

## Reasoning Rubric

PATTERN RECOGNITION			
4	3	2	1
Quantitative description of pattern; Can make accurate predictions based on empirical pattern	Description of regular qualitative pattern with multiple components	Notice variation. Description of general pattern with limited components	No pattern or variation noted
DESIGN EXPERIMENTS			
4	3	2	1
Purposeful planned experiments; systematic testing of model components (variables); prediction or outcomes	Manipulate one or more variables relative to a model; make predictions	Thinking about a single variable in terms of empirical generalizations—conducting experiments to verify or elaborate empirical patterns without a causal model	No purposeful experimentation
JUDGE MODELS			
4	3	2	1
Ask whether a model can explain all the data available (and recognize where it falls short); assess a model's ability to be used to make correct predictions; judges models based upon whether or not they are consistent with what they have experienced or believe about the world (prior knowledge)	Ask whether a model can explain all the data available (and recognize where it falls short); regularly assess a model's ability to be used to make correct predictions	Offer/demand data to support individual claims; sometimes assess a model's ability to be used to make correct predictions	Judge models based upon aesthetic criteria or group dynamics only

## ASK QUESTIONS

4	3	2	1
<p>Regularly ask a combination of the following types of questions:</p> <ol style="list-style-type: none"> <li>1. Clarification of ideas</li> <li>2. What if?</li> <li>3. Why?</li> <li>4. How?</li> </ol>	<p>Ask more than one type of question:</p> <ol style="list-style-type: none"> <li>1. Clarification of ideas</li> <li>2. What if?</li> <li>3. Why?</li> <li>4. How?</li> </ol> <p>A <i>What if?</i> Question makes a prediction and hypothetically explores problem space</p> <p>A <i>Why?</i> Question demands justification for an action or idea</p> <p>A <i>How?</i> Question demands a causal explanation for a phenomenon</p>	<p>Mainly ask one type of question:</p> <ol style="list-style-type: none"> <li>1. Clarification of ideas</li> </ol> <p>A <i>clarification</i> question demands additional explanation of <i>ideas</i> (is distinct from questions such as “what is that number you wrote there?”)</p>	<p>Seldom or never asks questions</p>