



SCORING GUIDELINES

Teams should:

- Use mathematical models **either developed originally or discovered through research**.
- **Demonstrate a depth of understanding** of their solution.
- Provide **additional insight** if their solution is drawn from sources.

For each of questions 1 through 3, teams should **create a mathematical model**, which means:

- Define all variables and parameters (with units).
- Justify assumptions.
- Describe the mathematical approach(es) used in the model.
- Apply to or demonstrate for any situations presented.
- Discuss implications of the result(s).

Guidance on the parts of the problem is below; a [solution paper template](#) can be downloaded for more direction:

Solution Component	Considerations	Value
Executive Summary	<ul style="list-style-type: none"> • Overview of the problem (all three parts). • Brief description of the mathematical approaches that will be used. • Provide and discuss a summary of the results (even if they are incorrect). 	Up to 20%
Question 1	<ul style="list-style-type: none"> • An accessible entry point to a larger problem. • A warm-up—it is anticipated that most teams will develop a solution for this question. 	Up to 20%
Question 2	<ul style="list-style-type: none"> • Investigation of essential issues underlying this real-world problem. • The main event—every team can have some success and many teams will cover it well. 	Up to 25%
Question 3	<ul style="list-style-type: none"> • A challenging aspect; requires broader and/or deeper perspective. • The discriminator—many teams will do something, while only a few will have striking results. 	Up to 15%
Discretionary points	<ul style="list-style-type: none"> • Team examined a wider set of circumstances. • Team used a creative problem solving perspective. • Team made connections between all three parts and the overall driving question. • Paper is exceptionally well written/organized. • Detailed sensitivity analysis is presented. • Model verification is performed. • Strengths and weaknesses are addressed. • Effective and well-motivated use of technical computing. 	Up to 20%

More on reverse

Other considerations

Basic Modeling and Writing Concerns:

- Check that the units are consistent.
- All figures and graphs should have a title, a label, a caption, and the axes should be labelled.
- All tables should have a title, a header, a label, and a caption.
- All variables and parameters should be clearly defined.
- Motivate and fully explain the use of any complicated mathematical expressions.
- When citing outside sources, clearly explain what statistics, models, equations, or insights you took from each source.

Clearly insincere or disrespectful submissions should receive a total score of 0 (zero) and do not receive certificates of participation.

Comments from judges for teams are encouraged and are emailed to teams. Judges may be brief and/or relay questions they had about a team's work.

The Technical Computing Award

If a team chooses to solve one or more parts of the challenge using a programming platform (specifically something other than a spreadsheet), they may be eligible for the Technical Computing Award. Solutions must demonstrate outstanding use of computing which advances the model and/or reveals its implications.

Code must be formatted to make it easy for judges to understand what the program is doing and how the algorithm is executed¹. This means:

- Code must include comments that describe how the code works.
- Variables should have meaningful names.
- Code should use consistent indentation to allow for easy readability.

Teams must also discuss their program **in the paper**:

- Teams must justify the use of technical computing. That is, it must be clear why the team leveraged a computer program instead of just a calculator.
- Teams should include a brief summary of the purpose and key features of their code.
- If a "built-in" function is used:
 - it should be clear that the team knows what the underlying function does and why it was chosen, and
 - the input parameters should be clearly provided and justified.
- Teams must include an explanation or demonstration of how the code was tested for accuracy or correctness.

¹See Appendix B of the handbook [Math Modeling: Computing & Communicating](#) for examples.