reviewed by the PUMAS Editor and made available for subsequent readers. On the Examples Wanted Bulletin Board, participants can post their requests for new examples on particular topics. And there is a Teachers' on-line Assessment form, available from the Examples Search page, so we can receive additional comments and suggestions. We have a linked map of the entire Web Site on the PUMAS Help page. The PUMAS Collection currently holds nearly 50 examples. And the site averages over 2,000 hits per week from teachers all over the world.

6. To answer a few of Silvia's specific questions:

6.1. Authors are recruited by word-of-mouth, through presentations and occasional workshops given by the PUMAS Editor, from endorsements or bulletin announcements by scientific organizations such as NASA and the AGU, and by Web links to the PUMAS site. We are ALWAYS looking for new examples of Practical Uses of Math And Science, at all pre-college grade levels.

Users have heard about PUMAS through awards from the US National Science Teachers Association (NSTA) and the US National Council of Teachers of Mathematics (NCTM), through Web Links to PUMAS, occasional workshops, distribution of PUMAS flyers, and word-of-mouth.

6.2. Feedback from teachers is generally very positive (though most teachers who are not interested probably wouldn't contact us anyway). Actually, a fairly strong and active community of like-minded teachers and scientists has been drawn to PUMAS, and this community has slowly grown for almost five years. A good indication of the level of interest and commitment is the quality of the reviews. It is not unusual for a reviewer to offer a complete re-writing of an example, to help make it accessible to pre-college teachers.

There is of course much more to be said... I'll be happy to discuss all this with you further, either via e-mail, or if the opportunity arises, in person. Please feel free to join us on-line, as a User, a volunteer for the pool of PUMAS Reviewers, a Contributor... it is great fun and very rewarding.

With thanks and best wishes.

Ralph Kahn
PUMAS Editor and Founder