

# PROJECT MATH MINDS

## ARE YOU UP FOR THE CHALLENGE OF ACTUARIAL WORK?

In its second year, the Project Math Minds scholarship opportunity is again available. The Project highlights the high level math skills used by the actuarial profession. ('Actuaries' are consistently rated as one of the top math based careers in America.)

**Up to three scholarships ranging between \$1,000 and \$5,000 will be awarded!**

## PROJECT DESCRIPTION

You are an actuary working for a consulting company. A small insurance company that is looking to expand into the Workers' Compensation line of insurance has offered to pay you \$50,000 to identify five to eight states where the company could begin offering this line of insurance profitably. Your company executives would like to see an eight percent underwriting profit. You may assume that the company's expense ratio is 30% for this project.

Hint: Loss ratio trends, loss trends vs. premium trends, etc. used for final recommendation would be better than just identifying states with the best loss ratios.

Using your mathematical skills, analyze the available data for profitability and trends to identify the best states in which to be profitable. Use appropriate graphs and reasoning to justify why your selected states are the best option. **But be careful**, you'll also need your outstanding English skills to communicate your results to a group of Actuaries who will read your recommendations!

Actuaries, aka Cranium Coaches, are available to guide you and answer any questions you may have as you develop your project. . Email all questions to [mathminds@actfnd.org](mailto:mathminds@actfnd.org). Allow 1 week to receive a response.

## DO YOUR RESEARCH HERE

(Please remember to be respectful when accessing these Web sites. You should only use the publicly accessible data on these Web sites. You do not need to join or request a member password or ID.)

1. To find out more the actuarial field, visit [www.beanactuary.org](http://www.beanactuary.org)

2. All State Government Web sites have basic information about Workers Compensation. Visit your state's Web site for a definition of Workers Comp and other valuable FAQ's that may help you with this project. **\*Remember, workers comp rules vary by state.**

3. 2007 Policy Year Underwriting Results by State (Note, the link to download the data is an Excel file.):

<https://www.ncci.com/nccimain/IndustryInformation/ActuarialInformation/Pages/PolicyYearResults2007.aspx>

4. 2007 Accident Year Underwriting Results by State (Again, note the link to download the data is an Excel file.) There is also a link to download a pdf with combined ratios by state as well:

<https://www.ncci.com/nccimain/IndustryInformation/ActuarialInformation/Pages/CAYResults2007.aspx>

5. General Overview:

<https://www.ncci.com/nccimain/events/minutespresentationsmaterials/archivedarticles/pages/newsfromannuallissuesymposium2007.aspx>

## PROJECT SCORING GUIDELINES

### I. Creative Ability - 10 points

Does the solution presented satisfy the given problem? Is the solution more than a straight-forward answer to the problem? Does the solution involve some sophistication in its justification?

### II. Use of Mathematics - 15 points

a) Does the project use more than just arithmetic and basic statistics (like mean, median, mode)? Does the student use statistical regression appropriately to analyze trends?

b) Are mathematical conclusions displayed using computer graphics for better visualization?

c) If mathematical proof is involved, are steps clear, concise, and lead directly from prior statements?

d) If simulation or approximation methods are used, are they appropriate to the problem? Is there an analysis of possible errors involved in using these methods?

### III. Actuarial Thought - 30 points

- a) Was there a procedural plan for obtaining a solution? What mathematics was involved in this solution?
- b) Were the variables clearly recognized and defined? Is there evidence that the student understands the variables/terminology being used?
- c) Does the finalist recognize the data's limitations?
- d) Does the finalist understand the project's ties to related research?
- e) Does the finalist have an idea of what further research is needed?
- f) Did the finalist cite scientific literature?

#### **IV. Thoroughness - 15 points**

How completely was the problem covered?

#### **V. Skill - 5 points**

Was the project completed under adult supervision, or did the student work mainly alone?

#### **VI. Clarity - 25 points**

- a) How clearly does the finalist discuss his/her project and explain the purpose, procedure, and conclusions? Is there real understanding of the project?
- b) Does the written material reflect that understanding?
- c) Are important phases of the project presented in an orderly manner?
- d) How clearly is the data presented?
- e) How clearly are the results presented?
- f) How well does the project *display* explain the project?

**DUE DATES**

Your *Project Math Minds* research project need to be postmarked by March 15, 2009. Winners will be announced by April 15, 2009.

## SUBMISSIONS

Your essay should be limited to approximately twenty typed, double-spaced pages (one inch margins). Please number your pages and include your last name and school on each page in the header or footer. Do not fold your submission. There is no limit on the supporting graphics; however, each graphic must be referenced in the essay as to how it supports the recommendation.

Submit your completed projects to:

The Actuarial Foundation

Project Math Minds

475 N. Martingale Rd., Ste. 600

Schaumburg, IL 60173-2226

## ???QUESTIONS???

Actuaries, aka Cranium Coaches, are available to guide you and answer any questions you may have as you develop your project. Email all questions to [mathminds@actfnd.org](mailto:mathminds@actfnd.org). Allow 1 week to receive a response.