

# Judging the Mathematical Contest in Modeling (MCM): Process and Insights

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# Judging the MCM: Process and Insights

## Abstract: Judging the MCM: Process and Insights

The Mathematical Contest in Modeling (MCM), sponsored by COMAP (<http://www.comap.com>), began in February, 1985, with 90 papers; the contest has grown to 10,670+ teams from around the world participating in 2018. Judging this vast collection of papers in 8 weeks is a feat. We will outline the judging process highlighting what judges look for in a student paper to provide insight for student teams and advisors. Our goal is to make it even more difficult for the judges to identify the papers awarded “**Finalist.**”

# MCM Statistics

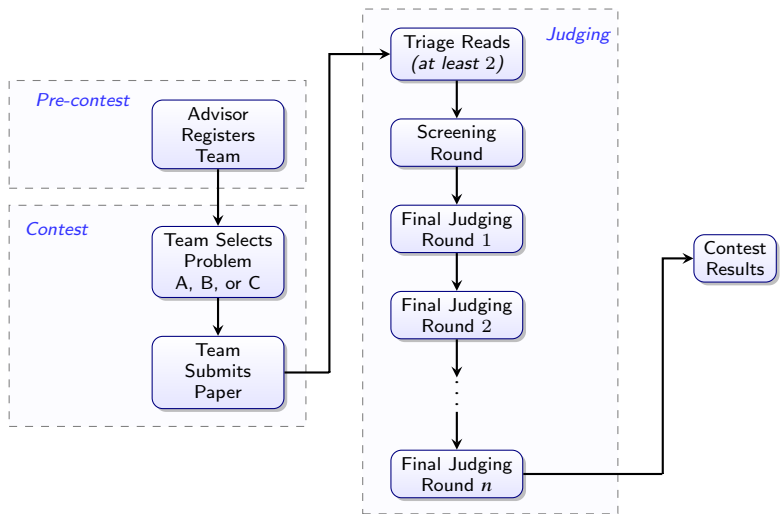
## 2018 MCM

- 10670 teams entered
- 2514 Problem A (24%)
- 3408 Problem B (32%)
- 4748 Problem C (44%)
- 331 US Teams (3%)
- 10339 Foreign Teams (97%)<sup>1</sup>
- 16 Outstanding Winner (0.2%)
- 23 Finalist Winner (0.22%)
- 1074 Meritorious Winner (10%)
- 3574 Honorable Mention (33%)
- 5766 Successful Participant (54%)
- 31 Unsuccessful Participant (0.3%)
- 186 Disqualified (1.75%)

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<sup>1</sup>Australia, Canada, China, Finland, Hong Kong (SAR), India, Indonesia, Ireland, Macau (SAR), Mexico, Scotland, South Africa, South Korea, Spain, United Kingdom and Vietnam

# The Path of a Team's Paper



# Triage Judging

## *From the “2018 MCM Problem A Triage Judging Guidelines”*

“The triage process relies on the professional expertise, experience, and judgment of academic faculty and industry professionals supporting the administration of the MCM/ICM to read and recognize key quality indicators in team papers:

- proper applications of mathematics and science,
- depth of exploration,
- completeness of a recognized modeling process,
- proper reliance upon and documentation of supporting research,
- innovative and insightful modeling approaches, and
- clear and concise exposition,

among others.”

# Triage Judging

## The Triage

- Papers are binned by problem, then go to Problem Triage Teams in the U.S. and China.
- The Contest Director and the respective Head Problem Judge prepare a *Triage Guidance* for each problem.
- Each Triage Team has 20+ faculty/practitioners. The U.S. teams are led by the Head Problem Judges.
- A paper is read by at least 2 judges,<sup>2</sup> and scored — *ranked, not graded* — 0, *Very incomplete or Failed to address the problem*, to 7, *Outstanding*.
- If the judges' normalized scores differ too much, additional judges read the paper.
- Based on experience & the distribution of scores, papers are categorized as
  - Meritorious
  - Honorable Mention
  - Successful Participant
  - Unsuccessful Participant
  - Disqualified

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<sup>2</sup>Triage Judges receive a stipend of \$10 per paper scored.

