

## 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 <u>data set</u> (e.g., rates of increase or decrease over time) to predict additional values or outcomes.
<b>Contexts or Questions:</b> <ul style="list-style-type: none"> <li>• How many school buses are needed?</li> <li>• How long can this snack last?</li> <li>• How much can we earn by selling ___?</li> <li>• How much water can we save?</li> <li>• How many ___ do we need for ___?</li> </ul>	<b>Contexts or Questions:</b> <ul style="list-style-type: none"> <li>• Predict future number of attendees</li> <li>• Predict future prices or sales</li> <li>• Predict future weather</li> <li>• Predict future success of athletes</li> <li>• Predict future yield (crops, garden)</li> </ul>
<b><i>Descriptive Modeling with CLAIM probe:</i></b> Students are provided with a claim about expected outcomes and asked to evaluate whether and under what conditions the claim could be true.	<b><i>Predictive Modeling with CLAIM probe:</i></b> 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 “ <u>best</u> ” option or plan to achieve a <u>given goal</u> . 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 <u>criteria</u> and <u>data</u> . Students decide how to weight criteria and use their ranking to make a decision or selection.
<b>Contexts or Questions:</b> <ul style="list-style-type: none"> <li>• The “best” route through a theme park</li> <li>• The “best” arrangement for a garden</li> <li>• The “best” way to share costs</li> <li>• The “best” price for a menu item</li> <li>• The “best” way to package an item</li> </ul>	<b>Contexts or Questions:</b> <ul style="list-style-type: none"> <li>• Select players for a team</li> <li>• Select a field trip or vacation spot</li> <li>• Select a fundraising option</li> <li>• Select a carnival game</li> <li>• Select a phone or internet plan</li> </ul>
<b><i>Optimizing Model with CLAIM probe:</i></b> Students are presented with a claim about the “best” option, and asked to evaluate whether the proposed option is the “best” given the goal.	<b><i>Rating &amp; Ranking Model with CLAIM probe:</i></b> 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: <ul style="list-style-type: none"> <li>• Show how the plan/recommendation works in the specific scenario.</li> <li>• Describe assumptions, and how those assumptions impact plan or conclusion.</li> <li>• Use numbers, words, equations and/or diagrams to explain and justify conclusion.</li> <li>• Describe how one could use the plan in other similar situations.</li> </ul>	