► MATHEMATICS PROJECT CATEGORIES

A. Real World Problem Investigation

Projects entered in this category should involve students in designing, conducting, and reporting on an extended investigation of a problem situation in a genuine real world setting. Appropriate mathematics investigations usually include some or all of the following elements:

- Posing question(s) of interest
- Making and testing predictions, conjectures, estimates
- Making and recording informal observations
- Planning a systematic way to look for answers
- Investigating multiple solution strategies or multiple solutions
- Collecting data systematically
- Organizing and representing data
- Interpreting and drawing conclusions
- Communicating results to others
- Generating new questions for further investigation

Examples of projects that have been completed in past Fairs:

Survey: Create a survey question about something you would like to know about students in your school. Decide on an appropriate sampling strategy. Collect, tally, organize, present, and analyze your data. Make at least two comparisons among subgroups. Explain your methods. Present your conclusions.

Estimate Large Numbers: Choose a forested area in the mountains and find more than one way to estimate the number of trees contained in the area. Explain all your estimation methods, what factors affect the outcome, and the advantages and disadvantages of each method. (This could also be done with estimating population in a given area of students' home villages or cities; or estimating traffic flow at a particular intersection, or estimating the number of manakeesh consumed in a certain village or neighborhood in one day, etc.).

Filling Space: Without actually counting anything, estimate or predict how many oranges (pieces of fruit) it would take to completely fill your classroom. Explain how you determined your estimate. Decide on a method to test the accuracy of your estimate. How would things change if you filled the room with a different object? Why? Explain your methods. Present your conclusions.

Probability Simulation: Choose a real world situation. Design an appropriate simulation model (e.g., winning prizes in cereal boxes, probability of having the same birthday, animal and human habitats, etc.). Carry out your simulation. Explain your methods and why your simulation makes sense. Present your conclusions.

B. Abstract Problem Investigation

Projects entered into this category should involve students in selecting an open-ended, non-routine, abstract mathematical problem that can be solved in more than one way or has multiple solutions, and designing at least one way to solve it. *Typically such problems should go above and beyond what is covered in the normal school curriculum*. Projects that include exploration of multiple solution strategies would be judged more favorably than those that show only one way of solving (when there are more) or only one solution (when there are more). Projects in this category could also involve pattern exploration. An example of a project of this type completed in past fairs is the following geometry investigation: In the given square WXYZ with midpoint M of the line segment WZ, the lines XZ and YM partition the square into four portions marked p, q, r, and s. Express the areas of p, q, r, and s as fractions of the areas of the square. Hence, find ratios of the areas p:q:r:s. Show at least three different ways of solving the problem. Your different solutions should be m

C. Real World Model or Demonstration

Projects entered into this category should explain a specific mathematical concept or process in a new way and show how the chosen concept or process functions in the real world. The model or demonstration must illustrate the meaning of the chosen concept or why a certain process works and what concepts underlay it and why it is significant in one or more real world situation(s). In addition to the presentation of the model or demonstration, projects should include a written rationale for why the model or demonstration is a particularly effective way to explain the chosen concept or process and how it functions in the real world. It would not be appropriate simply to make a three-dimensional model that shows, for example, a geometric theorem or illustration of place-values or geometric shapes, etc.