# Triage Scores

## General Triage Scoring Rubric

Triage Scores	
7	} Possibly Outstanding or Meritorious
6	
5	} Probably Honorable Mention
4	
3	
2	} Successful Participant
1	
0	} Incomplete or Failed to Address the Problem
<i>DQ</i>	} Violated Contest Rules

# Final Judging: The Screening Round

## The Screening Round

- Head Problem Judges select the top papers ( $\sim 5\%$ ) to enter the Screening Round.
- A stratified pack of papers is given to each Final Judge.
- Final Judges score the papers using the Triage 0 to 7 scale.
- Final Judges add a “Round Rank” by rank ordering the papers in the batch they are assigned.
- At the end of Screening Round, each panel of Final Judges develops a 100 point rubric for their problem for the Final Judging Rounds.



# Final Judging: The Final Judging Rubric

## A Sample Final Judging Rubric

Each panel of Final Judges creates a rubric to fit their particular problem adjusting categories and points as needed. A starting rubric appears below.

Document Number:						
Executive Summary	Assumptions & Justification	Model / Value Added	Sensitivity / Stren & Weak	Required Documents	Clarity of Writing	Total
10	15	40	15	10	10	100
Comments/Notes:						

# Final Judging: Final Judging Rounds

## Final Judging Rounds 1 to $n - 1$

- A stratified (by score & rank) set of papers is assigned to each judge.
- Judges give a score 0 to 100 according to the problem rubric the panel developed and a round rank to each paper.
- Head Problem Judges cull approximately 50% after each round.

## The Final Final Round

- The remaining papers (approx. 10 to 15) are designated *Finalist*.
- Each judge reads all the remaining papers.
- The panel deliberates coming to a consensus on which papers are designated *Outstanding* and which are chosen for awards.

# Final Judging: The Awards

## MCM Awards

- Society Awards

AMS, ASA, INFORMS,  
MAA (travel funds for MathFest), SIAM (\$500 per student)

- Special Named Awards



Ben Fusaro Award,



Frank R. Giordano Award

- COMAP and Two Sigma Investment Award

“The [International COMAP Scholarship Award](#) will be awarded to the four(4) top MCM/ICM teams from any of the participating countries; \$9,000 being split among the team members and \$1,000 to the school represented.”

The [UMAP Journal](#) publishes the results & Outstanding student papers.

## How to Become a Judge

*If you are interested in joining the adventure by becoming a Triage Judge, and can commit to scoring papers during a six week period (roughly averaging one hour per day) beginning early February, ...*

*then send an email to either*

Prof. Kelly Black  
A Problem Head Judge  
(*continuous*)  
University of Georgia  
[kjblack@gmail.com](mailto:kjblack@gmail.com)



Assoc. Dean Robert Burks  
B Problem Head Judge  
(*discrete*)  
Naval Postgraduate School  
[reburks@nps.edu](mailto:reburks@nps.edu)



Dean David Olwell  
C Problem Head Judge  
(*data insights*)  
Saint Martin's University  
[dholwell@me.com](mailto:dholwell@me.com)



# Thank You



MCM/ICM Website at [COMAP](https://mcmcontest.com/)  
<https://mcmcontest.com/>

2019 MCM Announcement

— 5:00 pm EST 1/24/19 to 8:00 pm EST 1/28/19

[https://www.comap.com/undergraduate/contests/mcm/flyer/2019\\_MCM-ICM\\_Flyer.pdf](https://www.comap.com/undergraduate/contests/mcm/flyer/2019_MCM-ICM_Flyer.pdf)



Email  
[BauldryWC@appstate.edu](mailto:BauldryWC@appstate.edu)

These Slides

<https://mathsci2.appstate.edu/~wmcB/JMM/2019/>

