**Types of Mathematical Modeling Tasks**

|  |  |
| --- | --- |
| **DESCRIPTIVE MODELING** | **PREDICTIVE MODELING** |
| 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. | 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. |
| **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 \_\_\_\_? | **Contexts or Questions:**   * Predict future number of attendees * Predict future prices or sales * Predictfutureweather * Predict future success of athletes * Predict future yield (crops, garden) |
| ***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** | **RATING & RANKING 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). | 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:   * 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 | 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 |
| ***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 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. | |

NOTE: Adapted from Immersion (<http://immersion.mspnet.org>; <http://nsfimmersion.onmason.com>