### Types of Mathematical Modeling Tasks

<table>
<thead>
<tr>
<th>DESCRIPTIVE MODELING</th>
<th>PREDICTIVE MODELING</th>
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<td>Students are provided with information about a particular scenario, and use math modeling to describe possible outcomes. Possible outcomes depend on assumptions and/or constraints.</td>
<td>Students use math modeling to analyze relationships or trends in a data set (e.g., rates of increase or decrease over time) to predict additional values or outcomes.</td>
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#### Contexts or Questions:
- How many school buses are needed?
- How long can this snack last?
- How much can we earn by selling ___?
- How much water can we save?
- How many ___ do we need for ____?

#### Descriptive Modeling with CLAIM probe:
Students are provided with a claim about expected outcomes and asked to evaluate whether and under what conditions the claim could be true.

#### Predictive Modeling with CLAIM probe:
Students are provided with a claim about trends, patterns, or future values, and asked to evaluate whether and under what conditions the claim could be true.

### OPTIMIZING MODELING

Students use math modeling to find the “best” option or plan to achieve a given goal. What is “best” depends on the goal (e.g., shortest, fastest, cheapest, fairest, longest, smallest).

#### Contexts or Questions:
- The “best” route through a theme park
- The “best” arrangement for a garden
- The “best” way to share costs
- The “best” price for a menu item
- The “best” way to package an item

#### Optimizing Model with CLAIM probe:
Students are presented with a claim about the “best” option, and asked to evaluate whether the proposed option is the “best” given the goal.

### RATING & RANKING MODELING

Students use math modeling to rate and rank different options based on criteria and data. Students decide how to weight criteria and use their ranking to make a decision or selection.

#### Contexts or Questions:
- Select players for a team
- Select a field trip or vacation spot
- Select a fundraising option
- Select a carnival game
- Select a phone or internet plan

#### Rating & Ranking Model with CLAIM probe:
Students are presented with a claim about the top ranked option, and asked to evaluate whether the ranking criteria are reasonable.

### IN ALL MATH MODELING TASKS

Students generate a plan/conclusion/recommendation, and justify it using math. All plans should:

- Show how the plan/recommendation works in the specific scenario.
- Describe assumptions, and how those assumptions impact plan or conclusion.
- Use numbers, words, equations and/or diagrams to explain and justify conclusion.
- Describe how one could use the plan in other similar situations.

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1 Found at Mathematical Modeling with Cultural and Community Contexts M2C3 project site: [https://sites.google.com/qc.cuny.edu/m2c3/home](https://sites.google.com/qc.cuny.edu/m2c3/home).

Adapted from IMMERSION project [http://nsfimmersion.onmason.com/](http://nsfimmersion.onmason.com/).